GENERAL CATALOG

MIKI PULLEY

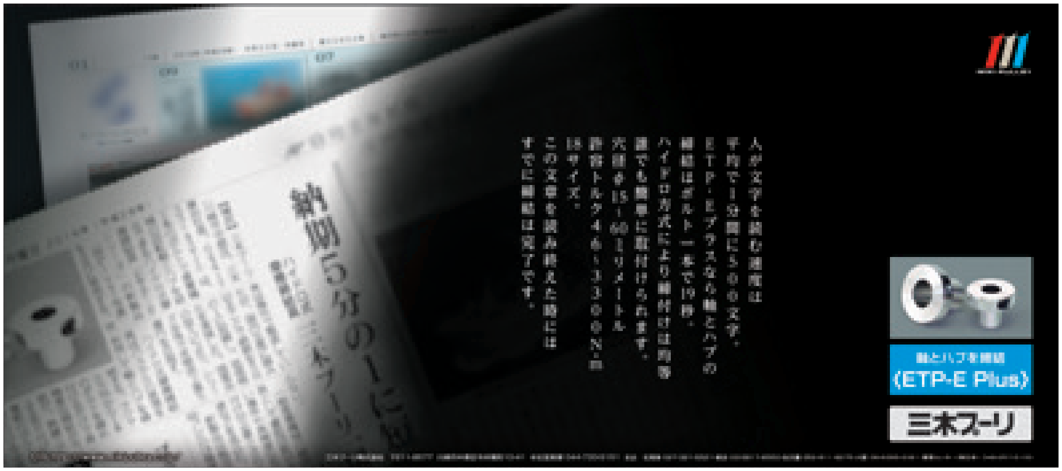
MIKI PULLEY

MIKI PULLEY GENERAL CATALOG

PRODUCTS AND SERVICES
THAT MIKI PULLEY IS PROUD

We took the first place in the Newspaper Category 3 of the 51st Japan Industrial Advertisement Awards.

For details, see P.344 >>>



We took the third place in the Newspaper Category 4 of the 51st Japan Industrial Advertisement Awards.

For details, see P.200　>>>

We took the first place in the Magazine Category of the 51st Japan Industrial Advertisement Awards.

For details, see P.36　>>>

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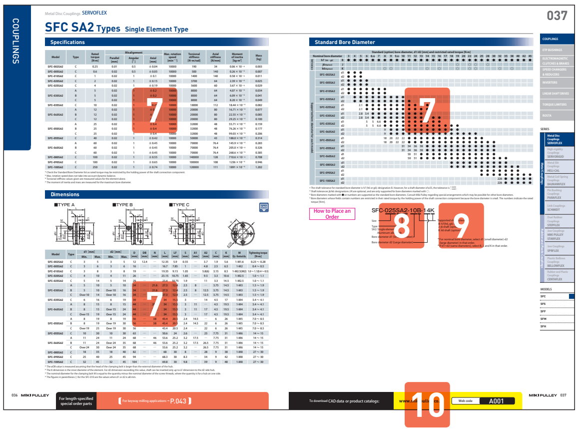

1 Series name
2 Series features
3 Model lineup
4 Model selection by comparing the characteristics
5 Classification within the series

6 Icons indicating the features
7 Detailed model specifications
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9 Options
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Usage Notes

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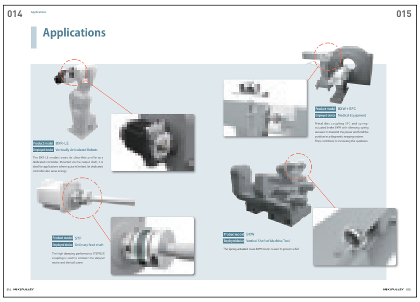
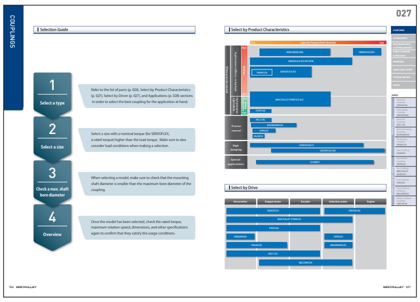


Product use cases by machine and equipment are presented at the beginning of the catalog. You can search for your desired product by the machine and equipment you use.

Product Selection by Characteristic and Drive



Products are presented by series. Select your desired model from the table on the characteristics and drives.

If you know the product that you want to buy, it is convenient to search for it by model.

Search by Model ≫ P.654-

Icons

Each product on the product pages is provided with an icon. It is intended to help you to select your product.

CAD

Indicates that CAD data is available for the product.
The data can be downloaded from the website.

RoHS

Indicates that the product complies with RoHS directives.

Feature Icons

High torsional stiffness

Absorption of vibrations and impacts

Wide range of variations

No backlash

Low inertia

High output response

High torque

Easy to remove

Spline

These icons indicate the features of the products.

Please use our website.

www.mikipulley.co.jp

Information on the website, such as various inquiries, company profile of Miki Pulley, and exhibitions in which we participate will be updated as needed. Please use our website.

Direct Search by Web Code

All products in the catalog are provided with a 4-digit Web code.
You can enter a Web code on the website and then download the 2D/3D CAD data for the product and detailed catalog information.

Quick Search

Easily refine your search to find your desired coupling by simply specifying conditions such as specifications and size.

As The Best Partner for Our Customers

We aspire to improve our services in order to continue to be the best partner for our customers.

1 Continuous Quality Improvement

Since its foundation in 1939, Miki Pulley has been leading the field of power transmission and control equipment as the pioneer of the field. We believe that we were able to be at the forefront for a long time because we have continued to challenge new things such as advanced technologies that are ahead of the times and reforming of production.
And maintaining high quality is one reason we have gained the complete trust of customers.
One of our goals is to become a company that places high value on the quality of all things, including the quality of products, the quality of operations, the quality of employees, and the quality of the workplace environment.
We have proactively carried out various quality improvement activities.

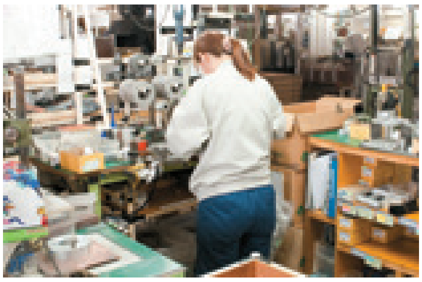
Quality Improvement 1 Understanding Customers

There is one thing that we always keep in mind when we make products. That is, each of the workers understands the products of our customers. Before making products, we learn which part of the product of the customer is to be produced, where the product is used, and how it contributes to society. When you know the customer, you will have a stronger sense of responsibility, and when you have a stronger sense of responsibility, the quality will rise. Such a virtuous cycle is created. To improve quality, the attitude of workers must first be changed. We believe that this is very important.

We put pictures of the products of our customers on the wall of the workplace to deepen understanding of the products.

Quality Improvement 2 Stall Production System Allows One Worker to Do Everything Alone

We employ a stall production system to make products. The production line of each product is like a stall with an owner (worker). A large advantage of the stall production system is that it changes the attitude of the worker. The division of labor system assigns each of the workers a special assignment such as scheduling, preparation of parts, assembly, and packing. The stall production system, on the other hand, allows one worker to do everything from parts management through to delivery date management, so he or she has a stronger sense of responsibility. Furthermore, workers are able to get to know their customers clearly so their attitude to the work will change from passive to active and the motivation will increase. Several years have passed since we changed the division of labor system to the stall production system, and defects have decreased dramatically and quality has improved.



One worker who does everything from assembly and inspection through to inventory management.

Quality Improvement 3 In-house Development of Equipment to Ensure Decrease in Mistakes

We developed a jig that can easily turn over heavy parts.

We make assembly machines and inspection equipment in-house so more than a half of all the machinery and equipment were made in-house. We identify workplaces where mistakes such as confusion regarding the number of screws and mounting in the reverse direction are likely to take place or actually took place, or where the work load on workers can be reduced, and make and use special jigs in such workplaces to prevent defects. Furthermore, we make inspection equipment to suit each product in-house to ensure that products are made without any mistakes.

Quality Improvement 4 Six Qualification System Required to Actually Start Operating

The skills of workers must be developed to improve quality. We encourage workers to take national proficiency tests and have our own qualification system called Six Qualification System. This is a requirement for workers to work on production lines and workers are not allowed to get involved in making products unless they have passed the tests. Workers must take the tests once every year. Workers who have passed the tests are not allowed to continue working permanently but must take the tests every year to develop and maintain their skills.

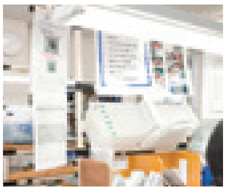
We have six qualification tests for screw tightening, winding, soldering, spot welding, riveting, and bonding.

Small Efforts

We continue to devise little ways of preventing defects. Some of them are described below.

Production of one piece on a production line at a time

It is our principle that only one piece is made on a production line at a time. Only one piece is inspected, assembled, and checked on a production line at a time to make it easy to find mistakes and make quality more stable.



Failure sheet

If a failure occurs, a sheet describing the cause for the failure is put on the wall of the workplace to attract attention to the failure to prevent it from occurring again.

Reduction of the length of movement lines

We attempt to reduce the length of movement lines by, for example, reducing three workbenches to one. We eliminate unnecessary operations to reduce the burden on workers and increase the precision of work.

Ensuring the 5S practices are maintained

We ensure that the 5S activities are carried out; for example, all workers clean their workplaces together at a prescribed time every day. Which makes it possible to detect all abnormalities early, resulting in stable quality.

Paint markers

We use paint markers to check tightening errors with a torque wrench. Products are not allowed to be delivered if they do not have the three marks of green, white, and yellow on them.

2 We Support Customization Flexibly

We are able to customize most of our products and make products to order.
We have a flexible system to be able to carefully meet the needs of individual customers.

Customization Cases

Coupling

- Use of a long spacer
- Electroless nickel plating
- Without alumite
- Short hub type, etc.

ETP bushing (shaft connecting element)

- Large bore diameter
- With an integrated gear
- Short sleeve type
- Connection of only inner/outer diameters, etc.

Spring-actuated brake

- With increased torque
- Large size
- Ultra-small
- Quietness (special plate and one-sided braking), etc.

These are just a few examples. We will meet your special customization requirements that are not in the catalog.

Web code (inquiry) **Z0001**

Comments from Our Customers

We used to source the couplings connecting the engine and the hydraulic pump from an overseas supplier but it was difficult to obtain detailed dimension data. We thus changed to Miki Pulley products that are simple in structure and easy to understand. And we have continued to use Miki Pulley products for the 30 years since then.

Construction machine manufacturer

Company A

A brake motor driving the blade in bookbinding machines must stop reliably for safety, have power, and be compact. It was Miki Pulley's product that met all the requirements.

Bookbinding machine manufacturer

Company B

We have been sourcing brakes for gondolas for a long time from Miki Pulley and there has never been a problem. Miki Pulley has met our demanding requirements and is highly valued by our customers at home and abroad.

Building cleaning gondola manufacturer

Company C

Miki Pulley has made a light well-balanced aluminum custom coupling for us that meets our requirements. We highly appreciate that they delivered it in a short lead time.

Small-sized machine tool manufacturer

Company D

We use Miki Pulley's reliable ROSTA rubber springs in the moving parts of our game machines. The structure is simple so we were able to reduce the number of parts and simplify the assembly and design.

Amusement machine manufacturer

Company E

We appreciate that Miki Pulley makes various proposals that are in our interest in contrast to suppliers who require us to make machines according to their parts.

Semiconductor equipment manufacturer

Company F

3 We Provide Solutions for All Power Transmission and Control Problems.

We have a sales system in which a sales person and an engineer make up a team to provide services to customers quickly and precisely.

Under the motto of friendliness and attentiveness from the day of foundation, we provide solutions for hardware and software problems and provide various services, including product consultation and after-sales services, with expertise and attentiveness.

4 Worldwide Network

We have developed a worldwide network in order to introduce excellent products from countries around the world and contribute to the world by providing our knowledge.

We have a nationwide network of 10 branches and sales offices with the Technical Center at its center.

We supply necessary products to customers quickly and precisely.

Is This Really a Sintered Part!?

Providing large-sized sintered parts in small lots and at low cost.

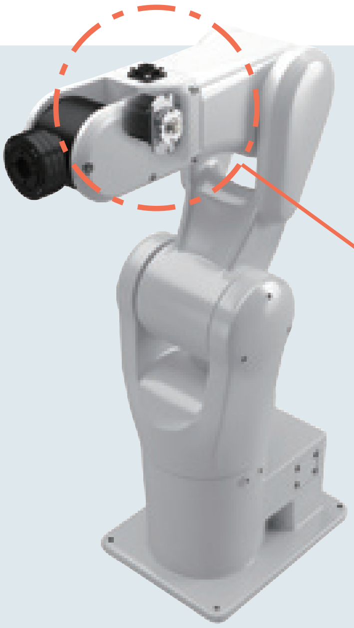
MST
PRODUCTS

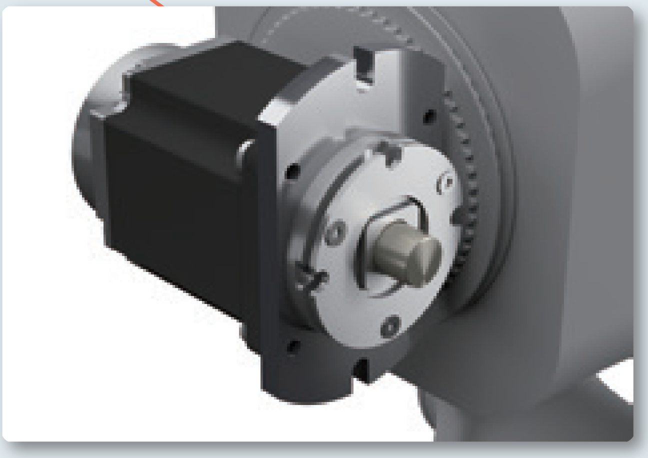
High Density Parts Boasting Strength Close to That of Ingot Materials.
Completely Changes the General View of Sintering.

MST products refer to high-density sintered parts made by the Miki Pulley Fine Metal Forming technique.
These products are produced using a unique large multi-stage CNC forming press system (available in 500-ton and 1000-ton models) that encompasses all steps of the manufacturing process from filling and molding through to sintering.
The service we offer includes features such as ingot-like high levels of density and machine strength together with a degree of precision not possible with conventional mechanical forming presses.
We provide high-quality sintered parts that completely revolutionize the general view toward sintering in small lots and at low cost.

For details, see P604 »

Applications

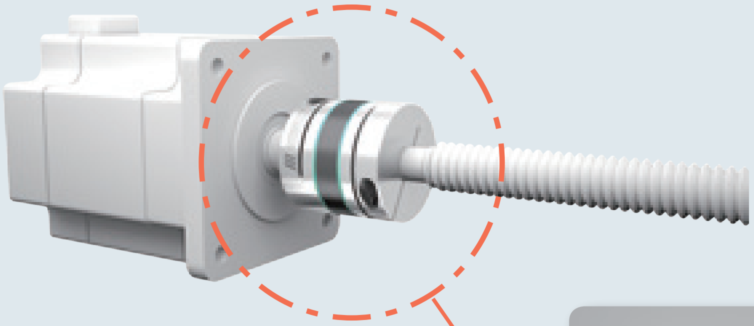


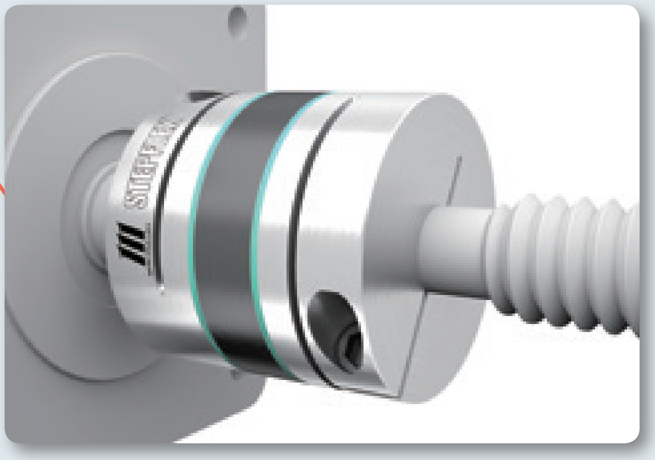


Product model BXR-LE

Employed device Vertically Articulated Robots

The BXR-LE models owes its ultra-thin profile to a dedicated controller. Mounted on the output shaft, it is ideal for applications where space is limited. Its dedicated controller also saves energy.

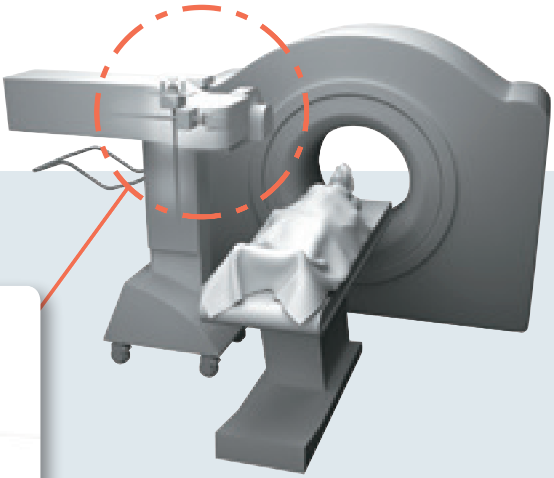


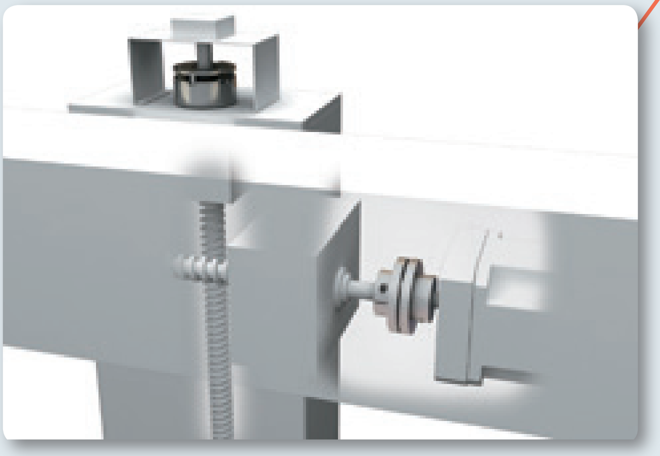


Product model STF

Employed device Ordinary feed shaft

The high damping performance STEPFLEX coupling is used to connect the stepper motor and the ball screw.

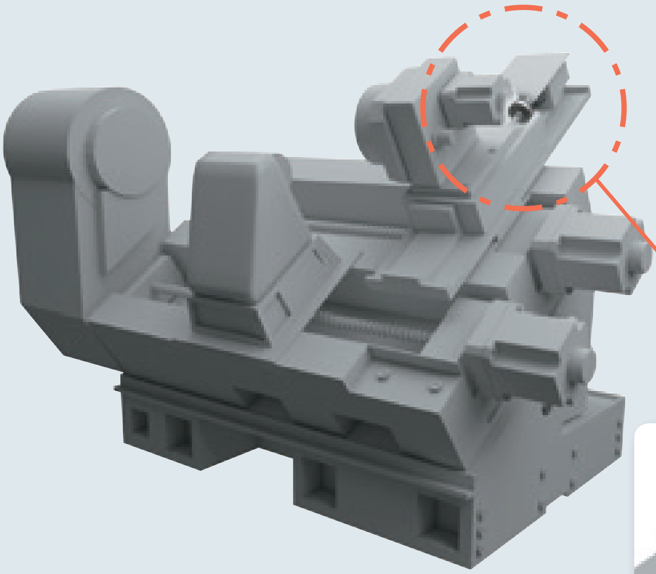




Product model BXW＋SFC

Employed device Medical Equipment

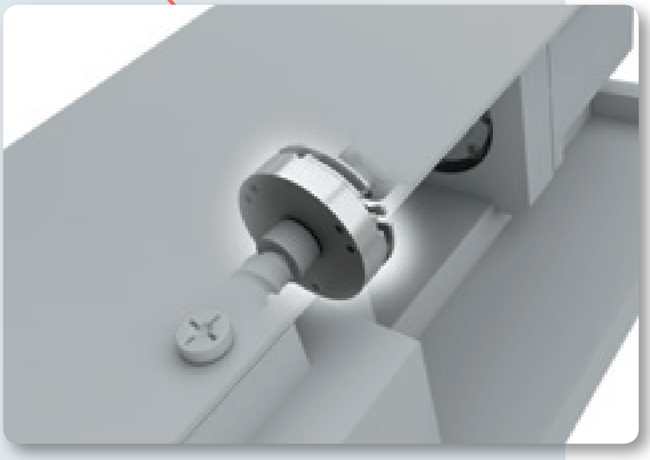
Metal disc coupling SFC and spring-actuated brake BXW with silencing spring are used to transmit the power and hold the position in a diagnostic imaging system. They contribute to increasing the quietness.



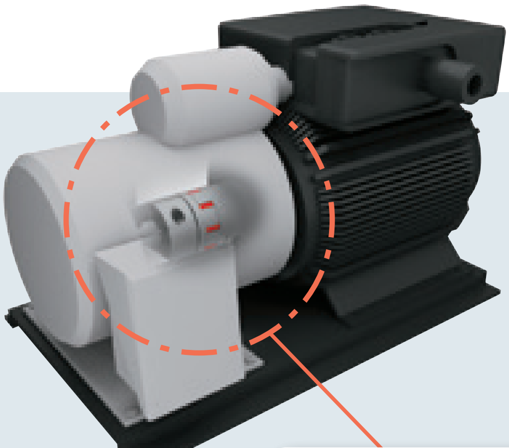
Product model BXW

Employed device Vertical Shaft of Machine Tool

The Spring-actuated brake BXW model is used to prevent a fall.



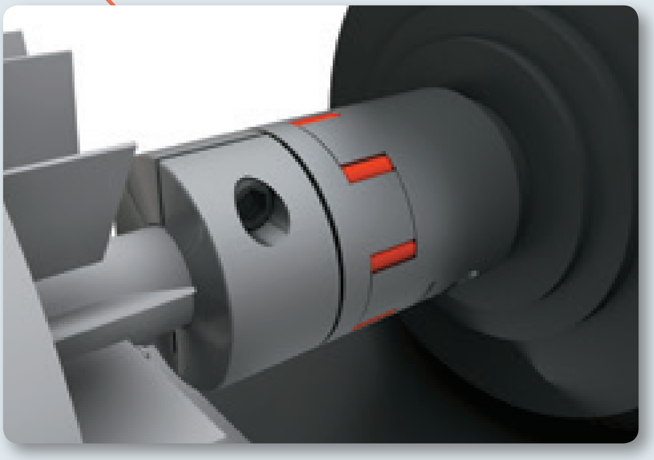
Applications

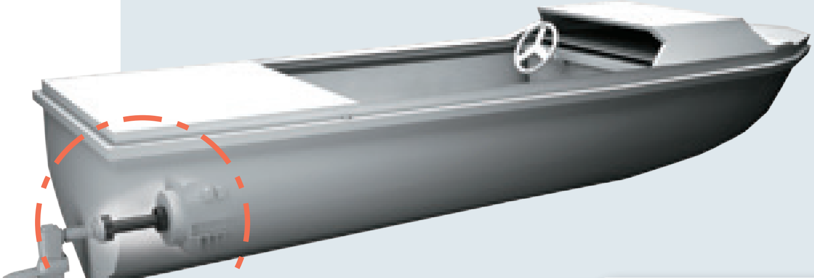


Product model ALS R

Employed device Vacuum Pump

MIKI PULLEY STARFLEX coupling is used to connect the drive unit.
The structure is simple and maintenance is easy.

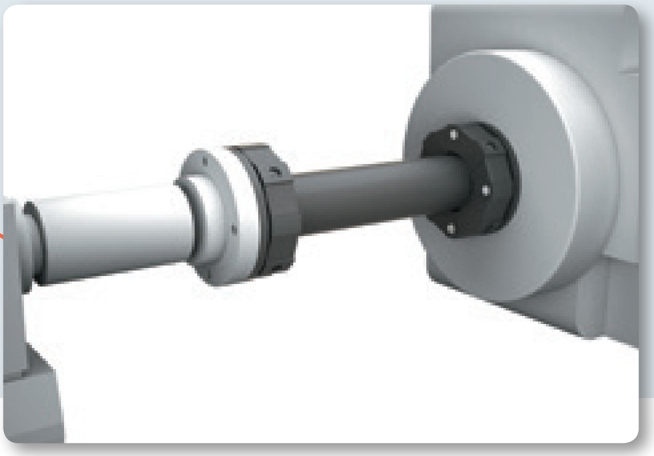


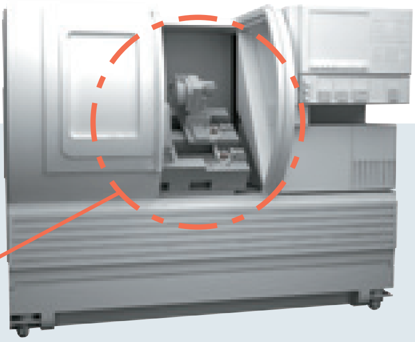


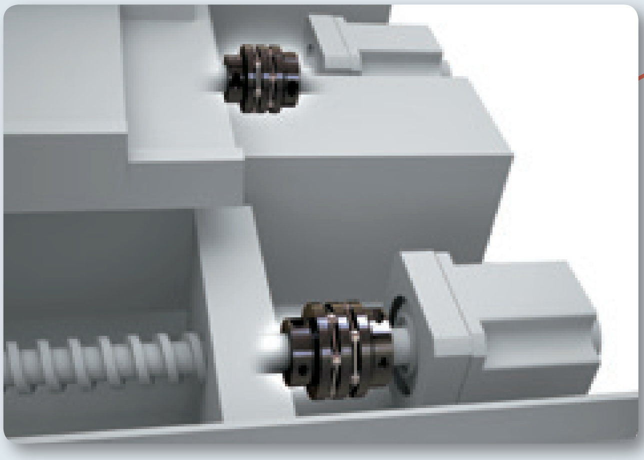
Product model CF-A 0Z

Employed device Pleasure Boat

CENTAFLEX coupling and floating shaft (high-speed rotation) are used to connect the engine and the propeller.



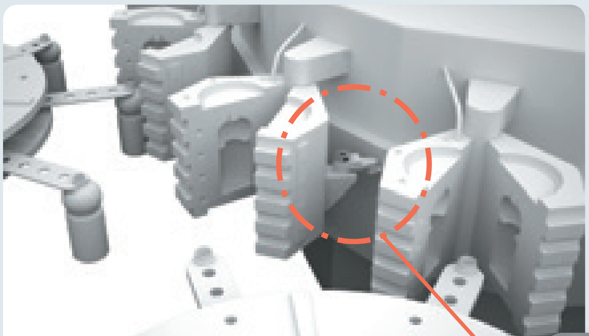


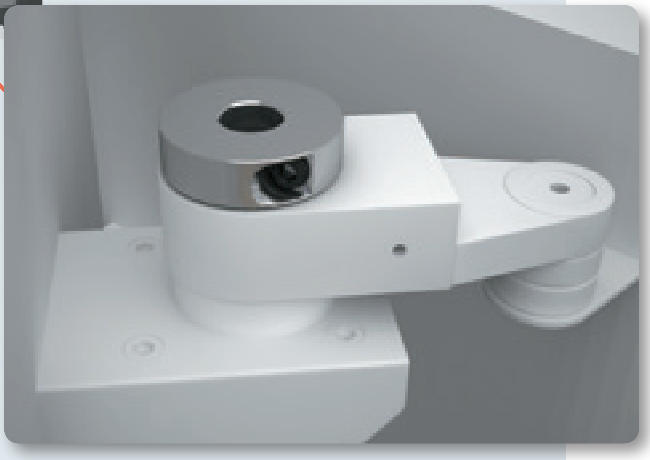


Product model SFF

Employed device CNC Lathe

The Ultra-high stiffness coupling SFF model is used to connect the servo motor and the feed shaft. The rated torque is higher than the conventional models, and the coupling size and the moment of inertia can be reduced.



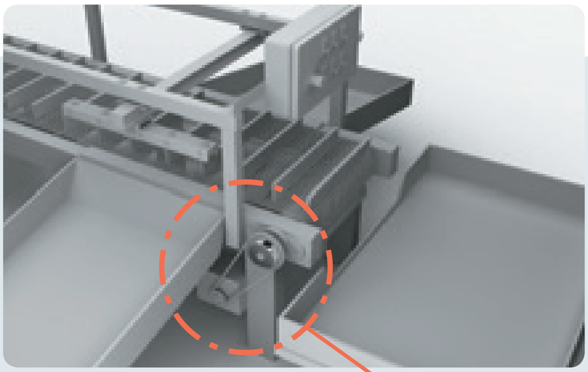


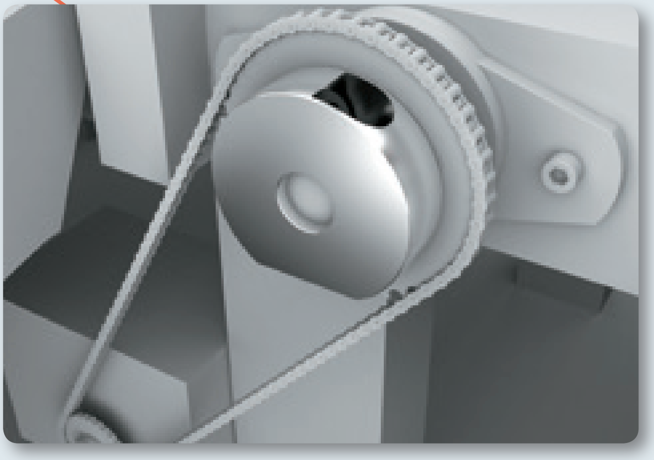
Product model ETP-T

Employed device Plastic Bottle Molding Machine

ETP bushing is used to connect the mold fixing shaft and the shaft of the index feeding unit.
Connection with one bolt substantially reduces the adjustment time.

Applications





Product model ETP BUSHINGS

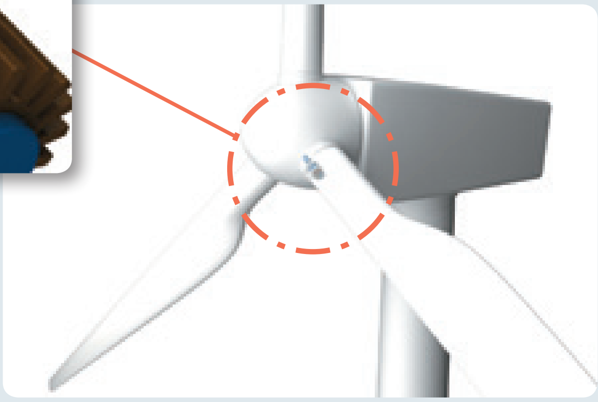
Employed device Food Processing Machine

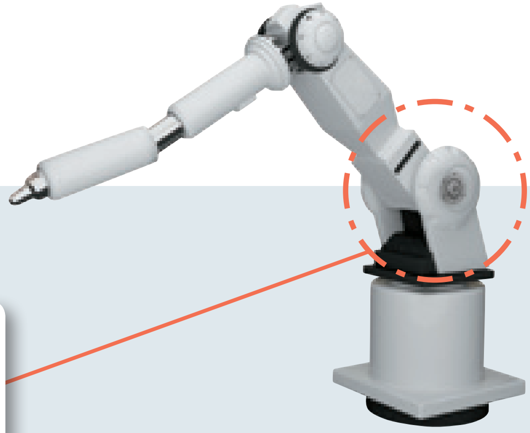
Stainless ETP bushing is used in a food processing machine.
It can be used in sections that need to be washed or are exposed to water.

Product model BXW Large Size (Custom Product)

Employed device Wind Turbine Generator

A large BXW is used in a pitch drive device of a wind turbine generator.

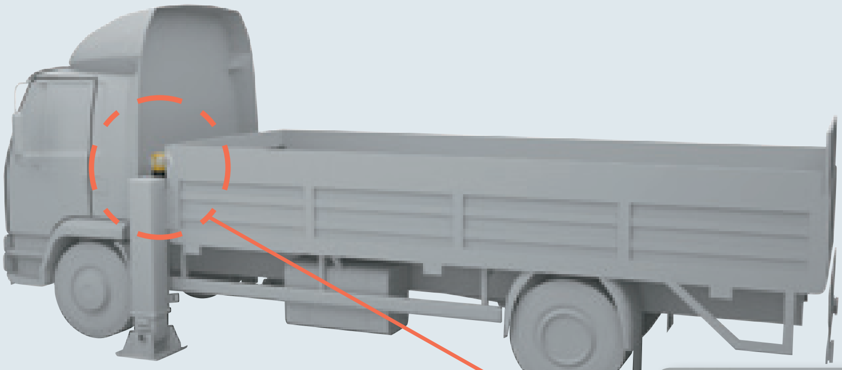


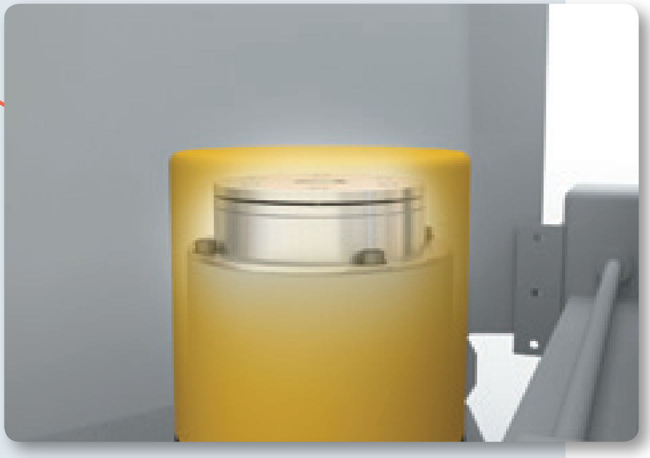


Product model BXR

Employed device Articulated Robot

Spline type BXR is used to hold the arm.
A slim design saves space and a light rotor substantially reduces wear from idling.



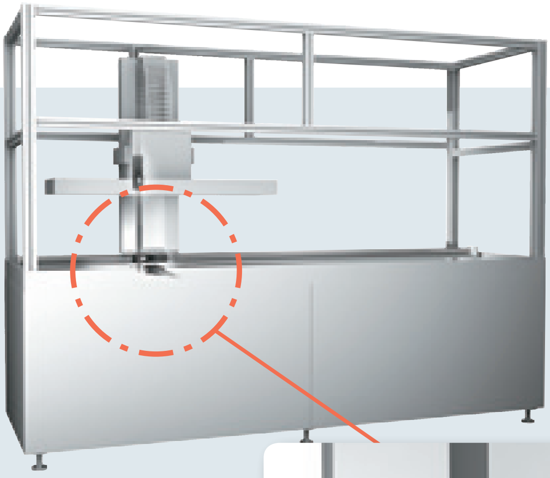


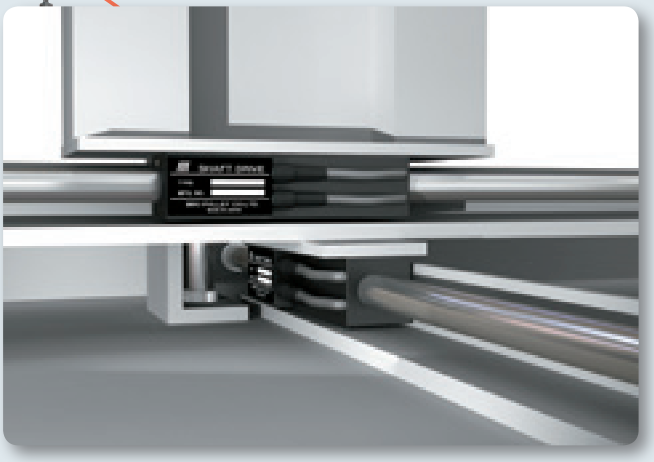
Product model 111

Employed device Special-purpose Vehicles

The Electromagnetic-actuated brake 111 model is used in the elevating device for the auxiliary leg.

Applications

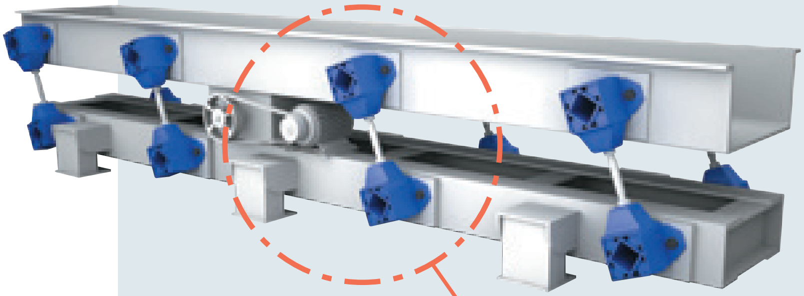




Product model Linear Shaft Drive

Employed device Food Container Inspection Equipment

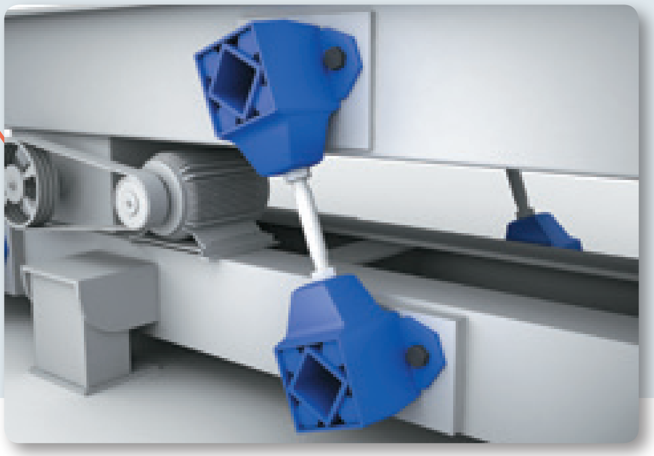
A cylindrical linear motor system is used in the conveyor drive unit.
The JIS protection class is IP65.

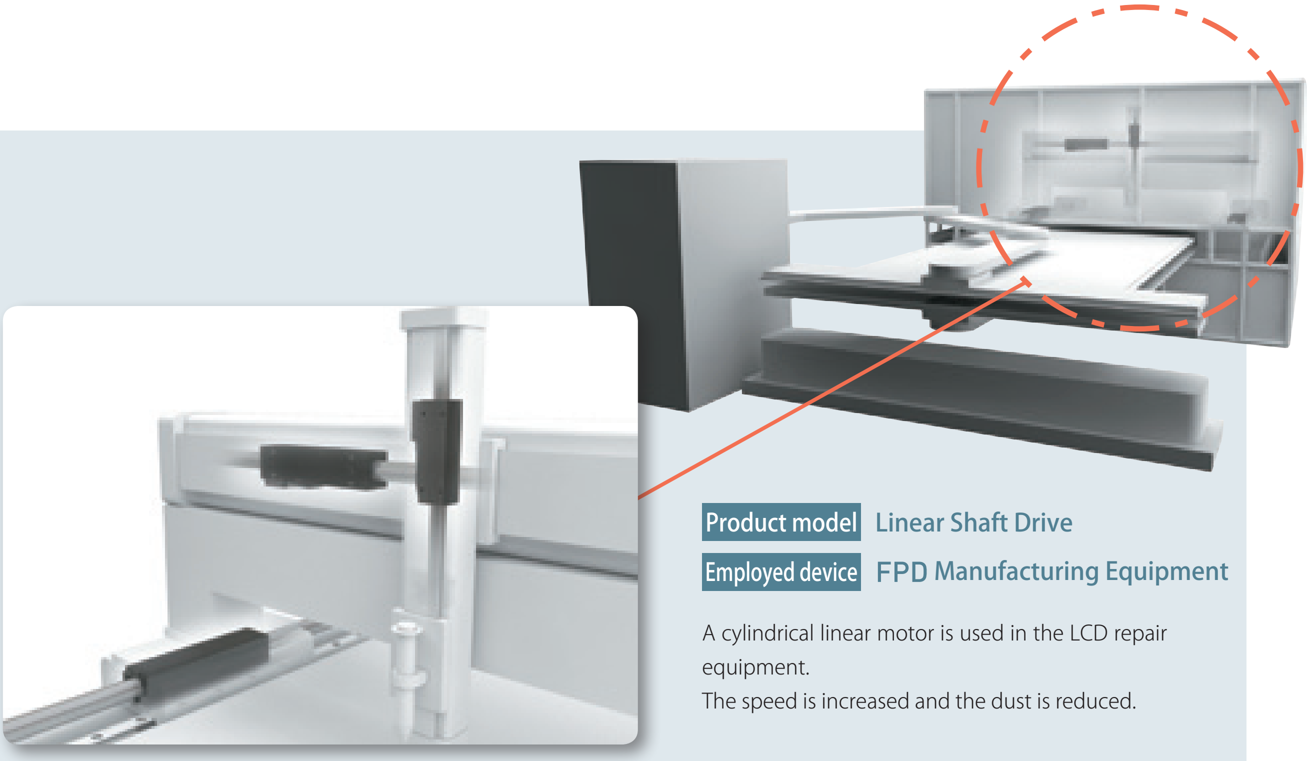


Product model AU

Employed device Vibration Conveyor

The ROSTA oscillating mounting AU model is used in the vibration conveyor.
The service life is longer than that of a metal disc and coil spring.

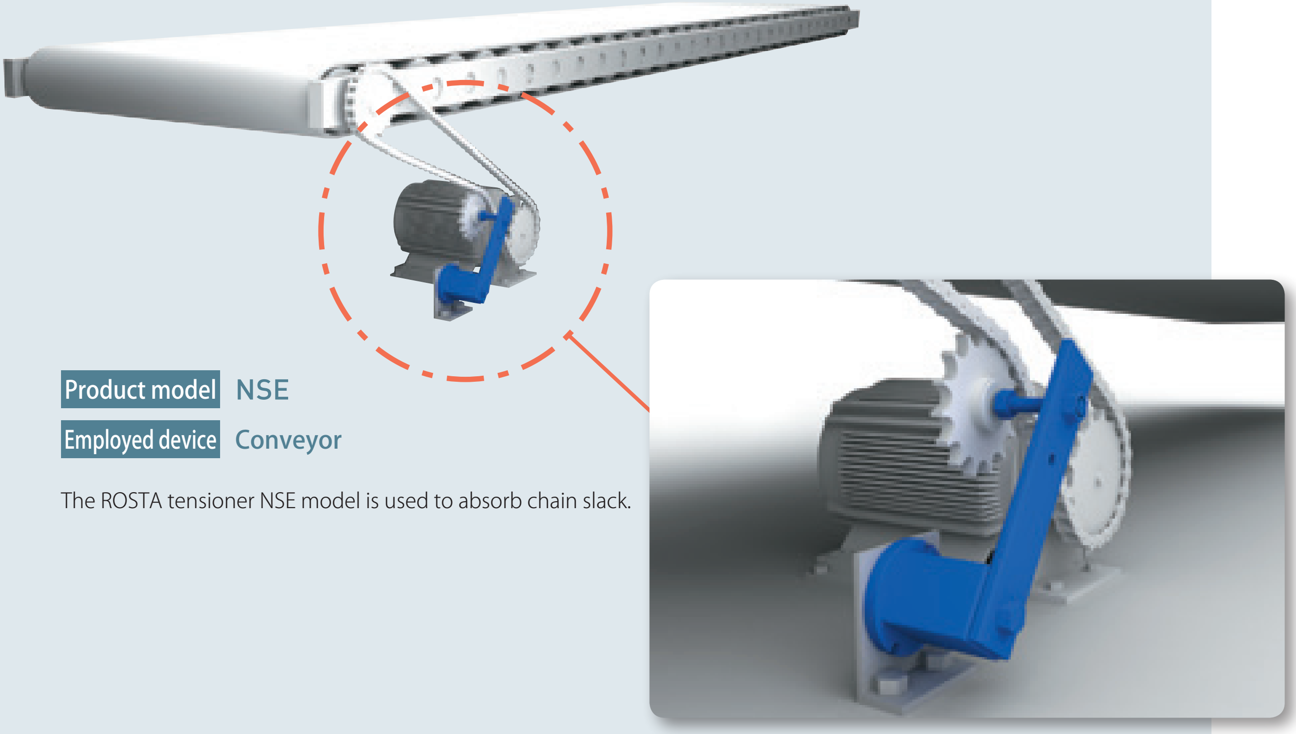




Product model Linear Shaft Drive

Employed device FPD Manufacturing Equipment

A cylindrical linear motor is used in the LCD repair equipment.
The speed is increased and the dust is reduced.



Product model NSE

Employed device Conveyor

The ROSTA tensioner NSE model is used to absorb chain slack.

COUPLINGS

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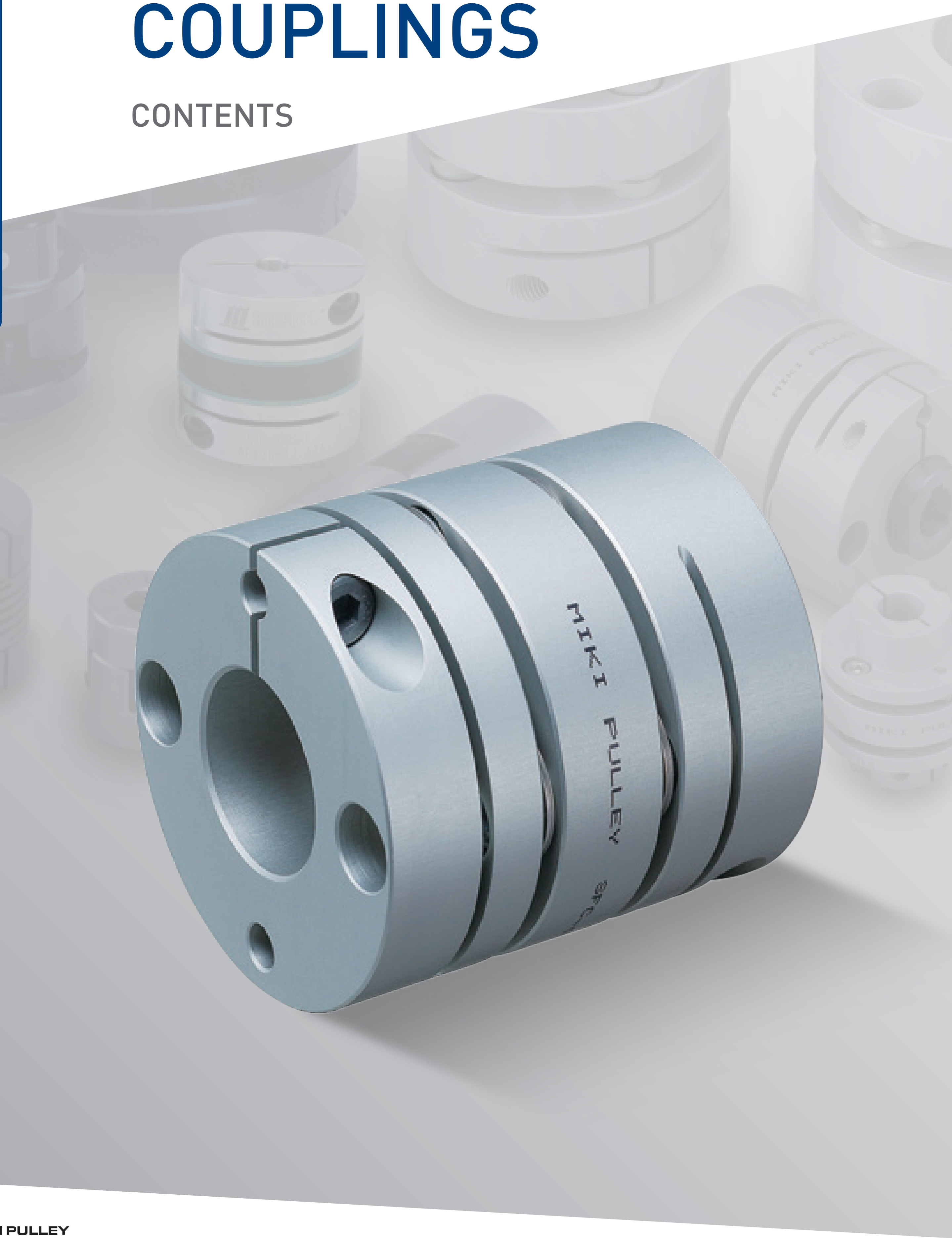

Coupling Models

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SERVOFLEX

MODELS

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SFC DA2

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SFS S

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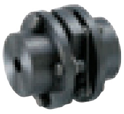
SFS W



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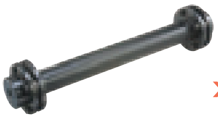
SFS G



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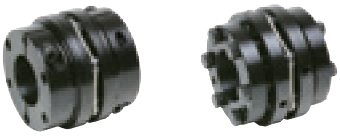
SFF SS



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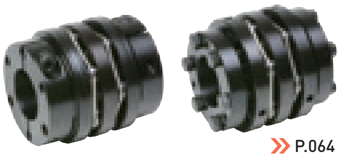
SFF DS



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SERIES

HELI-CAL

MODELS

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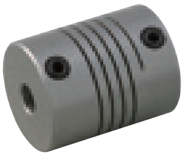

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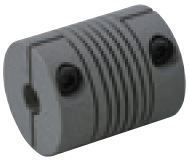

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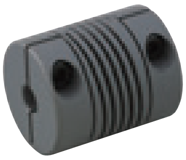
DSCR



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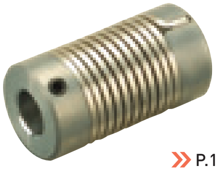
SFH G

P.082

BAUMANNFLEX

ZG



P.104

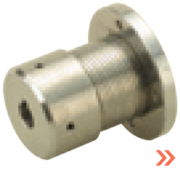
MM

P.106

LM

P.105

MF



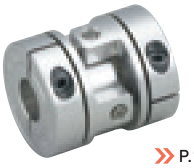
P.107

PARAFLEX

CPE

P.111

CPU



P.112

SCHMIDT

NSS

P.115

DL

P.120

BELLOWFLEX

CHP

P.149

CENTAFLEX

CF-A

P.158

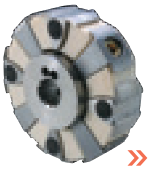
CF-X

P.174

CM

P.184

CF-H



P.170

CF-B

P.180

Selection Guide

1

Select a type

Refer to the list of parts (p. 024), Select by Product Characteristics (p. 027), Select by Driver (p. 027), and Applications (p. 028) sections in order to select the best coupling for the application at hand.

2

Select a size

Select a size with a nominal torque (for SERVOFLEX, a rated torque) higher than the load torque. Make sure to also consider load conditions when making a selection.

3

Check a max. shaft bore diameter

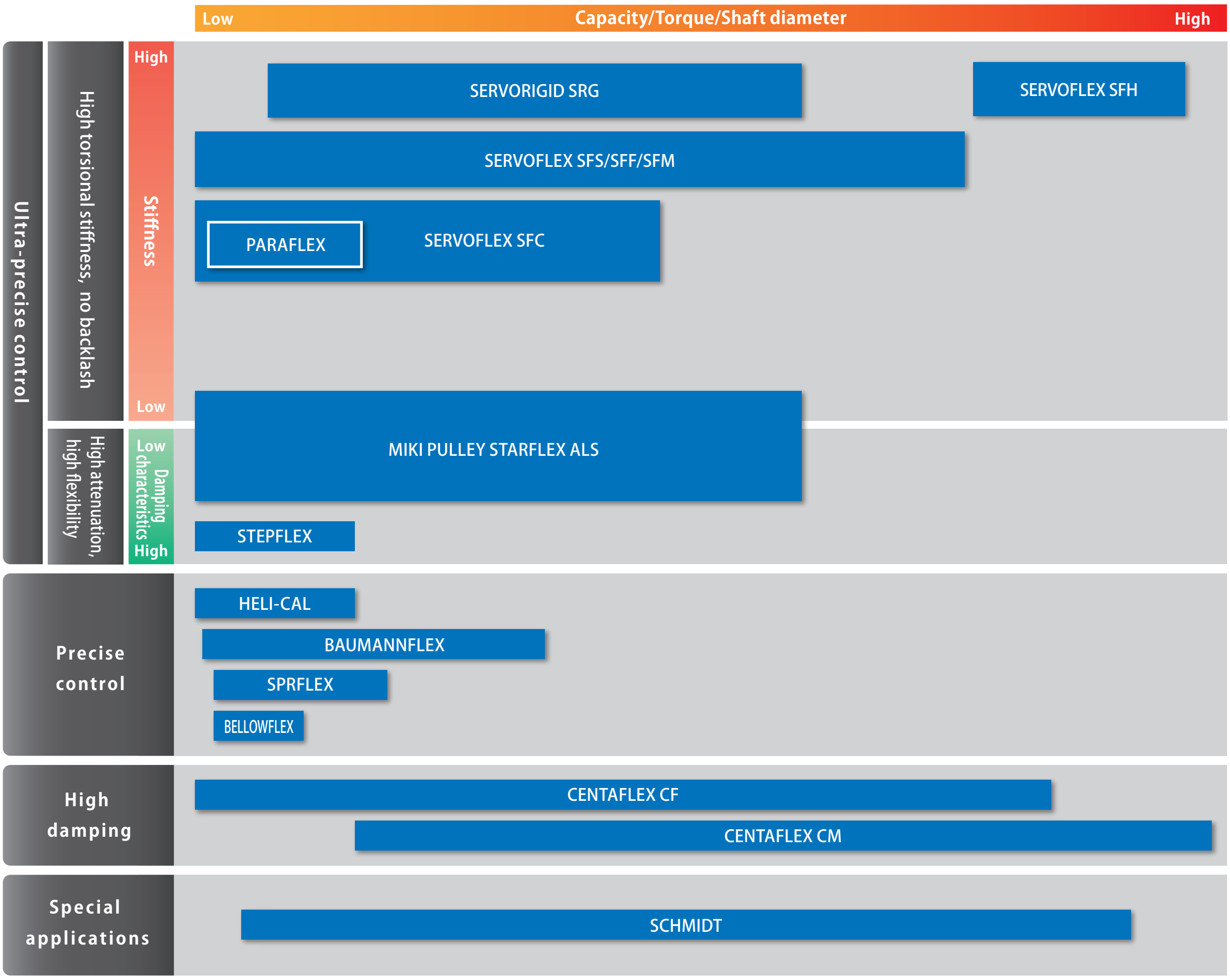
When selecting a model, make sure to check that the mounting shaft diameter is smaller than the maximum bore diameter of the coupling.

4

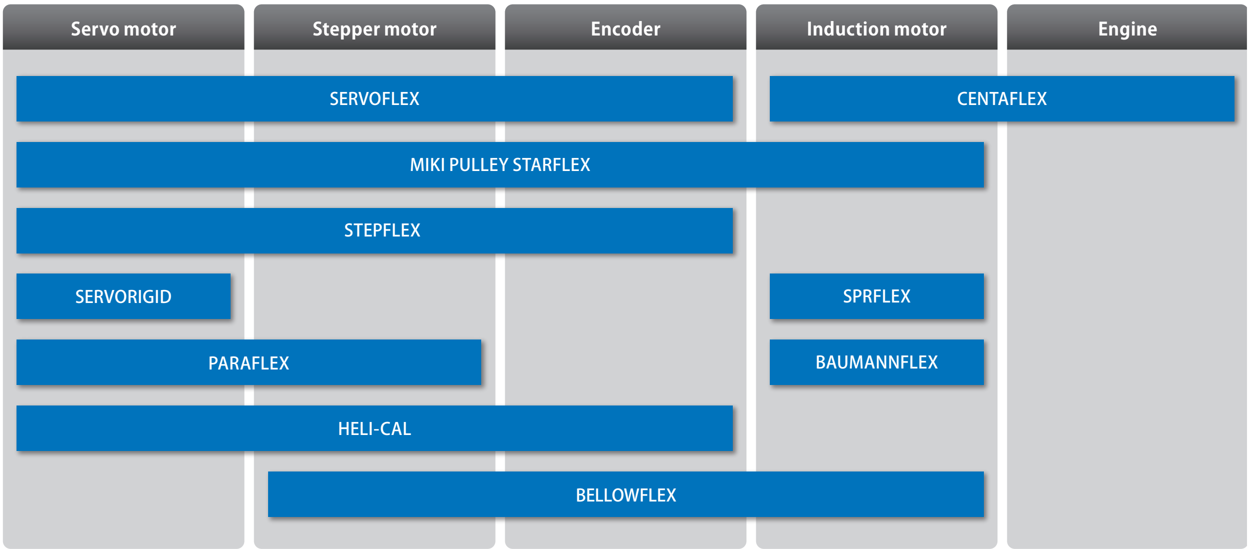
Overview

Once the model has been selected, check the rated torque, maximum rotation speed, dimensions, and other specifications again to confirm that they satisfy the usage conditions.

Select by Product Characteristics



Select by Drive

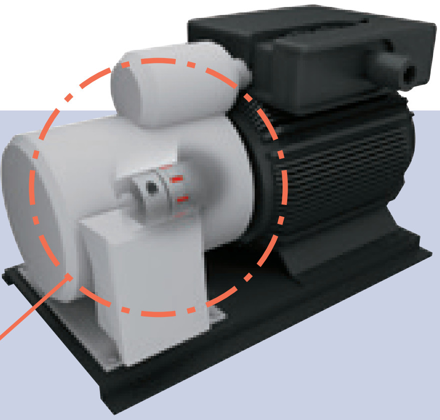


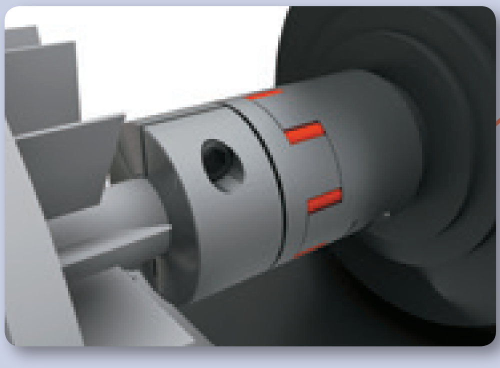
	Servo motor	Stepper motor	Encoder	Induction motor	Engine
SERVOFLEX	●	●	●		
CENTAFLEX				●	●
MIKI PULLEY STARFLEX	●	●	●	●	
STEPFLEX	●	●	●		
SERVORIGID	●				
SPRFLEX				●	
PARAFLEX	●	●			
BAUMANNFLEX				●	
HELI-CAL	●	●	●		
BELLOWFLEX		●	●	●	

Applications

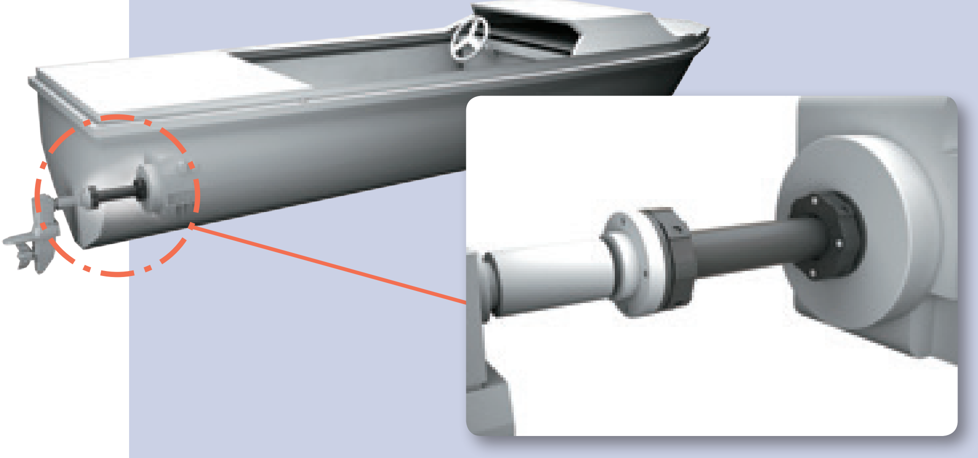
Product model ALS R

Employed device Vacuum Pump





MIKI PULLEY STARFLEX coupling for connecting the drive unit.
Simple structure and easy maintenance.



Product model CF-A 0Z

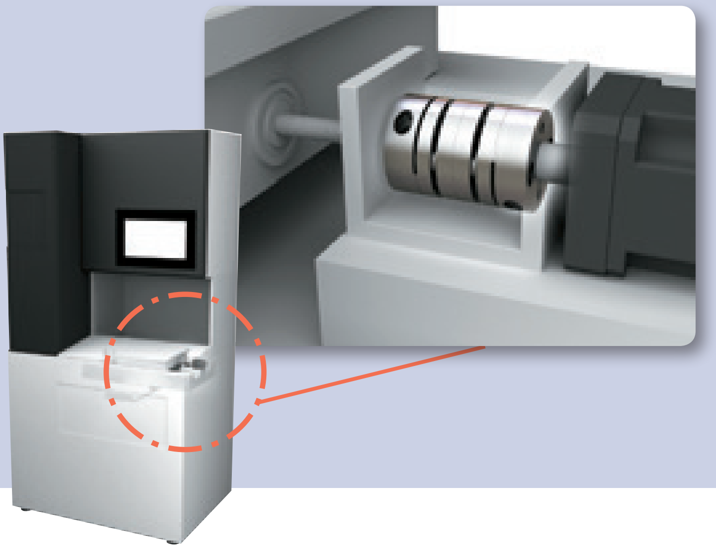
Employed device Pleasure Boat

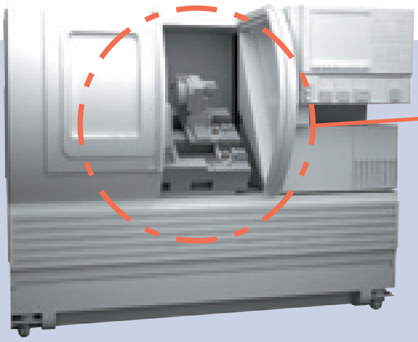
CENTAFLEX coupling and floating shaft (for high-speed rotation) are used to connect the engine and the propeller.

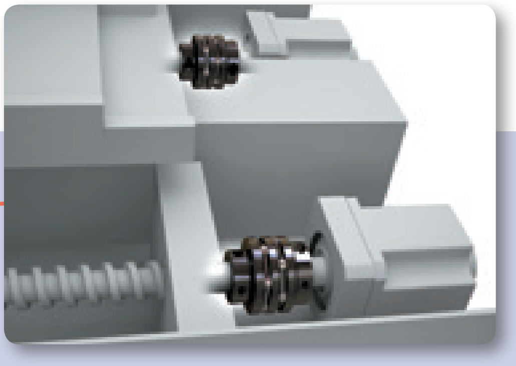
Product model SFC

Employed device Dicing Saw

SERVOFLEX for connecting the servo motor and ball screw. It is used for ultra-precision machining of semiconductor wafers.





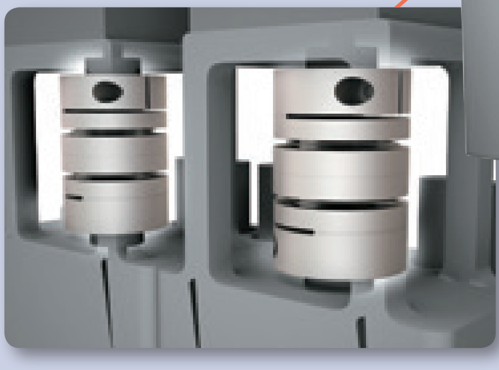


Ultra-high stiffness coupling SFF model for connecting the servo motor and feed shaft. The rated torque is higher than the conventional models, and the coupling size and the moment of inertia can be reduced.

Product model SFF

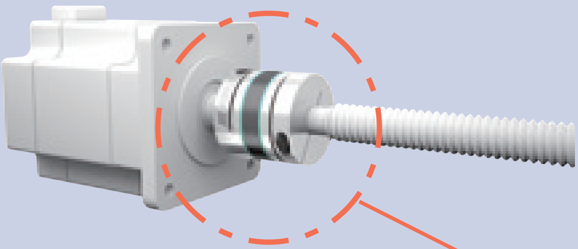
Employed device CNC Lathe

SERVOFLEX coupling for the head of a chip mounter.



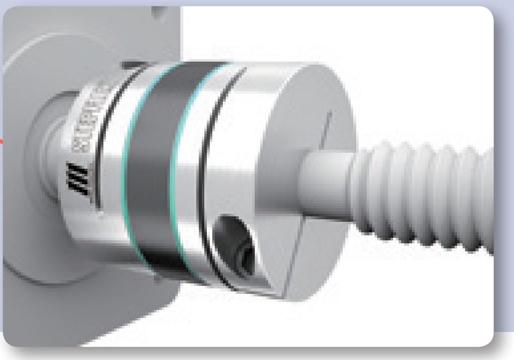
Product model SFC

Employed device Chip Mounter



Product model STF

Employed device General-purpose Feed Shaft



The high damping performance STEPFLEX coupling is used to connect the stepper motor and the ball screw.

Metal Disc Couplings

SERVOFLEX

Ultra-high stiffness

Low inertia

High response

No backlash

Max. rated torque [N·m]	8000
Bore ranges [mm]	φ3～115
Operating temperature range[°C]	−30～120(100)
Drive	Servomotor/stepper motor
Applications	Machine tool / semiconductor manufacturing equipment / printing press / packing machine

High-stiffness and Low-inertia Servomotor Couplings

Metal disc couplings developed for high-speed and high-precision positioning and ultra-precise control of servomotors, etc. While achieving high stiffness, high torque, low inertia, and high response speed, these couplings are also flexible in the torsional direction, in the uneven directions, and in the shaft direction, and are totally free from backlash. Models with various characteristics are available, and each model has a single element type that emphasizes stiffness and a double element type that emphasizes flexibility.

RoHS

Available Models

Series	Applications	Lineup
SERVOFLEX	Compact (medium and small capacity)	SFC
	Standard	SFS
	Feed shaft	SFF
	Main shaft	SFM
	High torque	SFH

Model Selection

Model type	Rated torque [N・m]	High stiffness	Low inertia	Mountability	Mounting accuracy	High-speed rotation	Material	Operating temperature [°C]
SFC	0.25 ～ 250	◎	●	●	◎	◎	Aluminum alloy	-30 ～ 100
SFS	20 ～ 800	◎	◎	△	○	○	Steel	-30 ～ 120
SFF	8 ～ 1000	●	●	◎	●	●	Steel	-30 ～ 120
SFM	60 ～ 1000	●	◎	○	●	●	Steel	-30 ～ 120
SFH	1000 ～ 8000	●	◎	△	○	○	Steel	-30 ～ 120

* Symbols in the table indicate four levels of adaptability in order of ●◎○△ with ● showing the highest level of adaptability and △ showing the lowest level. (Adaptability high ←●◎○△→ low)

Product Lineup

SFC

High stiffness · Ultra-low inertia · High response · Easy to remove · Wide range of options · No backlash

RoHS

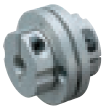
Applications: NC lathe, machining center, chip mounter, actuator, SCARA robot, semiconductor manufacturing equipment

Max. rated torque	[N·m]	250
Bore ranges	[mm]	ϕ 3 ～ 45

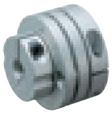
High Stiffness and Ultra-low Inertia

Small- and medium-capacity model, which is made of a high-strength aluminum alloy and whose outer hub diameter is linked to the shaft diameter to achieve a ultra-low inertia ideal for high-speed rotation. Three different shapes are available depending on the combination of bore diameters you use.

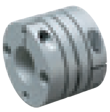
TYPE A



TYPE B



TYPE C



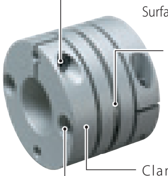
Simple and Reliable Connection

A single clamping method is used for connection to the shaft. The clamping hub is shock and vibration proof, enabling reliable connection and helping to substantially reduce mounting time. A special jig is used for centering to achieve an extremely high concentricity.

Wide Variety of Options

A wide variety of options such as a tapered shaft, length-specified special order, and keyway milling application are available. You can combine options to meet your desired specifications.

SFC SA2



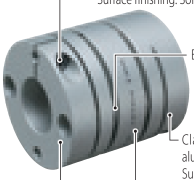
Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Solid lubricant coating[*1]

Element material: SUS304 metal disc
SUS304 collar[*2]

Clamping hub material: High-strength aluminum alloy
Surface finishing: Alumite treatment

Bolt material: Alloy steel for machine structural use
Surface finishing: Trivalent chromate treatment[*3]

SFC DA2



Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Solid lubricant coating[*1]

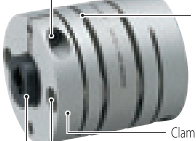
Element material: SUS304 metal disc
SUS304 collar[*2]

Clamping hub material: High-strength aluminum alloy
Surface finishing: Alumite treatment

Spacer material: High-strength aluminum alloy
Surface finishing: Alumite treatment

Bolt material: Alloy steel for machine structural use
Surface finishing: Trivalent chromate treatment[*3]

SFC SA2/DA2 BC



Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Solid lubricant coating

Element material: SUS304 metal disc
SUS304 collar

Clamping hub material: High-strength aluminum alloy
Surface finishing: Alumite treatment

Bolt material: Alloy steel for machine structural use
Surface finishing: Trivalent chromate treatment

Taper adapter material: S45C or an equivalent
Surface finishing: Black coating applied

[*1] For surface processing of the clamping bolts , black coating is applied only for #002.
[*2] The collar material in the marked area is S45C in sizes #080 to #100, and the surface finishing is trivalent chrome treatment.
[*3] The bolt surface finishing in the marked area is anti-rust coating in sizes #080 to #100.

SFS

High stiffness · Low inertia · Wide range of variations · Length-specified · Metal-plateable · No backlash

RoHS

Applications: Machine tool, printing press, packing machine, coater/ coating machine

Max. rated torque	[N·m]	800
Bore ranges	[mm]	ϕ 8 ～ 60

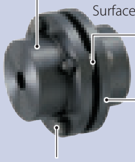
Wide Variations

SERVOFLEX standard model. 18 types with different numbers of elements, distances between shafts, shaft connection methods, etc. are available. You can select the electroless nickel plating for the pilot bore and key/set screw.

Parts Delivery

You can order the parts of the coupling to be delivered instead of an assembled coupling, so you can use this coupling in a design in which the assembled coupling could not be mounted. You can also order an assembled coupling to be delivered or combine different types of hubs.

SFS S



Set screw with hexagonal hole material: Alloy steel for machine structural use
Surface finishing: Black coating applied

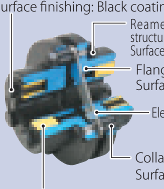
Element material: SUS304 metal disc
Collar: S45C or an equivalent

Flange material: S45C or an equivalent
Surface finishing: Black coating applied

Reamer bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

SFS S-□M-□M

Pressure bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied



Reamer bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Flange material: S45C or an equivalent
Surface finishing: Black coating applied

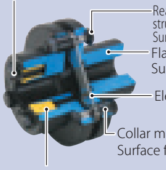
Element material: SUS304 metal disc
Collar: S45C or an equivalent

Collar material: S45C or an equivalent
Surface finishing: Black coating applied

Sleeve material: S45C or an equivalent
Surface finishing: Black coating applied

SFS S-□M-□C

Pressure bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied



Reamer bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

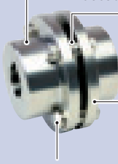
Flange material: S45C or an equivalent
Surface finishing: Black coating applied

Element material: SUS304 metal disc
Collar: S45C or an equivalent

Collar material: S45C or an equivalent
Surface finishing: Black coating applied

Sleeve material: S45C or an equivalent
Surface finishing: Black coating applied

SFS S-C



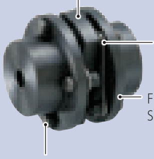
Set screw with hexagonal hole material: SUS304 or an equivalent

Element material: SUS304 metal disc
Collar: S45C or an equivalent
Surface finishing: Electroless nickel plating treatment

Flange material: S45C or an equivalent
Surface finishing: Electroless nickel plating treatment

Reamer bolt material: Alloy steel for machine structural use
Surface finishing: Electroless nickel plating treatment

SFS W



Spacer material: SS400 or an equivalent
Surface finishing: Black coating applied

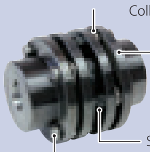
Element material: SUS304 metal disc
Collar: S45C or an equivalent

Flange material: S45C or an equivalent
Surface finishing: Black coating applied

Reamer bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

SFS G

Element material: SUS304 metal disc
Collar: S45C or an equivalent



Flange material: S45C or an equivalent
Surface finishing: Black coating applied

Spacer material: Carbon steel
Surface finishing: Black coating or painting

Reamer bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

SFF

RoHS

Ultra-high stiffness | Ultra-low inertia | High torque | Highly accurate mounting | No backlash

Applications: NC lathe, machining center, chip mounter, electrical discharge machine

Max. rated torque	[N・m]	1000
Bore ranges	[mm]	φ 8 ～ 80

Ultra-high Stiffness and Ultra-low Inertia

Ultrahigh torsional stiffness, achieving 1.5 times the rated torque of the current model and low inertia.

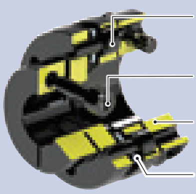
High-precision Clamping Connection

The number of mounting bolts has been reduced substantially. You can remarkably reduce mounting time.

Frictional Coupling for Large Diameters

This model supports frictional coupling for larger-diameter shafts than the previous models.

SFF SS



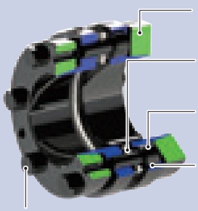
Bolt with hexagonal hole material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Clamping hub material: S45C or an equivalent
Surface finishing: Black coating applied

Element material: SUS304 metal disc
Collar: S45C or an equivalent

Tapered shaft hub



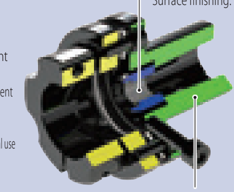
Sleeve material: S45C heat-treated material or an equivalent
Surface finishing: Black coating applied

Element material: SUS304 metal disc
Collar: S45C or an equivalent

Flange material: S45C heat-treated material or an equivalent
Surface finishing: Black coating applied

Bolt with hexagonal hole material: Alloy steel for machine structural use
Surface finishing: Black coating applied

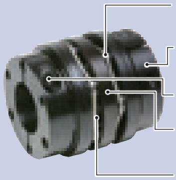
Pressure bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied



Center nut material: S45C or an equivalent
Surface finishing: Black coating applied

Taper flange material: S45C or an equivalent
Surface finishing: Black coating applied

SFF DS



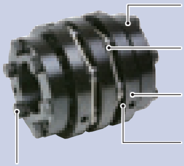
Bolt with hexagonal hole material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Clamping hub material: S45C or an equivalent
Surface finishing: Black coating applied

Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Spacer material: S45C or an equivalent
Surface finishing: Black coating applied

Element material: SUS304 metal disc
Collar: S45C or an equivalent



Sleeve material: S45C heat-treated material or an equivalent
Surface finishing: Black coating applied

Element material: SUS304 metal disc
Collar: S45C or an equivalent

Flange material: S45C heat-treated material or an equivalent
Surface finishing: Black coating applied

Bolt with hexagonal hole material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Pressure bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Clamping hub + wedge coupling hub

Clamping hub and wedge coupling hub can be used in combination.

SFM

RoHS

Ultra-high stiffness | Ultra-low inertia | High torque | Highly accurate mounting | No backlash | High speed

Application: Machine tool main shaft

Max. rated torque	[N・m]	1000
Bore ranges	[mm]	φ 12 ～ 80

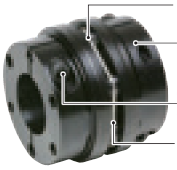
As Machine Tool Main Shaft

Hi-spec model for meeting the high-torque, low-inertia, and high-revolution demands of machine tool main shafts.

Max. Rotation Speed 24000 min^{-1}

High-speed design, balance corrected.

SFM SS

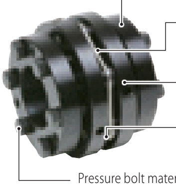


Bolt with hexagonal hole material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Clamping hub material: S45C or an equivalent
Surface finishing: Black coating applied

Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Element material: SUS304 metal disc
Collar: S45C or an equivalent



Sleeve material: S45C heat-treated material or an equivalent
Surface finishing: Black coating applied

Element material: SUS304 metal disc
Collar: S45C or an equivalent

Flange material: S45C heat-treated material or an equivalent
Surface finishing: Black coating applied

Bolt with hexagonal hole material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Pressure bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

SFH

RoHS

High output response | Ultra-high stiffness | Low inertia | Length-specified | No backlash

Applications: Double column machining center, printing press, testing machinery, wind turbine generator

Max. rated torque	[N・m]	8000
Bore ranges	[mm]	φ 22 ～ 115

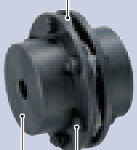
Max. Rated Torque 8000N·m

This model was developed to transmit a large torque, has an extremely high torsional stiffness, and enables precise shaft rotation and ultra-precise control.

Total Length Can Be Specified

The total length can be specified for a type that connects the middle of the element using a floating shaft.

SFH S

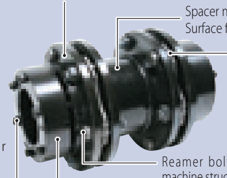


Element material: SUS304 metal disc
Collar: S45C or an equivalent

Reamer bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Flange hub material: S45C or an equivalent
Surface finishing: Black coating applied

SFH G-□K-□K



Flange material: S45C or an equivalent
Surface finishing: Black coating applied

Spacer material: S45C or an equivalent
Surface finishing: Black coating applied

Element material:
SUS304 metal disc
Collar: S45C or an equivalent

Reamer bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

Sleeve material: S45C or an equivalent
Surface finishing: Black coating applied

Pressure bolt material: Alloy steel for machine structural use
Surface finishing: Black coating applied

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA

SERIES
Metal Couplings
Metal Disc Couplings SERVOFLEX
High-rigidity Couplings SERVORIGID
Metal Slit Couplings HELI-CAL
Metal Coil Spring Couplings BAUMANNFLEX
Pin Bushing Couplings PARAFLEX
Link Couplings SCHMIDT
Rubber and Plastic Couplings
Dual Rubber Couplings STEPFLEX
Jaw Couplings MIKI PULLEY STARFLEX
Jaw Couplings SPRFLEX
Plastic Bellows Couplings BELLOWFLEX
Rubber and Plastic Couplings CENTAFLEX

MODELS
SFC
SFS
SFF
SFM
SFH

Customization Cases

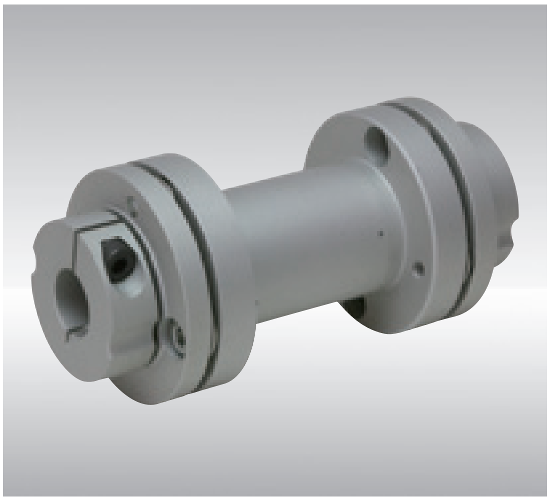
SFC Model stainless steel

The all-stainless-steel construction provides even better rust-proofing.

SFC Model with slit plate

A slit plate is mounted between the hubs to allow it to be used with position detection sensors such as an encoder and photo sensor.

SFC Model with long spacer



This is a specification for when the mounting distance between shafts is long. It can be used in applications such as synchronization of gantry mechanism.

SFF Model For non-excitation brake assemblies

The device design can be made more compact by forming the spline to the outer diameter of the SFF model and using it as the rotor hub for a Miki Pulley non-excitation brake.

For details, please visit our website.

For inquiries on customization

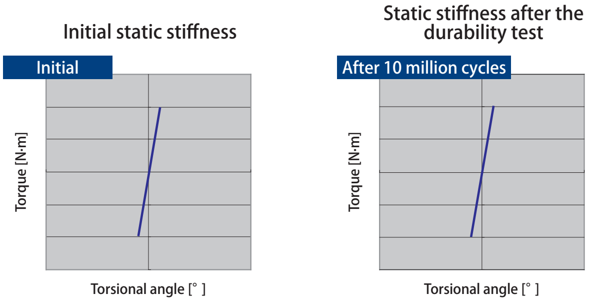
www.mikipulley.co.jp

Web code Z001

FAQ

Q1 What are the durability and aging deterioration of the SERVOFLEX?

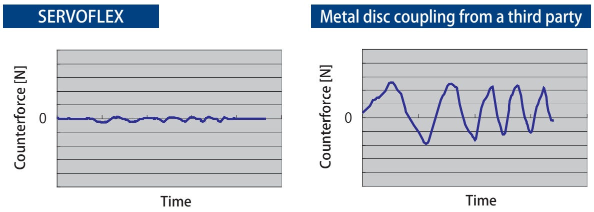
A We conduct a torsional durability test by applying a load larger than the rated torque. SERVOFLEX passed the test by withstanding the metal fatigue limit of 10 million cycles of repeated load. SERVOFLEX is all made of metal materials so the deterioration is extremely slow, and it is able to transmit torque with high precision for a long period of time.



Torsional characteristics of the SERVOFLEX before and after the durability test with 10 million cycles of repeated load

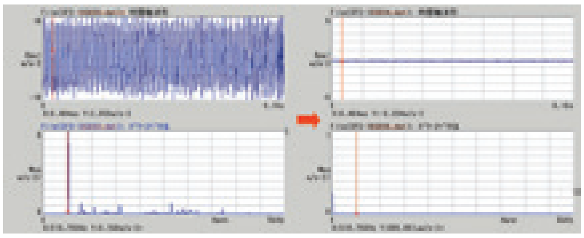
Q2 When a coupling is mounted, the driven shaft runs out. What is the cause?

A The runout of a driven shaft caused by a coupling is mainly attributed to the counterforce of the shaft caused by insufficient centering. All of the SERVOFLEX series are assembled using high-precision special jigs to ensure high concentricity of the bores on the left and right. The counterforce of the shaft is extremely small so the runout of the driven shaft can be minimized.



Q3 Noise and vibrations occurred during use of a metal disc coupling. Please tell me how to prevent them.

A For a servo motor, noise and vibrations can be suppressed by setting the machine resonance suppression filter to its natural frequency in the control system. For a stepper motor, vibrations can be absorbed and suppressed by changing the rotation speed or using a STEPFLEX coupling with high damping ability.

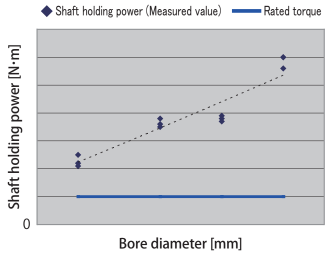


Before adjusting the resonant filter of the servo motor

After adjusting the resonant filter of the servo motor

Q4 Can enough torque be transmitted using the clamping method for connection to the shaft?

A Our torque transmission test uses a sufficient safety factor, so slip of the connection caused by the connection method will not occur when using the rated torque in the catalog. A keyway can be milled into the clamping hub. If you are interested, please refer to P.043 Keyway Milling Option.



Shaft holding power based on SFC-040DA2 bore diameter

SFC SA2 Types Single Element Type

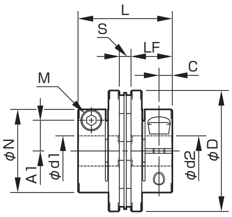
Specifications

Model	Type	Rated torque [N·m]	Misalignment			Max. rotation speed $[min^{-1}]$	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia $[kg·m^2]$	Mass [kg]
			Parallel [mm]	Angular [°]	Axial [mm]					
SFC-002SA2	C	0.25	0.01	0.5	±0.04	10000	190	34	0.06×10^{-6}	0.003
SFC-005SA2	C	0.6	0.02	0.5	±0.05	10000	500	140	0.26×10^{-6}	0.007
SFC-010SA2	C	1	0.02	1	±0.1	10000	1400	140	0.58×10^{-6}	0.011
SFC-020SA2	C	2	0.02	1	±0.15	10000	3700	64	2.39×10^{-6}	0.025
SFC-025SA2	C	4	0.02	1	±0.19	10000	5600	60	3.67×10^{-6}	0.029
SFC-030SA2	A	5	0.02	1	±0.2	10000	8000	64	4.07×10^{-6}	0.034
	B	5	0.02	1	±0.2	10000	8000	64	6.09×10^{-6}	0.041
	C	5	0.02	1	±0.2	10000	8000	64	8.20×10^{-6}	0.049
SFC-035SA2	C	10	0.02	1	±0.25	10000	18000	112	18.44×10^{-6}	0.082
SFC-040SA2	A	12	0.02	1	±0.3	10000	20000	80	16.71×10^{-6}	0.077
	B	12	0.02	1	±0.3	10000	20000	80	22.55×10^{-6}	0.085
	C	12	0.02	1	±0.3	10000	20000	80	29.25×10^{-6}	0.100
SFC-050SA2	A	25	0.02	1	±0.4	10000	32000	48	55.71×10^{-6}	0.159
	B	25	0.02	1	±0.4	10000	32000	48	76.26×10^{-6}	0.177
	C	25	0.02	1	±0.4	10000	32000	48	99.03×10^{-6}	0.206
SFC-055SA2	C	40	0.02	1	±0.42	10000	50000	43	188.0×10^{-6}	0.314
SFC-060SA2	A	60	0.02	1	±0.45	10000	70000	76.4	145.9×10^{-6}	0.283
	B	60	0.02	1	±0.45	10000	70000	76.4	205.0×10^{-6}	0.326
	C	60	0.02	1	±0.45	10000	70000	76.4	268.6×10^{-6}	0.385
SFC-080SA2	C	100	0.02	1	±0.55	10000	140000	128	710.6×10^{-6}	0.708
SFC-090SA2	C	180	0.02	1	±0.65	10000	100000	108	1236×10^{-6}	0.946
SFC-100SA2	C	250	0.02	1	±0.74	10000	120000	111	1891×10^{-6}	1.202

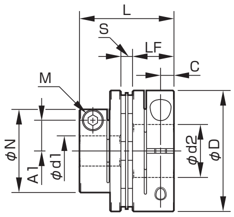
* Check the Standard Bore Diameter list as rated torque may be restricted by the holding power of the shaft connection component.
* Max. rotation speed does not take into account dynamic balance.
* Torsional stiffness values given are measured values for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

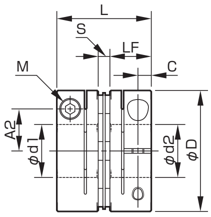
■TYPE A



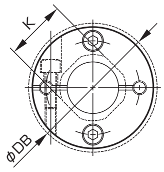
■TYPE B



■TYPE C



CAD



Model	Type	d1 [mm]		d2 [mm]		D [mm]	DB [mm]	N [mm]	L [mm]	LF [mm]	S [mm]	A1 [mm]	A2 [mm]	C [mm]	K [mm]	M Qty - Nominal dia.	Tightening torque [N·m]
		Min.	Max.	Min.	Max.												
SFC-002SA2	C	3	5	3	5	12	12.4	—	12.35	5.9	0.55	—	3.7	1.9	5.6	1-M1.6	0.23～0.28
SFC-005SA2	C	3	6	3	6	16	—	—	16.7	7.85	1	—	4.8	2.5	6.5	1-M2	0.4～0.5
SFC-010SA2	C	3	8	3	8	19	—	—	19.35	9.15	1.05	—	5.8(6)	3.15	8.5	1-M2.5(M2)	1.0～1.1(0.4～0.5)
SFC-020SA2	C	4	10	4	11	26	—	—	23.15	10.75	1.65	—	9.5	3.3	10.6	1-M2.5	1.0～1.1
SFC-025SA2	C	5	14	5	14	29	—	—	23.4	10.75	1.9	—	11	3.3	14.5	1-M2.5	1.0～1.1
SFC-030SA2	A	5	10	5	10	34	—	21.6	27.3	12.4	2.5	8	—	3.75	14.5	1-M3	1.5～1.9
	B	5	10	Over 10	16	34	—	21.6	27.3	12.4	2.5	8	12.5	3.75	14.5	1-M3	1.5～1.9
	C	Over 10	14	Over 10	16	34	—	—	27.3	12.4	2.5	—	12.5	3.75	14.5	1-M3	1.5～1.9
SFC-035SA2	C	6	16	6	19	39	—	—	34	15.5	3	—	14	4.5	17	1-M4	3.4～4.1
SFC-040SA2	A	8	15	8	15	44	—	29.6	34	15.5	3	11	—	4.5	19.5	1-M4	3.4～4.1
	B	8	15	Over 15	24	44	—	29.6	34	15.5	3	11	17	4.5	19.5	1-M4	3.4～4.1
	C	Over 15	19	Over 15	24	44	—	—	34	15.5	3	—	17	4.5	19.5	1-M4	3.4～4.1
SFC-050SA2	A	8	19	8	19	56	—	38	43.4	20.5	2.4	14.5	—	6	26	1-M5	7.0～8.5
	B	8	19	Over 19	30	56	—	38	43.4	20.5	2.4	14.5	22	6	26	1-M5	7.0～8.5
	C	Over 19	25	Over 19	30	56	—	—	43.4	20.5	2.4	—	22	6	26	1-M5	7.0～8.5
SFC-055SA2	C	10	30	10	30	63	—	—	50.6	24	2.6	—	23	7.75	31	1-M6	14～15
SFC-060SA2	A	11	24	11	24	68	—	46	53.6	25.2	3.2	17.5	—	7.75	31	1-M6	14～15
	B	11	24	Over 24	35	68	—	46	53.6	25.2	3.2	17.5	26.5	7.75	31	1-M6	14～15
	C	Over 24	30	Over 24	35	68	—	—	53.6	25.2	3.2	—	26.5	7.75	31	1-M6	14～15
SFC-080SA2	C	18	35	18	40	82	—	—	68	30	8	—	28	9	38	1-M8	27～30
SFC-090SA2	C	25	40	25	45	94	—	—	68.3	30	8.3	—	34	9	42	1-M8	27～30
SFC-100SA2	C	32	45	32	45	104	—	—	69.8	30	9.8	—	39	9	48	1-M8	27～30

* The øDB value is measured assuming that the head of the clamping bolt is larger than the external diameter of the hub.
* The K dimension is the inner diameter of the element. For d2 dimension exceeding this value, shaft can be inserted only up to LF dimension to the d2 side hub.
* The nominal diameter for the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for a hub on one side.
* The figures in parentheses ( ) for the SFC-010 are the values when d1 or d2 is ø8 mm.

For length-specified special order parts

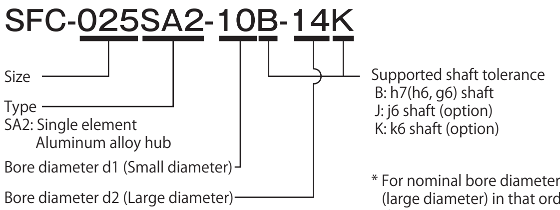
For keyway milling applications→P.043

Standard Bore Diameter

			Standard (option) bore diameter, d1/d2 [mm] and restricted rated torque [N·m]																														
Nominal bore diameter			3	4	5	6	6.35	7	8	9	9.525	10	11	12	13	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45
Shaft tolerance	h7 (h6 · g6)	B	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	j6(Option)	J																			○		○	○		○							
	k6(Option)	K							○	○						○		○			○		○	○				○		○			
Supported bore diameter for each model	SFC-002SA2	d1	●	●	●																												
		d2	●	●	●																												
	SFC-005SA2	d1	●	●	●	●																											
		d2	●	●	●	●																											
	SFC-010SA2	d1	●	●	●	●	●	●	●																								
		d2	●	●	●	●	●	●	●																								
	SFC-020SA2	d1		●	●	●	●	●	●	●	●	●																					
		d2		●	●	●	●	●	●	●	●	●	●																				
	SFC-025SA2	d1			2.1	●	●	●	●	●	●	●	●	●	●	●																	
		d2			2.1	●	●	●	●	●	●	●	●	●	●	●																	
	SFC-030SA2	d1			2.8	3.4	●	●	●	●	●	●	●	●	●	●																	
		d2			2.8	3.4	●	●	●	●	●	●	●	●	●	●	●	●															
	SFC-035SA2	d1				5	5	6.6	●	●	●	●	●	●	●	●	●	●															
		d2				5	5	6.6	●	●	●	●	●	●	●	●	●	●	●	●	●												
	SFC-040SA2	d1							9	●	●	●	●	●	●	●	●	●	●	●	●												
		d2							9	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									
	SFC-050SA2	d1							18	20	22	22	●	●	●	●	●	●	●	●	●	●	●	●	●								
		d2							18	20	22	22	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
	SFC-055SA2	d1										31	34	36	38	●	●	●	●	●	●	●	●	●	●	●	●						
		d2										31	34	36	38	●	●	●	●	●	●	●	●	●	●	●	●						
	SFC-060SA2	d1											50	51	●	●	●	●	●	●	●	●	●	●	●	●	●						
		d2											50	51	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
	SFC-080SA2	d1																		●	●	●	●	●	●	●	●	●	●				
		d2																		●	●	●	●	●	●	●	●	●	●	●	●		
	SFC-090SA2	d1																							●	●	●	●	●	●	●		
		d2																							●	●	●	●	●	●	●	●	●
	SFC-100SA2	d1																										226	●	●	●	●	●
		d2																										226	●	●	●	●	●

* The shaft tolerance for standard bore diameter is h7 (h6 or g6): designation B. However, for a shaft diameter of ø35, the tolerance is $^{+0.010}_{-0.025}$.
* Shaft tolerances j6/k6: designations J/K are optional, and are only supported for bore diameters marked with ○.
* Bore diameters marked with ● or numbers are supported as the standard bore diameters. Consult Miki Pulley regarding special arrangements which may be possible for other bore diameters.
* Bore diameters whose fields contain numbers are restricted in their rated torque by the holding power of the shaft connection component because the bore diameter is small. The numbers indicate the rated torque [N•m].

How to Place an Order



* For nominal bore diameter, select d1 (small diameter)-d2 (large diameter) in that order.
* If d1=d2 (same diameters), select B, J, and K in that order.

SFC DA2 Types Double Element Type

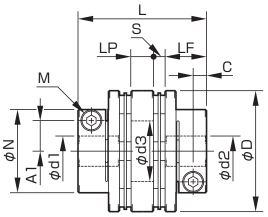
Specifications

Model	Type	Rated torque [N·m]	Misalignment			Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg·m²]	Mass [kg]
			Parallel [mm]	Angular [°]	Axial [mm]					
SFC-002DA2	C	0.25	0.03	0.5(On one side)	± 0.08	10000	95	17	0.07×10^{-6}	0.004
SFC-005DA2	C	0.6	0.05	0.5(On one side)	± 0.1	10000	250	70	0.37×10^{-6}	0.010
SFC-010DA2	C	1	0.11	1(On one side)	± 0.2	10000	700	70	0.80×10^{-6}	0.015
SFC-020DA2	C	2	0.15	1(On one side)	± 0.33	10000	1850	32	3.43×10^{-6}	0.035
SFC-025DA2	C	4	0.16	1(On one side)	± 0.38	10000	2800	30	5.26×10^{-6}	0.040
SFC-030DA2	A	5	0.18	1(On one side)	± 0.4	10000	4000	32	7.43×10^{-6}	0.054
	B	5	0.18	1(On one side)	± 0.4	10000	4000	32	9.45×10^{-6}	0.060
	C	5	0.18	1(On one side)	± 0.4	10000	4000	32	11.56×10^{-6}	0.068
SFC-035DA2	C	10	0.24	1(On one side)	± 0.5	10000	9000	56	26.93×10^{-6}	0.121
SFC-040DA2	A	12	0.24	1(On one side)	± 0.6	10000	10000	40	29.98×10^{-6}	0.124
	B	12	0.24	1(On one side)	± 0.6	10000	10000	40	35.82×10^{-6}	0.131
	C	12	0.24	1(On one side)	± 0.6	10000	10000	40	42.52×10^{-6}	0.146
SFC-050DA2	A	25	0.28	1(On one side)	± 0.8	10000	16000	24	98.34×10^{-6}	0.250
	B	25	0.28	1(On one side)	± 0.8	10000	16000	24	118.9×10^{-6}	0.268
	C	25	0.28	1(On one side)	± 0.8	10000	16000	24	141.7×10^{-6}	0.298
SFC-055DA2	C	40	0.31	1(On one side)	± 0.84	10000	25000	21.5	261.3×10^{-6}	0.459
SFC-060DA2	A	60	0.34	1(On one side)	± 0.9	10000	35000	38.2	256.6×10^{-6}	0.447
	B	60	0.34	1(On one side)	± 0.9	10000	35000	38.2	315.7×10^{-6}	0.489
	C	60	0.34	1(On one side)	± 0.9	10000	35000	38.2	379.3×10^{-6}	0.549
SFC-080DA2	C	100	0.52	1(On one side)	± 1.10	10000	70000	64	1039×10^{-6}	1.037
SFC-090DA2	C	180	0.52	1(On one side)	± 1.30	10000	50000	54	1798×10^{-6}	1.369
SFC-100DA2	C	250	0.55	1(On one side)	± 1.48	10000	60000	55.5	2754×10^{-6}	1.739

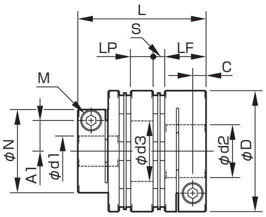
* Check the "Standard Bore Diameters" as rated torque may be restricted by the holding power of the shaft connection component.
* Max. rotation speed does not take into account dynamic balance.
* Torsional stiffness values given are measured values for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

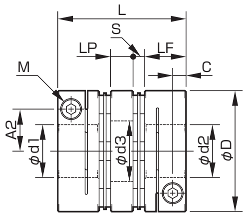
■TYPE A



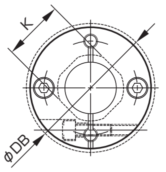
■TYPE B



■TYPE C



CAD



Model	Type	d1 [mm]		d2 [mm]		D [mm]	DB [mm]	N [mm]	L [mm]	LF [mm]	LP [mm]	S [mm]	A1 [mm]	A2 [mm]	C [mm]	d3 [mm]	K [mm]	M Qty - Nominal dia.	Tightening torque [N•m]
		Min.	Max.	Min.	Max.														
SFC-002DA2	C	3	5	3	5	12	12.4	—	15.7	5.9	2.8	0.55	—	3.7	1.9	5.2	5.6	1-M1.6	0.23 ～ 0.28
SFC-005DA2	C	3	6	3	6	16	—	—	23.2	7.85	5.5	1	—	4.8	2.5	6.5	6.5	1-M2	0.4 ～ 0.5
SFC-010DA2	C	3	8	3	8	19	—	—	25.9	9.15	5.5	1.05	—	5.8(6)	3.15	8.5	8.5	1-M2.5(M2)	1.0～1.1(0.4～0.5)
SFC-020DA2	C	4	10	4	11	26	—	—	32.3	10.75	7.5	1.65	—	9.5	3.3	10.6	10.6	1-M2.5	1.0 ～ 1.1
SFC-025DA2	C	5	14	5	14	29	—	—	32.8	10.75	7.5	1.9	—	11	3.3	15	14.5	1-M2.5	1.0 ～ 1.1
SFC-030DA2	A	5	10	5	10	34	—	21.6	37.8	12.4	8	2.5	8	—	3.75	15	14.5	1-M3	1.5 ～ 1.9
	B	5	10	Over 10	16	34	—	21.6	37.8	12.4	8	2.5	8	12.5	3.75	15	14.5	1-M3	1.5 ～ 1.9
	C	Over 10	14	Over 10	16	34	—	—	37.8	12.4	8	2.5	—	12.5	3.75	15	14.5	1-M3	1.5 ～ 1.9
SFC-035DA2	C	6	16	6	19	39	—	—	48	15.5	11	3	—	14	4.5	17	17	1-M4	3.4 ～ 4.1
SFC-040DA2	A	8	15	8	15	44	—	29.6	48	15.5	11	3	11	—	4.5	20	19.5	1-M4	3.4 ～ 4.1
	B	8	15	Over 15	24	44	—	29.6	48	15.5	11	3	11	17	4.5	20	19.5	1-M4	3.4 ～ 4.1
	C	Over 15	19	Over 15	24	44	—	—	48	15.5	11	3	—	17	4.5	20	19.5	1-M4	3.4 ～ 4.1
SFC-050DA2	A	8	19	8	19	56	—	38	59.8	20.5	14	2.4	14.5	—	6	26	26	1-M5	7.0 ～ 8.5
	B	8	19	Over 19	30	56	—	38	59.8	20.5	14	2.4	14.5	22	6	26	26	1-M5	7.0 ～ 8.5
	C	Over 19	25	Over 19	30	56	—	—	59.8	20.5	14	2.4	—	22	6	26	26	1-M5	7.0 ～ 8.5
SFC-055DA2	C	10	30	10	30	63	—	—	68.7	24	15.5	2.6	—	23	7.75	31	31	1-M6	14 ～ 15
SFC-060DA2	A	11	24	11	24	68	—	46	73.3	25.2	16.5	3.2	17.5	—	7.75	31	31	1-M6	14 ～ 15
	B	11	24	Over 24	35	68	—	46	73.3	25.2	16.5	3.2	17.5	26.5	7.75	31	31	1-M6	14 ～ 15
	C	Over 24	30	Over 24	35	68	—	—	73.3	25.2	16.5	3.2	—	26.5	7.75	31	31	1-M6	14 ～ 15
SFC-080DA2	C	18	35	18	40	82	—	—	98	30	22	8	—	28	9	40	38	1-M8	27 ～ 30
SFC-090DA2	C	25	40	25	45	94	—	—	98.6	30	22	8.3	—	34	9	47	42	1-M8	27 ～ 30
SFC-100DA2	C	32	45	32	45	104	—	—	101.6	30	22	9.8	—	39	9	50	48	1-M8	27 ～ 30

* The øDB value is measured assuming that the head of the clamping bolt is larger than the external diameter of the hub.
* The K dimension is the inner diameter of the element. For d2 dimension exceeding this value, shaft can be inserted only up to LF dimension to the d2 side hub.
* The nominal diameter for the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for a hub on one side.
* The figures in parentheses ( ) for the SFC-010 are the values when d1 or d2 is ø8 mm.

For length-specified special order parts

【For length-specified special order parts → P.042】【For keyway milling applications → P.043】

Standard Bore Diameter

			Standard (option) bore diameter, d1/d2 [mm] and restricted rated torque [N·m]																														
Nominal bore diameter			3	4	5	6	6.35	7	8	9	9.525	10	11	12	13	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45
Shaft tolerance	h7 (h6 • g6)	B	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	j6(Option)	J																			○		○	○		○							
	k6(Option)	K							○	○						○		○			○		○	○				○		○			
Supported bore diameter for each model	SFC-002DA2	d1	●	●	●																												
		d2	●	●	●																												
	SFC-005DA2	d1	●	●	●	●																											
		d2	●	●	●	●																											
	SFC-010DA2	d1	●	●	●	●	●	●	●																								
		d2	●	●	●	●	●	●	●																								
	SFC-020DA2	d1		●	●	●	●	●	●	●	●	●																					
		d2		●	●	●	●	●	●	●	●	●	●																				
	SFC-025DA2	d1			2.1	●	●	●	●	●	●	●	●	●	●	●																	
		d2			2.1	●	●	●	●	●	●	●	●	●	●	●																	
	SFC-030DA2	d1			2.8	3.4	●	●	●	●	●	●	●	●	●	●																	
		d2			2.8	3.4	●	●	●	●	●	●	●	●	●	●	●	●															
	SFC-035DA2	d1				5	5	6.6	●	●	●	●	●	●	●	●	●	●															
		d2				5	5	6.6	●	●	●	●	●	●	●	●	●	●	●	●	●												
	SFC-040DA2	d1							9	●	●	●	●	●	●	●	●	●	●	●	●												
		d2							9	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									
	SFC-050DA2	d1							18	20	22	22	●	●	●	●	●	●	●	●	●	●	●	●	●								
		d2							18	20	22	22	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
	SFC-055DA2	d1										31	34	36	38	●	●	●	●	●	●	●	●	●	●	●	●						
		d2										31	34	36	38	●	●	●	●	●	●	●	●	●	●	●	●						
	SFC-060DA2	d1											50	51	●	●	●	●	●	●	●	●	●	●	●	●	●						
		d2											50	51	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
	SFC-080DA2	d1																		●	●	●	●	●	●	●	●	●	●				
		d2																		●	●	●	●	●	●	●	●	●	●	●	●		
	SFC-090DA2	d1																							●	●	●	●	●	●	●		
		d2																							●	●	●	●	●	●	●	●	●
	SFC-100DA2	d1																										226	●	●	●	●	●
		d2																										226	●	●	●	●	●

* The shaft tolerance for standard bore diameter is h7 (h6 or g6): designation B. However, for a shaft diameter of ø35, the tolerance is $^{+0.010}_{-0.025}$.

* Shaft tolerances j6/k6: designations J/K are optional, and are only supported for bore diameters marked with ○.

* Bore diameters marked with ● or numbers are supported as the standard bore diameters. Consult Miki Pulley regarding special arrangements which may be possible for other bore diameters.

* Bore diameters whose fields contain numbers are restricted in their rated torque by the holding power of the shaft connection component because the bore diameter is small. The numbers indicate the rated torque [N•m].

How to Place an Order

SFC-025DA2-10B-14K

Size

Type
DA2: Double element
Aluminum alloy hub

Bore diameter d1 (Small diameter)

Bore diameter d2 (Large diameter)

Supported shaft tolerance
B: h7(h6, g6) shaft
J: j6 shaft (option)
K: k6 shaft (option)

* For nominal bore diameter, select d1 (small diameter)-d2 (large diameter) in that order.

* If d1=d2 (same diameters), select B, J, and K in that order.

SFC SA2 Types Single Element Type

Option Tapered shaft supported

Allows coupling via a clamping hub when a taper adapter is mounted on the tapered shaft of a servo motor.

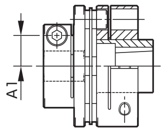
Specifications

Model	Type	Rated torque [N•m]	Misalignment			Max. rotation speed [min⁻¹]	Torsional stiffness [N•m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg•m²]	Mass [kg]
			Parallel [mm]	Angular [°]	Axial [mm]					
SFC-040SA2-□B-11BC	B	12	0.02	1	±0.3	10000	20000	80	26.58×10^{-6}	0.131
	C	12	0.02	1	±0.3	10000	20000	80	33.28×10^{-6}	0.146
SFC-050SA2-□B-11BC	B	25	0.02	1	±0.4	10000	32000	48	82.91×10^{-6}	0.240
	C	25	0.02	1	±0.4	10000	32000	48	103.5×10^{-6}	0.258
SFC-050SA2-□B-14BC	B	25	0.02	1	±0.4	10000	32000	48	88.72×10^{-6}	0.271
	C	25	0.02	1	±0.4	10000	32000	48	111.5×10^{-6}	0.301
SFC-050SA2-□B-16BC	B	25	0.02	1	±0.4	10000	32000	48	95.44×10^{-6}	0.309
	C	25	0.02	1	±0.4	10000	32000	48	118.2×10^{-6}	0.338
SFC-055SA2-□B-14BC	C	40	0.02	1	±0.42	10000	50000	43	201.1×10^{-6}	0.409
SFC-055SA2-□B-16BC	C	40	0.02	1	±0.42	10000	50000	43	207.8×10^{-6}	0.446
SFC-060SA2-□B-16BC	B	60	0.02	1	±0.45	10000	70000	76.4	228.7×10^{-6}	0.475
	C	60	0.02	1	±0.45	10000	70000	76.4	287.8×10^{-6}	0.517

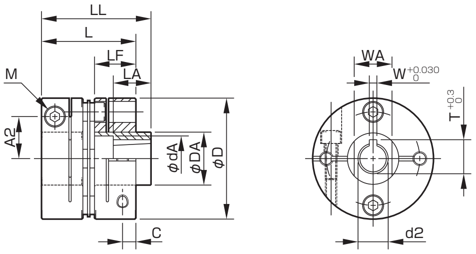
* Check the "Standard Bore Diameters" as rated torque may be restricted by the holding power of the shaft connection component.
* Max. rotation speed does not take into account dynamic balance.
* Torsional stiffness values given are measured values for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

■TYPE B



■TYPE C



Model	d2 [mm]	W [mm]	T [mm]	WA [mm]	LA [mm]	dA [mm]	DA [mm]	LL [mm]	D [mm]	L [mm]	LF [mm]	C [mm]	A1 [mm]	A2 [mm]	M Qty - Nominal dia.
SFC-040SA2-□B-11BC	11	4	12.2	18	16	17	22	44	44	34	15.5	4.5	11	17	1-M4
SFC-050SA2-□B-11BC	11	4	12.2	18	16	17	22	48.4	56	43.4	20.5	6	14.5	22	1-M5
SFC-050SA2-□B-14BC	14	4	15.1	24	19	22	28	53.4	56	43.4	20.5	6	14.5	22	1-M5
SFC-050SA2-□B-16BC	16	5	17.3	24	29	26	30	63.4	56	43.4	20.5	6	14.5	22	1-M5
SFC-055SA2-□B-14BC	14	4	15.1	24	19	22	28	56.6	63	50.6	24	7.75	—	23	1-M6
SFC-055SA2-□B-16BC	16	5	17.3	24	29	26	30	66.6	63	50.6	24	7.75	—	23	1-M6
SFC-060SA2-□B-16BC	16	5	17.3	24	29	26	30	69.6	68	53.6	25.2	7.75	17.5	26.5	1-M6

* For other dimensions, see dimensions for single element type SFC SA2.

Standard Bore Diameter

			Standard (option) bore diameter, d1 [mm] and restricted rated torque [N·m]																		
Nominal bore diameter			8	9	9.525	10	11	12	13	14	15	16	17	18	19	20	22	24	25	28	30
Shaft tolerance	h7 (h6 • g6)	B	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	j6(Option)	J													○		○	○		○	
	k6(Option)	K	○	○						○		○			○		○	○			
Supported bore diameter	SFC-040SA2		9	●	●	●	●	●	●	●	●	●	●	●	●						
	SFC-050SA2		18	20	22	22	●	●	●	●	●	●	●	●	●	●	●	●	●		
	SFC-055SA2					31	34	36	38	●	●	●	●	●	●	●	●	●	●	●	●
	SFC-060SA2						50	51	●	●	●	●	●	●	●	●	●	●	●	●	●

* The shaft tolerance for standard bore diameter is h7 (h6 or g6): designation B.
* Shaft tolerances j6/k6: designations J/K are optional, and are only supported for bore diameters marked with ○.
* Bore diameters marked with ● or numbers are supported as the standard bore diameters. Consult Miki Pulley regarding special arrangements which may be possible for other bore diameters.
* Bore diameters whose fields contain numbers are restricted in their rated torque by the holding power of the shaft connection component because the bore diameter is small. The numbers indicate the rated torque [N•m].

How to Place an Order

SFC-050SA2-12B-14BC

Size

Type
SA2: Single element
Aluminum alloy hub

Bore diameter
d1

Supported shaft tolerance
B: h7 (h6, g6), (Option K : k6, J : j6)

[d2] BC
BC: Taper adapter *Select d2 for BC.

SFC DA2 Types Double Element Type

Option Tapered shaft supported

Allows coupling via a clamping hub when a taper adapter is mounted on the tapered shaft of a servo motor.

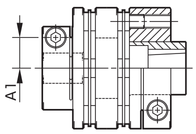
Specifications

Model	Type	Rated torque [N•m]	Misalignment			Max. rotation speed [min⁻¹]	Torsional stiffness [N•m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg•m²]	Mass [kg]
			Parallel [mm]	Angular [°]	Axial [mm]					
SFC-040DA2-☐B-11BC	B	12	0.24	1(On one side)	±0.6	10000	10000	40	39.42×10^{-6}	0.180
	C	12	0.24	1(On one side)	±0.6	10000	10000	40	46.12×10^{-6}	0.195
SFC-050DA2-☐B-11BC	B	25	0.28	1(On one side)	±0.8	10000	16000	24	125.5×10^{-6}	0.331
	C	25	0.28	1(On one side)	±0.8	10000	16000	24	146.1×10^{-6}	0.349
SFC-050DA2-☐B-14BC	B	25	0.28	1(On one side)	±0.8	10000	16000	24	131.1×10^{-6}	0.362
	C	25	0.28	1(On one side)	±0.8	10000	16000	24	154.1×10^{-6}	0.392
SFC-050DA2-☐B-16BC	B	25	0.28	1(On one side)	±0.8	10000	16000	24	138.1×10^{-6}	0.400
	C	25	0.28	1(On one side)	±0.8	10000	16000	24	160.8×10^{-6}	0.430
SFC-055DA2-☐B-14BC	C	40	0.31	1(On one side)	±0.84	10000	25000	21.5	274.0×10^{-6}	0.530
SFC-055DA2-☐B-16BC	C	40	0.31	1(On one side)	±0.84	10000	25000	21.5	280.5×10^{-6}	0.567
SFC-060DA2-☐B-16BC	B	60	0.34	1(On one side)	±0.9	10000	35000	38.2	339.4×10^{-6}	0.638
	C	60	0.34	1(On one side)	±0.9	10000	35000	38.2	398.5×10^{-6}	0.681

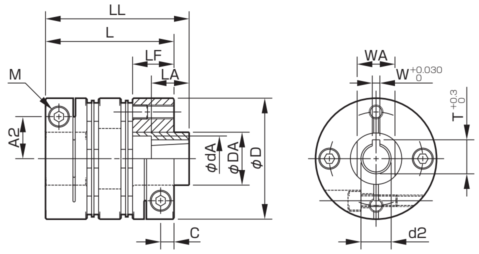
* Check the "Standard Bore Diameters" as rated torque may be restricted by the holding power of the shaft connection component.
* Max. rotation speed does not take into account dynamic balance.
* Torsional stiffness values given are measured values for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

■TYPE B



■TYPE C



CAD

Model	d2 [mm]	W [mm]	T [mm]	WA [mm]	LA [mm]	dA [mm]	DA [mm]	LL [mm]	D [mm]	L [mm]	LF [mm]	C [mm]	A1 [mm]	A2 [mm]	M Qty - Nominal dia.
SFC-040DA2-☐B-11BC	11	4	12.2	18	16	17	22	58	44	48	15.5	4.5	11	17	1-M4
SFC-050DA2-☐B-11BC	11	4	12.2	18	16	17	22	64.8	56	59.8	20.5	6	14.5	22	1-M5
SFC-050DA2-☐B-14BC	14	4	15.1	24	19	22	28	69.8	56	59.8	20.5	6	14.5	22	1-M5
SFC-050DA2-☐B-16BC	16	5	17.3	24	29	26	30	79.8	56	59.8	20.5	6	14.5	22	1-M5
SFC-055DA2-☐B-14BC	14	4	15.1	24	19	22	28	74.4	63	68.7	24	7.75	—	23	1-M6
SFC-055DA2-☐B-16BC	16	5	17.3	24	29	26	30	84.7	63	68.7	24	7.75	—	23	1-M6
SFC-060DA2-☐B-16BC	16	5	17.3	24	29	26	30	89.3	68	73.3	25.2	7.75	17.5	26.5	1-M6

* For other "Specifications" and "Dimensions", see "Specifications" and "Dimensions" for double element type SFC DA2.

Standard Bore Diameter

			Standard (option) bore diameter, d1 [mm] and restricted rated torque [N·m]																		
Nominal bore diameter			8	9	9.525	10	11	12	13	14	15	16	17	18	19	20	22	24	25	28	30
Shaft tolerance	h7 (h6 • g6)	B	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	j6(Option)	J													○		○	○		○	
	k6(Option)	K	○	○						○		○			○		○	○			
Supported bore diameter	SFC-040DA2		9	●	●	●	●	●	●	●	●	●	●	●	●						
	SFC-050DA2		18	20	22	22	●	●	●	●	●	●	●	●	●	●	●	●	●		
	SFC-055DA2					31	34	36	38	●	●	●	●	●	●	●	●	●	●	●	●
	SFC-060DA2						50	51	●	●	●	●	●	●	●	●	●	●	●	●	●

* The shaft tolerance for standard bore diameter is h7 (h6 or g6): designation B.
* Shaft tolerances j6/k6: designations J/K are optional, and are only supported for bore diameters marked with ○.
* Bore diameters marked with ● or numbers are supported as the standard bore diameters. Consult Miki Pulley regarding special arrangements which may be possible for other bore diameters.
* Bore diameters whose fields contain numbers are restricted in their rated torque by the holding power of the shaft connection component because the bore diameter is small. The numbers indicate the rated torque [N•m].

How to Place an Order

SFC-050DA2-12B-14BC

Size
Type
DA2: Double element
Aluminum alloy hub
Bore diameter
d1
Supported shaft tolerance
B: h7 (h6, g6), (Option K : k6, J : j6)
[d2] BC
BC: Taper adapter *Select d2 for BC.

SFC Models

Option For length-specified special order parts

SFC DA2 type spacer length can be changed to attain the necessary distance between shafts. Specify the length in 1 mm units.

Specifications

Model	Type	Rated torque [N•m]	Misalignment				Max. rotation speed [min⁻¹]	Moment of inertia [kg•m²]		Mass [kg]	
			Parallel[mm]		Angular [°]	Axial [mm]					
			Min. L	Max. L				Min. L	Max. L	Min. L	Max. L
SFC-005DA2	C	0.6	0.03	0.20	0.5(On one side)	± 0.1	10000	0.33×10^{-6}	0.62×10^{-6}	0.009	0.017
SFC-010DA2	C	1	0.08	0.44	1(On one side)	± 0.2	10000	0.72×10^{-6}	1.38×10^{-6}	0.014	0.026
SFC-020DA2	C	2	0.10	0.46	1(On one side)	± 0.33	10000	3.02×10^{-6}	5.30×10^{-6}	0.031	0.054
SFC-025DA2	C	4	0.09	0.46	1(On one side)	± 0.38	10000	4.55×10^{-6}	7.95×10^{-6}	0.036	0.061
SFC-030DA2	A	5	0.11	0.48	1(On one side)	± 0.4	10000	6.09×10^{-6}	12.80×10^{-6}	0.046	0.085
	B	5	0.11	0.48	1(On one side)	± 0.4	10000	8.11×10^{-6}	14.82×10^{-6}	0.053	0.091
	C	5	0.11	0.48	1(On one side)	± 0.4	10000	10.22×10^{-6}	16.93×10^{-6}	0.061	0.099
SFC-035DA2	C	10	0.15	0.54	1(On one side)	± 0.5	10000	23.85×10^{-6}	35.97×10^{-6}	0.108	0.161
SFC-040DA2	A	12	0.15	0.54	1(On one side)	± 0.6	10000	25.06×10^{-6}	44.76×10^{-6}	0.107	0.174
	B	12	0.15	0.54	1(On one side)	± 0.6	10000	30.89×10^{-6}	50.62×10^{-6}	0.116	0.182
	C	12	0.15	0.54	1(On one side)	± 0.6	10000	37.58×10^{-6}	57.31×10^{-6}	0.130	0.197
SFC-050DA2	A	25	0.16	0.63	1(On one side)	± 0.8	10000	77.42×10^{-6}	144.3×10^{-6}	0.205	0.347
	B	25	0.16	0.63	1(On one side)	± 0.8	10000	97.97×10^{-6}	164.8×10^{-6}	0.225	0.365
	C	25	0.16	0.63	1(On one side)	± 0.8	10000	120.8×10^{-6}	187.6×10^{-6}	0.252	0.394
SFC-055DA2	C	40	0.16	0.60	1(On one side)	± 0.84	10000	226.8×10^{-6}	325.0×10^{-6}	0.378	0.538
SFC-060DA2	A	60	0.19	0.63	1(On one side)	± 0.9	10000	210.8×10^{-6}	340.1×10^{-6}	0.382	0.567
	B	60	0.19	0.63	1(On one side)	± 0.9	10000	269.9×10^{-6}	399.2×10^{-6}	0.424	0.609
	C	60	0.19	0.63	1(On one side)	± 0.9	10000	333.5×10^{-6}	462.8×10^{-6}	0.484	0.669

* Check the "Standard Bore Diameters" for SFC DA2 as there may be limitations on the rated torque caused by the holding power of the coupling shaft section.

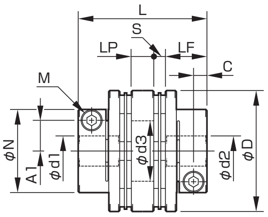
* Max. rotation speed does not take into account dynamic balance.

* The moment of inertia and mass are measured for the maximum bore diameter.

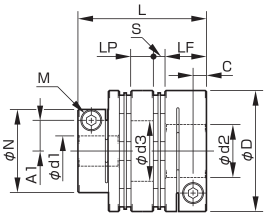
* See "Specifications" for SFC DA2 for stiffness values.

Dimensions

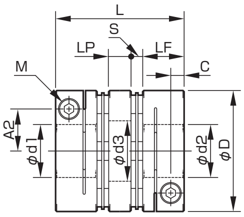
■TYPE A

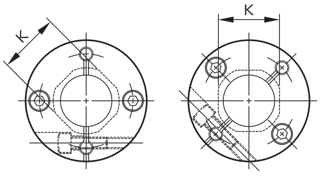


■TYPE B



■TYPE C





L≧Std. L<Std.

Model	Type	d1 [mm]		d2 [mm]		D [mm]	N [mm]	L [mm]			LF [mm]	S [mm]	A1 [mm]	A2 [mm]	C [mm]	d3 [mm]	K [mm]	M Qty - Nominal dia.	Tightening torque [N•m]
		Min.	Max.	Min.	Max.			Std.	Min.	Max.									
SFC-005DA2	C	3	6	3	6	16	—	23.2	21	40	7.85	1	—	4.8	2.5	6.5	6.5	1-M2	0.4 ～ 0.5
SFC-010DA2	C	3	8	3	8	19	—	25.9	24	45	9.15	1.05	—	5.8(6)	3.15	8.5	8.5	1-M2.5(M2)	1.0～1.1(0.4～0.5)
SFC-020DA2	C	4	10	4	11	26	—	32.3	29	50	10.75	1.65	—	9.5	3.3	10.6	10.6	1-M2.5	1.0 ～ 1.1
SFC-025DA2	C	5	14	5	14	29	—	32.8	29	50	10.75	1.9	—	11	3.3	15	14.5	1-M2.5	1.0 ～ 1.1
SFC-030DA2	A	5	10	5	10	34	21.6	37.8	34	55	12.4	2.5	8	—	3.75	15	14.5	1-M3	1.5 ～ 1.9
	B	5	10	Over 10	16	34	21.6	37.8	34	55	12.4	2.5	8	12.5	3.75	15	14.5	1-M3	1.5 ～ 1.9
	C	Over 10	14	Over 10	16	34	—	37.8	34	55	12.4	2.5	—	12.5	3.75	15	14.5	1-M3	1.5 ～ 1.9
SFC-035DA2	C	6	16	6	19	39	—	48	43	65	15.5	3	—	14	4.5	17	17	1-M4	3.4 ～ 4.1
SFC-040DA2	A	8	15	8	15	44	29.6	48	43	65	15.5	3	11	—	4.5	20	19.5	1-M4	3.4 ～ 4.1
	B	8	15	Over 15	24	44	29.6	48	43	65	15.5	3	11	17	4.5	20	19.5	1-M4	3.4 ～ 4.1
	C	Over 15	19	Over 15	24	44	—	48	43	65	15.5	3	—	17	4.5	20	19.5	1-M4	3.4 ～ 4.1
SFC-050DA2	A	8	19	8	19	56	38	59.8	53	80	20.5	2.4	14.5	—	6	26	26	1-M5	7.0 ～ 8.5
	B	8	19	Over 19	30	56	38	59.8	53	80	20.5	2.4	14.5	22	6	26	26	1-M5	7.0 ～ 8.5
	C	Over 19	25	Over 19	30	56	—	59.8	53	80	20.5	2.4	—	22	6	26	26	1-M5	7.0 ～ 8.5
SFC-055DA2	C	10	30	10	30	63	—	68.7	60	85	24	2.6	—	23	7.75	31	31	1-M6	14 ～ 15
SFC-060DA2	A	11	24	11	24	68	46	73.3	65	90	25.2	3.2	17.5	—	7.75	31	31	1-M6	14 ～ 15
	B	11	24	Over 24	35	68	46	73.3	65	90	25.2	3.2	17.5	26.5	7.75	31	31	1-M6	14 ～ 15
	C	Over 24	30	Over 24	35	68	—	73.3	65	90	25.2	3.2	—	26.5	7.75	31	31	1-M6	14 ～ 15

* The nominal diameter for the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for a hub on one side.

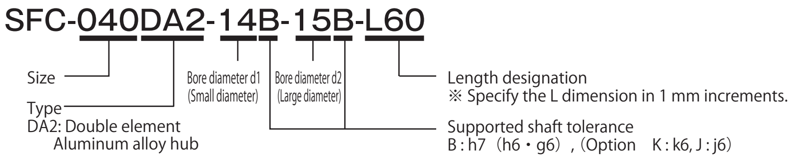
* The figures in parentheses ( ) for the SFC-010 are the values when d1 or d2 is ø8 mm.

* Compatible lengths L range from the minimum L dimension to the maximum L dimension shown in the above table. Specify in 1 mm units.

* When the L dimension is shorter than the standard, the left/right clamping bolt phases will be off by 45° .

* Check "Standard Bore Diameters" for SFC DA2 for the standard bore diameters.

How to Place an Order



SFC-040DA2-14B-15B-L60

Size

Type
DA2: Double element
Aluminum alloy hub

Bore diameter d1
(Small diameter)

Bore diameter d2
(Large diameter)

Length designation
※ Specify the L dimension in 1 mm increments.

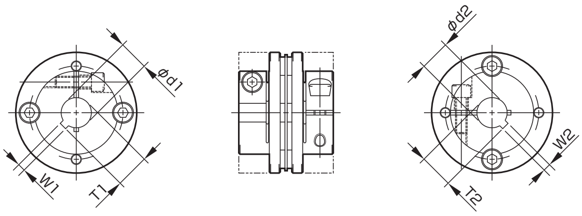
Supported shaft tolerance
B : h7（h6・g6）,（Option　K : k6, J : j6）

Option For keyway milling applications

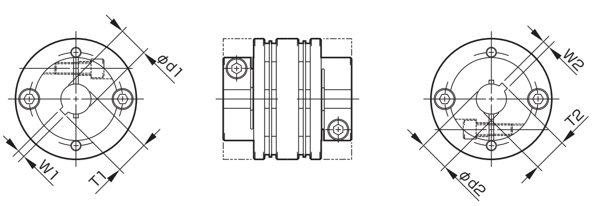
If you are using a keyed shaft, we can mill a keyway in the clamping hub to your specifications.

Keyway milling standard

■SFC SA2



■SFC DA2



H9 keyway width standards

Nominal bore dia.				Bore dia. d1・d2 [mm]	Keyway width W1・W2 [mm]	Keyway height T1・T2 [mm]	Nominal bore dia.				Bore dia. d1・d2 [mm]	Keyway width W1・W2 [mm]	Keyway height T1・T2 [mm]
Shaft diameter	Shaft tolerance						Shaft diameter	Shaft tolerance					
	h7	j6	k6					h7	j6	k6			
8	BH	—	KH	8	$3^{+0.025}_{0}$	$9.4^{+0.3}_{0}$	20	BH	—	—	20	$6^{+0.030}_{0}$	$22.8^{+0.3}_{0}$
9	BH	—	KH	9	$3^{+0.025}_{0}$	$10.4^{+0.3}_{0}$	22	BH	JH	KH	22	$6^{+0.030}_{0}$	$24.8^{+0.3}_{0}$
10	BH	—	—	10	$3^{+0.025}_{0}$	$11.4^{+0.3}_{0}$	24	BH	JH	KH	24	$8^{+0.036}_{0}$	$27.3^{+0.3}_{0}$
11	BH	—	—	11	$4^{+0.030}_{0}$	$12.8^{+0.3}_{0}$	25	BH	—	—	25	$8^{+0.036}_{0}$	$28.3^{+0.3}_{0}$
12	BH	—	—	12	$4^{+0.030}_{0}$	$13.8^{+0.3}_{0}$	28	BH	JH	—	28	$8^{+0.036}_{0}$	$31.3^{+0.3}_{0}$
13	BH	—	—	13	$5^{+0.030}_{0}$	$15.3^{+0.3}_{0}$	30	BH	—	—	30	$8^{+0.036}_{0}$	$33.3^{+0.3}_{0}$
14	BH	—	KH	14	$5^{+0.030}_{0}$	$16.3^{+0.3}_{0}$	32	BH	—	KH	32	$10^{+0.036}_{0}$	$35.3^{+0.3}_{0}$
15	BH	—	—	15	$5^{+0.030}_{0}$	$17.3^{+0.3}_{0}$	35	BH	—	—	35	$10^{+0.036}_{0}$	$38.3^{+0.3}_{0}$
16	BH	—	KH	16	$5^{+0.030}_{0}$	$18.3^{+0.3}_{0}$	38	BH	—	KH	38	$10^{+0.036}_{0}$	$41.3^{+0.3}_{0}$
17	BH	—	—	17	$5^{+0.030}_{0}$	$19.3^{+0.3}_{0}$	40	BH	—	—	40	$12^{+0.043}_{0}$	$43.3^{+0.3}_{0}$
18	BH	—	—	18	$6^{+0.030}_{0}$	$20.8^{+0.3}_{0}$	42	BH	—	—	42	$12^{+0.043}_{0}$	$45.3^{+0.3}_{0}$
19	BH	JH	KH	19	$6^{+0.030}_{0}$	$21.8^{+0.3}_{0}$	45	BH	—	—	45	$14^{+0.043}_{0}$	$48.8^{+0.3}_{0}$

Js9 keyway width standards

Nominal bore dia.				Bore dia. d1・d2 [mm]	Keyway width W1・W2 [mm]	Keyway height T1・T2 [mm]	Nominal bore dia.				Bore dia. d1・d2 [mm]	Keyway width W1・W2 [mm]	Keyway height T1・T2 [mm]
Shaft diameter	Shaft tolerance						Shaft diameter	Shaft tolerance					
	h7	j6	k6					h7	j6	k6			
8	BJ	—	KJ	8	3 ±0.0125	$9.4^{+0.3}_{0}$	20	BJ	—	—	20	6 ±0.0150	$22.8^{+0.3}_{0}$
9	BJ	—	KJ	9	3 ±0.0125	$10.4^{+0.3}_{0}$	22	BJ	JJ	KJ	22	6 ±0.0150	$24.8^{+0.3}_{0}$
10	BJ	—	—	10	3 ±0.0125	$11.4^{+0.3}_{0}$	24	BJ	JJ	KJ	24	8 ±0.0180	$27.3^{+0.3}_{0}$
11	BJ	—	—	11	4 ±0.0150	$12.8^{+0.3}_{0}$	25	BJ	—	—	25	8 ±0.0180	$28.3^{+0.3}_{0}$
12	BJ	—	—	12	4 ±0.0150	$13.8^{+0.3}_{0}$	28	BJ	JJ	—	28	8 ±0.0180	$31.3^{+0.3}_{0}$
13	BJ	—	—	13	5 ±0.0150	$15.3^{+0.3}_{0}$	30	BJ	—	—	30	8 ±0.0180	$33.3^{+0.3}_{0}$
14	BJ	—	KJ	14	5 ±0.0150	$16.3^{+0.3}_{0}$	32	BJ	—	KJ	32	10 ±0.0180	$35.3^{+0.3}_{0}$
15	BJ	—	—	15	5 ±0.0150	$17.3^{+0.3}_{0}$	35	BJ	—	—	35	10 ±0.0180	$38.3^{+0.3}_{0}$
16	BJ	—	KJ	16	5 ±0.0150	$18.3^{+0.3}_{0}$	38	BJ	—	KJ	38	10 ±0.0180	$41.3^{+0.3}_{0}$
17	BJ	—	—	17	5 ±0.0150	$19.3^{+0.3}_{0}$	40	BJ	—	—	40	12 ±0.0215	$43.3^{+0.3}_{0}$
18	BJ	—	—	18	6 ±0.0150	$20.8^{+0.3}_{0}$	42	BJ	—	—	42	12 ±0.0215	$45.3^{+0.3}_{0}$
19	BJ	JJ	KJ	19	6 ±0.0150	$21.8^{+0.3}_{0}$	45	BJ	—	—	45	14 ±0.0215	$48.8^{+0.3}_{0}$

* We can also handle standards not listed above. Consult Miki Pulley.

Standard Bore Diameter

Standard (option) bore diameter, d1/d2 [mm] and restricted rated torque [N·m]

Nominal bore diameter			8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45
Shaft tolerance	h7 (h6・g6)	B	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	j6(Option)	J												○		○	○		○							
	k6(Option)	K	○	○					○		○			○		○	○				○		○			
Supported bore diameter for each model	SFC-025SA2/DA2	d1	●	●	●	●	●	●	●																	
		d2	●	●	●	●	●	●	●																	
	SFC-030SA2/DA2	d1	●	●	●	●	●	●	●																	
		d2	●	●	●	●	●	●	●	●	●															
	SFC-035SA2/DA2	d1	●	●	●	●	●	●	●	●	●															
		d2	●	●	●	●	●	●	●	●	●	●	●	●												
	SFC-040SA2/DA2	d1	9	●	●	●	●	●	●	●	●	●	●	●												
		d2	9	●	●	●	●	●	●	●	●	●	●	●	●	●	●									
	SFC-050SA2/DA2	d1	18	20	22	●	●	●	●	●	●	●	●	●	●	●	●	●								
		d2	18	20	22	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
	SFC-055SA2/DA2	d1			31	34	36	38	●	●	●	●	●	●	●	●	●	●	●	●						
		d2			31	34	36	38	●	●	●	●	●	●	●	●	●	●	●	●						
	SFC-060SA2/DA2	d1				50	51	●	●	●	●	●	●	●	●	●	●	●	●	●						
		d2				50	51	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
	SFC-080SA2/DA2	d1											●	●	●	●	●	●	●	●	●	●				
		d2											●	●	●	●	●	●	●	●	●	●	●	●		
	SFC-090SA2/DA2	d1																●	●	●	●	●	●	●		
		d2																●	●	●	●	●	●	●	●	●
	SFC-100SA2/DA2	d1																			226	●	●	●	●	●
		d2																			226	●	●	●	●	●

* The shaft tolerance for standard bore diameter is h7 (h6 or g6): designation B. However, for a shaft diameter of ø35, the tolerance is $^{+0.010}_{-0.025}$.
* Shaft tolerances j6/k6: designations J/K are optional, and are only supported for bore diameters marked with ○.
* Bore diameters marked with ● or numbers are supported as the standard bore diameters. Consult Miki Pulley regarding special arrangements which may be possible for other bore diameters.
* Bore diameters whose fields contain numbers are restricted in their rated torque by the holding power of the shaft connection component because the bore diameter is small. The numbers indicate the rated torque [N•m].

How to Place an Order

SFC-060SA2-12BH-14KJ

Size
Type
SA2: Single element
DA2: Double element
Bore diameter d1 (Small diameter)
Bore diameter d2 (Large diameter)
Affixing method
KJ: k6 shaft + Js9 keyway
Affixing method
BH: h7 (h6, g6) shaft + H9 keyway

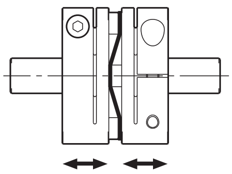
* For nominal bore diameter, select d1 (small diameter) -d2 (large diameter) in that order.
* If d1=d2 (same diameters), select B, J, and K in that order.
B・J・K・BH・BJ・JH・JJ・KH・KJ

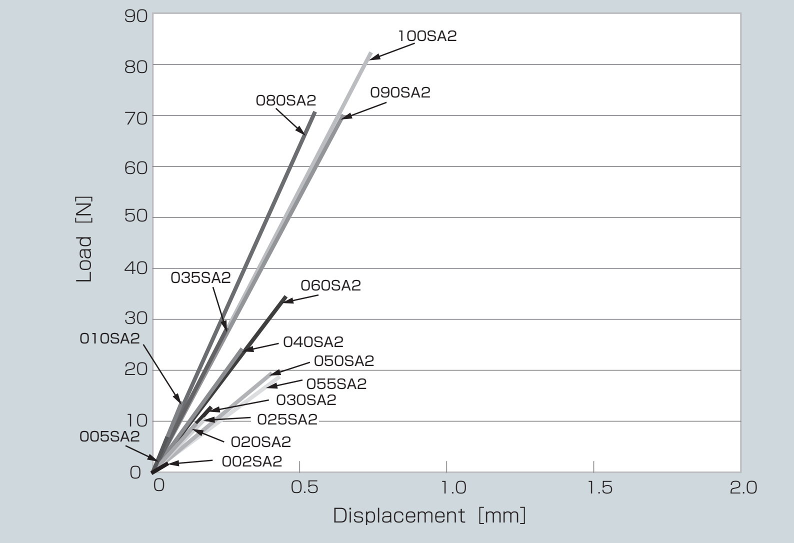
SFC Models

Items Checked for Design Purposes

Spring Characteristics SFC SA2

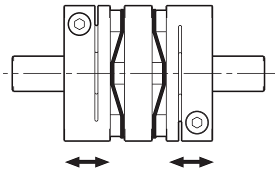
■ Axial load and amount of displacement

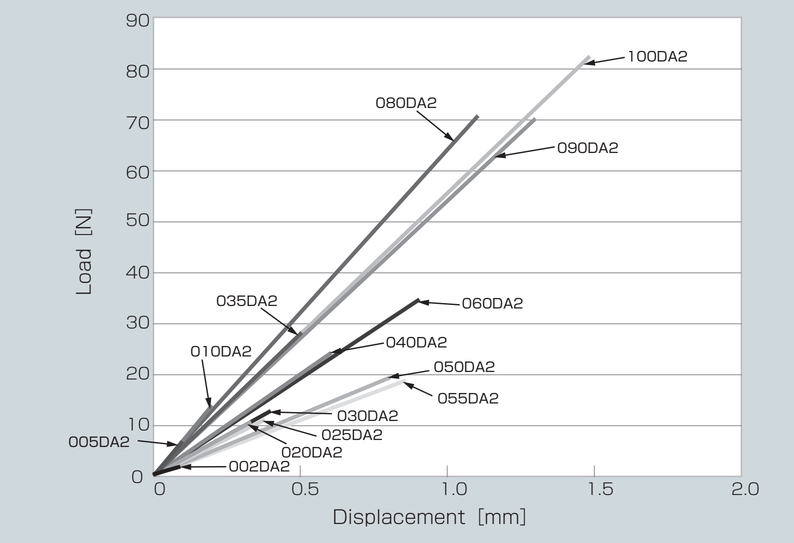




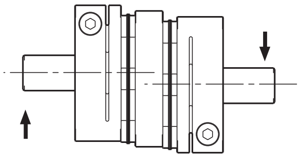
Spring Characteristics SFC DA2

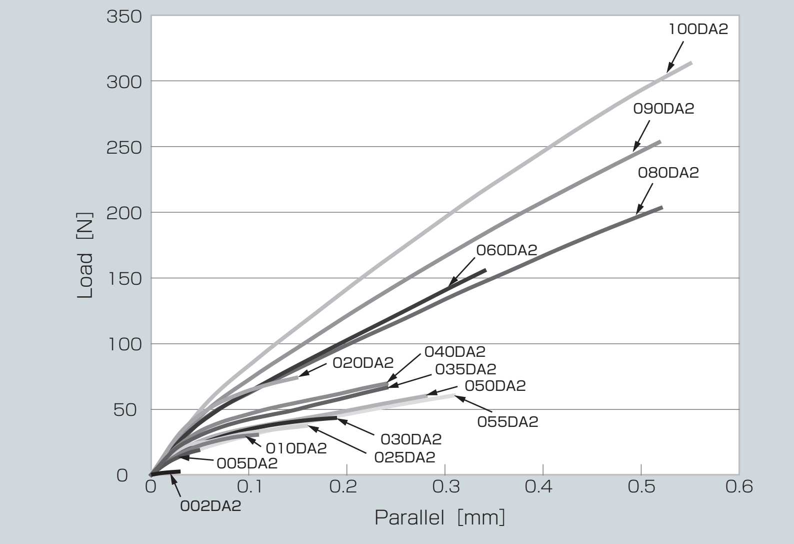
■ Axial load and amount of displacement





■ Parallel misalignment direction load and amount of displacement





Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

Couplings are assembled at high accuracy using a special mounting jig to ensure accurate concentricity of left and right internal diameters. Take extra precautions when handling couplings, should strong shocks be given on couplings, it may affect mounting accuracy and cause the parts to break during use.

(1) Couplings are designed for use within an operating temperature range of -30° C to 100° C. Although the couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water and oil as it may cause part deterioration.

(2) Handle the element with care as it is made of a thin stainless steel metal disc, also making sure to be careful so as not to injure yourself.

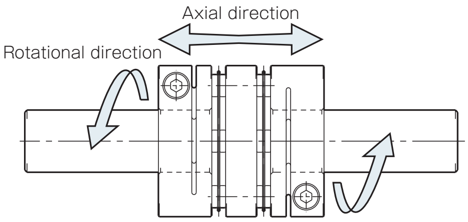
(3) Do not tighten up clamping bolts until after inserting the mounting shaft.

Mounting

(1) Check that coupling clamping bolts have been loosened and remove any rust, dust, oil residue, etc. from inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

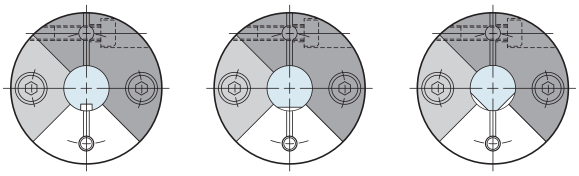
(2) Be careful when inserting the couplings into the shaft so as not to apply excessive force of compression or tensile force to the element. Be particularly careful not to apply excessive compressing force needlessly when inserting couplings into the paired shaft after attaching the couplings to the motor.

(3) With two of the clamping bolts loosened, make sure that couplings move gently along the axial and rotational directions. Readjust the centering of the two shafts if the couplings fail to move smoothly enough. This method is recommended as a way to easily check the concentricity of the left and right sides. If unable to use the same method, check the mounting accuracy using machine parts quality control procedures or an alternative method.

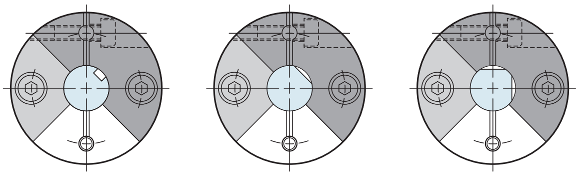


(4)As a general rule, round shafts are to be used for the paired mounting shaft. If needing to use a shaft with a different shape, be careful not to insert it into any of the locations indicated in the diagrams below. (Do not attempt to face keyways, D-shaped cuts, or other insertions to the grayed areas (□).) Placing the shaft in an undesirable location may cause the couplings to break or lead to a loss in shaft holding power. It is recommended that you use only round shafts to ensure full utilization of the entire range of coupling performance.

■ Proper Mounting Examples

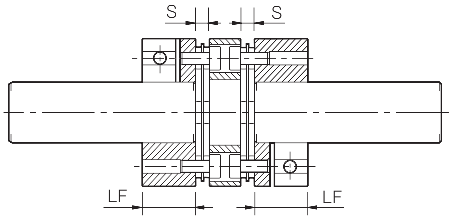


■ Poor Mounting Examples



※□ : Size 002/005, ■ : Size 010 or above

(5) Insert and mount each shaft far enough in that the paired mounting shaft touches the shaft along the entire length of the clamping hub of the coupling (LF dimension), as shown in the diagram below, and does not interfere with the elements, spacers or the other shaft. In addition, restrict the dimensions between clamping hub faces (S dimensions in the diagram) within the allowable misalignment of the axial direction displacement with respect to a reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.



Model	LF [mm]	S [mm]
SFC-002SA2/DA2	5.9	0.55
SFC-005SA2/DA2	7.85	1
SFC-010SA2/DA2	9.15	1.05
SFC-020SA2/DA2	10.75	1.65
SFC-025SA2/DA2	10.75	1.9
SFC-030SA2/DA2	12.4	2.5
SFC-035SA2/DA2	15.5	3
SFC-040SA2/DA2	15.5	3
SFC-050SA2/DA2	20.5	2.4
SFC-055SA2/DA2	24	2.6
SFC-060SA2/DA2	25.2	3.2
SFC-080SA2/DA2	30	8
SFC-090SA2/DA2	30	8.3
SFC-100SA2/DA2	30	9.8

(6) Check to make sure that no compression or tensile force is being applied along the axial direction before tightening up the two clamping bolts. Use a calibrated torque wrench to tighten the clamping bolts to within the tightening torque range listed below.

Model	Clamping bolts	Tightening torque [N·m]
SFC-002SA2/DA2	M1.6	0.23 ～ 0.28
SFC-005SA2/DA2	M2	0.4 ～ 0.5
SFC-010SA2/DA2	M2	0.4 ～ 0.5
SFC-010SA2/DA2	M2.5	1.0 ～ 1.1
SFC-020SA2/DA2	M2.5	1.0 ～ 1.1
SFC-025SA2/DA2	M2.5	1.0 ～ 1.1
SFC-030SA2/DA2	M3	1.5 ～ 1.9
SFC-035SA2/DA2	M4	3.4 ～ 4.1
SFC-040SA2/DA2	M4	3.4 ～ 4.1
SFC-050SA2/DA2	M5	7.0 ～ 8.5
SFC-055SA2/DA2	M6	14 ～ 15
SFC-060SA2/DA2	M6	14 ～ 15
SFC-080SA2/DA2	M8	27 ～ 30
SFC-090SA2/DA2	M8	27 ～ 30
SFC-100SA2/DA2	M8	27 ～ 30

* Use M2 bolts on SFC-010SA2/DA2 models with holes with a diameter of ø8 mm.

* The start and end numbers for the tightening torque ranges are between the minimum and maximum values. Tighten bolts to a tightening torque within the specified range for the model used.

SFC Models

Items Checked for Design Purposes

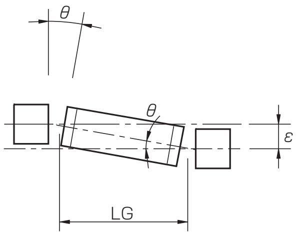
Suitable Torque Screwdriver/Torque Wrench

Nominal bolt diameter	Tightening torque [N•m]	Torque screwdriver/ wrench	Hexagon bit/ head	Coupling size
M1.6	0.23 ～ 0.28	CN30LTDK	CB 1.5mm	002
M2	0.4 ～ 0.5	CN60LTDK	SB 1.5mm	005・010
M2.5	1.0 ～ 1.1	CN120LTDK	SB 2mm	010・020・025
M3	1.5 ～ 1.9	CN200LTDK	SB 2.5mm	030
M4	3.4 ～ 4.1	CN500LTDK	SB 3mm	035・040
M5	7.0 ～ 8.5	N10LTDK	SB 4mm	050
M6	14 ～ 15	N25LCK	25HCK 5mm	055・060
M8	27 ～ 30	N50LCK	50HCK 6mm	080・090・100

* Torque screwdriver (wrench)/bit (head) models are those of Nakamura Mfg. Co., Ltd.

Length-specified Special Order Parts Option

Specify any length for the length-specified special order option for the SERVOFLEX SFC DA2. Use the following formula to calculate the amount of allowable parallel misalignment, adjust it to be no greater than that value, and then mount the coupling.



$$\varepsilon = \tan\theta \times LG$$

ε :Allowable parallel misalignment [mm]

θ :Allowable angular deflection [°]

$$LG = LP + S$$

LP : Total length of spacer [mm]

S : Gap size between clamping hub and spacer [mm]

Options for Keyway Milling

Options for keyway milling are available on request. However, because they are designed such that torque is tranferred to the friction coupling by the clamp mechanism, care should be taken not to exceed the coupling's permitted torque during use. Note also the following issues:

(1) Only ever use keys that are no wider than the keyway. Using keys that are a tight fit could results in damage during mounting or operation.

(2) The positional accuracy of keyway milling is visual. If positional accuracy relative to keyway hubs is required, contact Miki Pulley.

(3) Using Js9 class tolerances provides a tight fit, so couplings may be compressed when mounted on shafts. Take care not to further compress the couplings.

(4) Setting the fit of the key and keyway too loosely may result in play that generates dust. Also take care that the key does not come loose.

(5) Adding a set screw over the keyway is not recommended as it may lower clamp performance, and the set screw may also become loose within the torque range you use or during forward/reverse operation. It may also impair the structural strength of the clamping hub or damage the coupling.

Clamping Bolts

Use Miki Pulley-specified clamping bolts because they are processed with solid lubrication films (except for SFC-002 M1.6). Applying adhesives to prevent loosening, oil, or the like to a clamping bolt will alter torque coefficients due to those lubricating components, creating excessive axial forces and potentially damaging the clamping bolt or coupling. Consult Miki Pulley before using such products.

Surface Processing of Coupling Bore Diameter

The bore diameters of SERVOFLEX SFC models may or may not have surface processing in some components due to the circumstances of processing. This does not affect coupling performance. Consult Miki Pulley if your usage conditions require that bore diameters be surface processed or not.

Selection Order of Nominal Bore Diameters when Ordering

When specifying bore diameters, you should basically specify d1 (small diameter)-d2 (large diameter), and always specify d2 for taper adapters mounted on tapered shafts. However, where d1=d2 (same diameters), note the selection order below for each nominal bore diameter when ordering.

Nominal bore diameter symbol	Nominal bore diameter symbol description	Type	Selection diameter	Selection order
B	Shaft tolerance h7 (h6, g6)	Standard	d1・d2	1
J	Shaft tolerance j6	Option	d1・d2	2
K	Shaft tolerance k6	Option	d1・d2	3
BH	Shaft tolerance h7 (h6, g6) + keyway H9	Option	d1・d2	4
BJ	Shaft tolerance h7 (h6, g6) + keyway Js9	Option	d1・d2	5
JH	Shaft tolerance j6 + keyway H9	Option	d1・d2	6
JJ	Shaft tolerance j6 + keyway Js9	Option	d1・d2	7
KH	Shaft tolerance k6 + keyway H9	Option	d1・d2	8
KJ	Shaft tolerance k6 + keyway Js9	Option	d1・d2	9
BC	Taper adapter mounted on tapered shaft	Option	d2	10

Points to Consider Regarding the Feed Screw System

■ Servo motor oscillation

Gain adjustment on the servo motor may cause the servo motor to oscillate.

Oscillation in the servo motor during operation can cause problems particularly with the overall natural frequency and electrical control systems of the feed screw system.

In order for these issues to be resolved, the torsional stiffness for the coupling and feed screw section and the moment of inertia and other characteristics for the system overall will need to be adjusted and the torsional natural frequency for the mechanical system raised or the tuning function (filter function) for the electrical control system in the servo motor adjusted during the design stage.

■ Stepper motor resonance

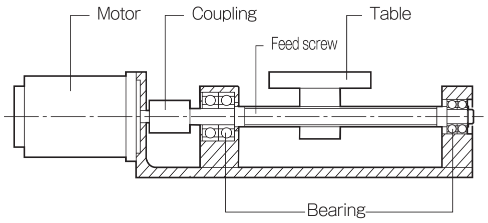
Stepper motors resonate at certain rotation speeds due to the pulsation frequency of the stepper motor and the torsional natural frequency of the system as a whole. To avoid resonance, either the resonant rotation speed must be simply skipped or the torsional natural frequency considered at the design stage.

Please contact Miki Pulley with any questions regarding stepper motor resonance or servo motor oscillation.

How to Find the Natural Frequency of a Feed Screw System

(1) Select a coupling based on the nominal and maximum torque of the servo motor or stepper motor.

(2) Find the overall natural frequency, Nf, from the torsional stiffness of the coupling and feed screw, κ , the moment of inertia of driving side, J1, and the moment of inertia of driven side, J2, for the feed screw system shown below.



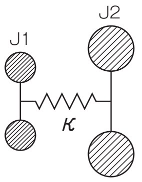
$$Nf=\frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{J1}+\frac{1}{J2}\right)}$$

Nf: Overall natural frequency of a feed screw system [Hz]

κ : Torsional stiffness of the coupling and feed screw [N·m/rad]

J1: Moment of inertia of driving side [kg·m^2]

J2: Moment of inertia of driven side [kg·m^2]



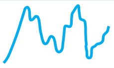
Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\ [N\cdot m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

(2) Determine the factor K from the load properties, and find the corrected torque, Td, applied to the coupling.

$$Td\ [N\cdot m] = Ta\ [N\cdot m] \times K \text{(Refer to the table below for values)}$$

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K	1.0	1.25	1.75	2.25

For servo motor drive, multiply the maximum torque, Ts, by the usage factor K = 1.2 to 1.5.

$$Td\ [N\cdot m] = Ts\ [N\cdot m] \times (1.2 \sim 1.5)$$

(3) Set the size so that the rated coupling torque, Tn, is higher than the corrected torque, Td.

$$Tn\ [N\cdot m] \geqq Td\ [N\cdot m]$$

(4) The rated torque of the coupling may be limited by the bore diameter of the coupling. See the Specifications and Standard Bore Diameters tables.

(5) Check that the mount shaft is no larger than the maximum bore diameter of the coupling.

*Contact Miki Pulley for assistance with any device experiencing extreme periodic vibrations.

Easy Selection Chart

Select a coupling size based on the rated output and the rated/maximum torque of the ordinary servo motor. The torque characteristics of servo motors vary between manufacturers, so check the specifications in the manufacturer catalog before finalizing a coupling size selection.

Servo motor specifications					Corresponding SERVOFLEX type specifications				
Rated output [W] [kW]	Rated rotation speed [min⁻¹]	Rated torque [N•m]	Max. torque [N•m]	Shaft diameter [mm]	Single element type	Double element type	Rated torque [N•m]	Max. bore diameter [mm]	Outer diameter [mm]
3W	3000 ~ 6000	0.0096	0.029	4	**SFC-002SA2**	**SFC-002DA2**	0.25	5	12
5W	3000 ~ 6000	0.016	0.048	5	**SFC-002SA2**	**SFC-002DA2**	0.25	5	12
10W	3000 ~ 6000	0.032	0.096	6	**SFC-005SA2**	**SFC-005DA2**	0.6	6	16
15W	3000 ~ 6000	0.047	0.143	4	**SFC-002SA2**	**SFC-002DA2**	0.25	5	12
20W	3000 ~ 6000	0.0638	0.191	6	**SFC-005SA2**	**SFC-005DA2**	0.6	6	16
30W	3000 ~ 6000	0.098	0.322	8	**SFC-010SA2**	**SFC-010DA2**	1	8	19
50W	3000 ~ 6000	0.16	0.64	8	**SFC-010SA2**	**SFC-010DA2**	1	8	19
100W	3000 ~ 6000	0.32	1.28	8	**SFC-020SA2**	**SFC-020DA2**	2	11	26
150W	3000 ~ 6000	0.477	1.67	8	**SFC-025SA2**	**SFC-025DA2**	4	14	29
200W	3000 ~ 6000	0.64	2.23	14	**SFC-025SA2**	**SFC-025DA2**	4	14	29
300W	3000 ~ 6000	0.95	3.72	14	**SFC-030SA2**	**SFC-030DA2**	5	16	34
400W	3000 ~ 6000	1.3	5	14	**SFC-035SA2**	**SFC-035DA2**	10	19	39
450W	1500	2.86	8.92	19	**SFC-040SA2**	**SFC-040DA2**	12	24	44
500W	2000	2.4	7.2	24	**SFC-040SA2**	**SFC-040DA2**	12	24	44
600W	3000 ~ 6000	1.91	5.73	19	**SFC-035SA2**	**SFC-035DA2**	10	19	39
750W	3000 ~ 6000	2.387	9	19	**SFC-040SA2**	**SFC-040DA2**	12	24	44
750W	2000	3.6	10.7	22	**SFC-050SA2**	**SFC-050DA2**	25	30	56
850W	1500	5.39	13.8	19	**SFC-050SA2**	**SFC-050DA2**	25	30	56
1kW	3000 ~ 6000	3.18	12.5	24	**SFC-050SA2**	**SFC-050DA2**	25	30	56
1kW	2000	5	16.6	24	**SFC-050SA2**	**SFC-050DA2**	25	30	56
1.5kW	2000	7.5	21.6	35	**SFC-060SA2**	**SFC-060DA2**	60	35	68
2kW	3000 ~ 6000	6.8	21	24	**SFC-055SA2**	**SFC-055DA2**	40	30	63
2kW	2000	9.54	31	35	**SFC-060SA2**	**SFC-060DA2**	60	35	68
2.2kW	2000	10.5	36.7	28	**SFC-060SA2**	**SFC-060DA2**	60	35	68
2.5kW	3000 ~ 6000	12	46	24	**SFC-060SA2**	**SFC-060DA2**	60	35	68
3kW	3000 ~ 6000	12	35	28	**SFC-060SA2**	**SFC-060DA2**	60	35	68
3kW	2000	14.3	42.9	35	**SFC-060SA2**	**SFC-060DA2**	60	35	68
3.5kW	3000 ~ 6000	11.1	33.4	28	**SFC-060SA2**	**SFC-060DA2**	60	35	68
3.5kW	2000	17	55	35	**SFC-080SA2**	**SFC-080DA2**	100	40	82
4kW	3000 ~ 6000	22	39.2	28	**SFC-060SA2**	**SFC-060DA2**	60	35	68
4kW	2000	19.1	66.9	35	**SFC-080SA2**	**SFC-080DA2**	100	40	82
4.5kW	1500	28.5	105	35	**SFC-090SA2**	**SFC-090DA2**	180	45	94
5kW	3000 ~ 6000	15.9	47.6	28	**SFC-080SA2**	**SFC-080DA2**	100	40	82
5kW	2000	23.9	71.6	35	**SFC-080SA2**	**SFC-080DA2**	100	40	82
6kW	2000	38	130	35	**SFC-090SA2**	**SFC-090DA2**	180	45	94
7kW	1500	44.6	134	42	**SFC-090SA2**	**SFC-090DA2**	180	45	94
7.5kW	1500	48	139	42	**SFC-100SA2**	**SFC-100DA2**	250	45	104
9kW	3000 ~ 6000	28.6	85	35	**SFC-090SA2**	**SFC-090DA2**	180	45	94
11kW	2000	52.5	158	42	**SFC-100SA2**	**SFC-100DA2**	250	45	104

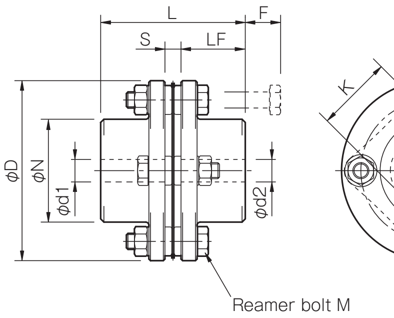
SFS S Types Single Element Type

Specifications

Model	Rated torque [N·m]	Misalignment		Max. rotation speed $[\text{min}^{-1}]$	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia $[\text{kg·m}^2]$	Mass [kg]
		Angular [°]	Axial [mm]					
SFS-05S	20	1	±0.6	25000	16000	43	0.11×10^{-3}	0.30
SFS-06S	40	1	±0.8	20000	29000	45	0.30×10^{-3}	0.50
SFS-08S	80	1	±1.0	17000	83000	60	0.87×10^{-3}	1.00
SFS-09S	180	1	±1.2	15000	170000	122	1.60×10^{-3}	1.40
SFS-10S	250	1	±1.4	13000	250000	160	2.60×10^{-3}	2.10
SFS-12S	450	1	±1.6	11000	430000	197	6.50×10^{-3}	3.40
SFS-14S	800	1	±1.8	9500	780000	313	9.90×10^{-3}	4.90
SFS-05S-C	15	1	±0.6	25000	16000	43	0.11×10^{-3}	0.30
SFS-06S-C	30	1	±0.8	20000	29000	45	0.30×10^{-3}	0.50
SFS-08S-C	60	1	±1.0	17000	83000	60	0.87×10^{-3}	1.00
SFS-09S-C	135	1	±1.2	15000	170000	122	1.60×10^{-3}	1.40
SFS-10S-C	190	1	±1.4	13000	250000	160	2.60×10^{-3}	2.10
SFS-12S-C	340	1	±1.6	11000	430000	197	6.50×10^{-3}	3.40
SFS-14S-C	600	1	±1.8	9500	780000	313	9.90×10^{-3}	4.90
SFS-06S-□M-□M	40	1	±0.8	5000	29000	45	0.30×10^{-3}	0.70
SFS-08S-□M-□M	80	1	±1.0	5000	83000	60	0.93×10^{-3}	1.30
SFS-09S-□M-□M	180	1	±1.2	5000	170000	122	1.80×10^{-3}	1.80
SFS-10S-□M-□M	250	1	±1.4	5000	250000	160	2.70×10^{-3}	2.30
SFS-12S-□M-□M	450	1	±1.6	5000	430000	197	6.80×10^{-3}	4.10
SFS-14S-35M-35M	580	1	±1.8	5000	780000	313	14.01×10^{-3}	6.40
SFS-06S-□M-11C	40	1	±0.8	5000	29000	45	0.29×10^{-3}	0.60
SFS-06S-15M-16C	40	1	±0.8	5000	29000	45	0.34×10^{-3}	0.70
SFS-08S-□M-16C	80	1	±1.0	5000	83000	60	0.84×10^{-3}	1.20
SFS-09S-□M-16C	180	1	±1.2	5000	170000	122	1.50×10^{-3}	1.60

*Max. rotation speed does not take into account dynamic balance.
*The moment of inertia and mass are measured for the maximum bore diameter.

Dimension (SFS-□S) Pilot Bore/Key or Set Screw



Unit [mm]

Model	d1・d2			D	N	L	LF	S	F	K	M
	Pilot bore	Min.	Max.								
SFS-05S	7	8	20	56	32	45	20	5	11	24	4-M5 × 22
SFS-06S	7	8	25	68	40	56	25	6	10	30	4-M6 × 25
SFS-08S	10	11	35	82	54	66	30	6	11	38	4-M6 × 29
SFS-09S	10	11	38	94	58	68	30	8	21	42	4-M8 × 36
SFS-10S	15	16	42	104	68	80	35	10	16	48	4-M8 × 36
SFS-12S	18	19	50	126	78	91	40	11	23	54	4-M10 × 45
SFS-14S	20	22	60	144	88	102	45	12	31	61	4-M12 × 54

* Pilot bores are to be drilled into the part. See the standard hole-drilling standards of P.54 for information on bore drilling.
* The nominal diameter of the reamer bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

How to Place an Order

SFS-10S-C-25H-30H

Bore diameter: d1 (Small diameter) - d2 (Large diameter)

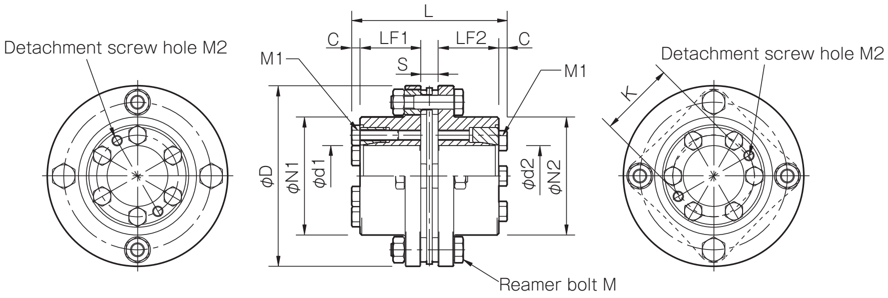
Size

Surface finishing options
Blank: Black coating
-C: Electroless nickel plating

Type: S
Single element

Blank: Pilot bore
Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
J: Compliant with the new JIS standards Js9
P: Compliant with the new JIS standards P9
N: Compliant with the new motor standards

Dimensions (SFS-☐S-☐M-☐M) Frictional Coupling



CAD

Unit [mm]

Model	Bore diameter	d1	d2	D	N1	N2	L	LF1	LF2	S	C	K	M	M1	M2
SFS-06S	☐M-☐M	12·14·15	12·14·15	68	40	40	65.6	25	25	6	4.8	30	4-M6 × 25	4-M5	2-M5
SFS-08S	☐M-☐M	15·16·20·22	15·16·20·22	82	54	54	75.6	30	30	6	4.8	38	4-M6 × 29	4-M6	2-M6
SFS-09S	☐M-☐M	25·28	25·28	94	58	58	77.6	30	30	8	4.8	42	4-M8 × 36	6-M6	2-M6
	☐M-35M	25·28	35			68	85.6		38						
SFS-10S	☐M-☐M	25·28·30·35	25·28·30·35	104	68	68	89.6	35	35	10	4.8	48	4-M8 × 36	6-M6	2-M6
SFS-12S	☐M-☐M*1	30·35	30·35	126	78	78	101.6	40	40	11	5.3	54	4-M10 × 45	4-M8	2-M8
SFS-14S	35M-35M	35	35	144	88	88	112.6	45	45	12	5.3	61	4-M12 × 54	6-M8	2-M8

* For a standard bore diameter, consult Miki Pulley as restrictions may apply to the permitted torque.

* The nominal diameters of each bolt and tap are equal to the quantity minus the nominal diameter of the screw threads times the nominal length. The quantities for the pressure bolt M1 and detachment screw hole M2 are quantities for the hub on one side.

* The rated torque of SFS-12S-30M-☐M in note *1 is limited by the ø30 shaft coupling mechanism and is 380 N·m.

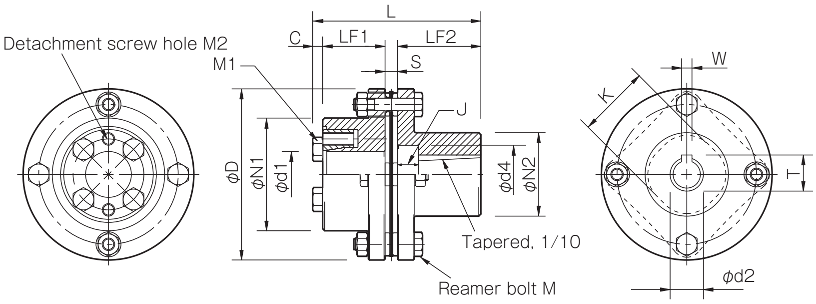
* The machining tolerance for paired mounting shafts is h7 (h6 or g6) class. However, for a shaft diameter of 35 mm, the tolerance is $^{+0.010}_{-0.025}$.

How to Place an Order

SFS-10S-25M-30M

Size
Type: S
Single element
Bore diameter: d1 (Small diameter) - d2 (Large diameter)
M: Frictional coupling

Dimension (SFS-☐S-☐M-☐C) Frictional Coupling/Tapered Shaft Supported



CAD

Unit [mm]

Model	Bore diameter	d1	d2	W $^{+0.030}_{0}$	T $^{+0.3}_{0}$	d4	J	D	N1	N2	L	LF1	LF2	S	C	K	M	M1	M2
SFS-06S	☐M-11C	12·14·15	11	4	12.2	18	9	68	40	30	60.8	25	25	6	4.8	30	4-M6 × 25	4-M5	2-M5
	15M-16C	15	16	5	17.3	28	10			40	75.8		40						
SFS-08S	☐M-16C	15·16·20·22	16	5	17.3	28	10	82	54	40	80.8	30	40	6	4.8	38	4-M6 × 29	4-M6	2-M6
SFS-09S	☐M-16C	25·28	16	5	17.3	28	10	94	58	40	82.8	30	40	8	4.8	42	4-M8 × 36	6-M6	2-M6

* For a standard bore diameter, consult Miki Pulley as restrictions may apply to the permitted torque.

* The nominal diameters of each bolt and tap are equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

* The machining tolerance for paired mounting shafts of the hub on the friction-coupled side is h7 (h6 or g6) class.

How to Place an Order

SFS-08S-20M-16C

Size
Type: S
Single element
Bore diameter: d1 - d2
M: Frictional coupling
C: Tapered shaft supported

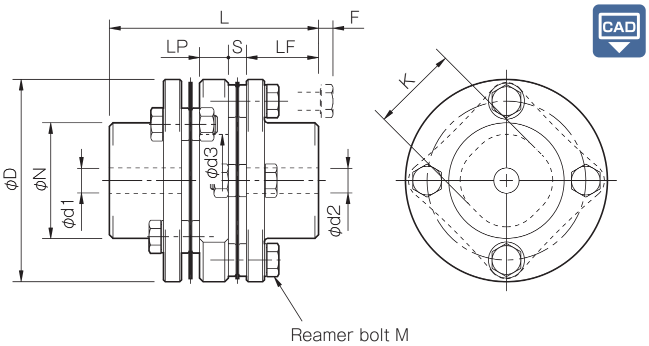
SFS W Types Double Element Type

Specifications

Model	Rated torque [N·m]	Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFS-05W	20	0.2	1 (On one side)	±1.2	10000	8000	21	0.14×10^{-3}	0.40
SFS-06W	40	0.3	1 (On one side)	±1.6	8000	14000	22	0.41×10^{-3}	0.70
SFS-08W	80	0.3	1 (On one side)	±2.0	6800	41000	30	1.10×10^{-3}	1.30
SFS-09W	180	0.5	1 (On one side)	±2.4	6000	85000	61	2.20×10^{-3}	2.10
SFS-10W	250	0.5	1 (On one side)	±2.8	5200	125000	80	3.60×10^{-3}	2.80
SFS-12W	450	0.6	1 (On one side)	±3.2	4400	215000	98	9.20×10^{-3}	4.90
SFS-14W	800	0.7	1 (On one side)	±3.6	3800	390000	156	15.00×10^{-3}	7.10
SFS-05W-C	15	0.2	1 (On one side)	±1.2	10000	8000	21	0.14×10^{-3}	0.40
SFS-06W-C	30	0.3	1 (On one side)	±1.6	8000	14000	22	0.41×10^{-3}	0.70
SFS-08W-C	60	0.3	1 (On one side)	±2.0	6800	41000	30	1.10×10^{-3}	1.30
SFS-09W-C	135	0.5	1 (On one side)	±2.4	6000	85000	61	2.20×10^{-3}	2.10
SFS-10W-C	190	0.5	1 (On one side)	±2.8	5200	125000	80	3.60×10^{-3}	2.80
SFS-12W-C	340	0.6	1 (On one side)	±3.2	4400	215000	98	9.20×10^{-3}	4.90
SFS-14W-C	600	0.7	1 (On one side)	±3.6	3800	390000	156	15.00×10^{-3}	7.10
SFS-06W-□M-□M	40	0.3	1 (On one side)	±1.6	5000	14000	22	0.41×10^{-3}	0.90
SFS-08W-□M-□M	80	0.3	1 (On one side)	±2.0	5000	41000	30	1.16×10^{-3}	1.60
SFS-09W-□M-□M	180	0.5	1 (On one side)	±2.4	5000	85000	61	2.40×10^{-3}	2.50
SFS-10W-□M-□M	250	0.5	1 (On one side)	±2.8	5000	125000	80	3.70×10^{-3}	3.00
SFS-12W-□M-□M	450	0.6	1 (On one side)	±3.2	4400	215000	98	9.50×10^{-3}	5.60
SFS-14W-35M-35M	580	0.7	1 (On one side)	±3.6	3800	390000	156	19.11×10^{-3}	8.60
SFS-06W-□M-11C	40	0.3	1 (On one side)	±1.6	5000	14000	22	0.40×10^{-3}	0.80
SFS-06W-15M-16C	40	0.3	1 (On one side)	±1.6	5000	14000	22	0.45×10^{-3}	0.90
SFS-08W-□M-16C	80	0.3	1 (On one side)	±2.0	5000	41000	30	1.07×10^{-3}	1.50
SFS-09W-□M-16C	180	0.5	1 (On one side)	±2.4	5000	85000	61	2.10×10^{-3}	2.30

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimension (SFS-□W) Pilot Bore/Key or Set Screw



Unit [mm]

Model	d1・d2			D	N	L	LF	LP	S	F	d3	K	M
	Pilot bore	Min.	Max.										
SFS-05W	7	8	20	56	32	58	20	8	5	4	20	24	8-M5 × 15
SFS-06W	7	8	25	68	40	74	25	12	6	3	24	30	8-M6 × 18
SFS-08W	10	11	35	82	54	84	30	12	6	2	28	38	8-M6 × 20
SFS-09W	10	11	38	94	58	98	30	22	8	12	32	42	8-M8 × 27
SFS-10W	15	16	42	104	68	110	35	20	10	7	34	48	8-M8 × 27
SFS-12W	18	19	50	126	78	127	40	25	11	10	40	54	8-M10 × 32
SFS-14W	20	22	60	144	88	144	45	30	12	15	46	61	8-M12 × 38

*Pilot bores are to be drilled into the part. See the standard hole-drilling standards of P.54 for information on bore drilling.
*The nominal diameter of the reamer bolt is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

How to Place an Order

SFS-10W-C-25H-30H

Size

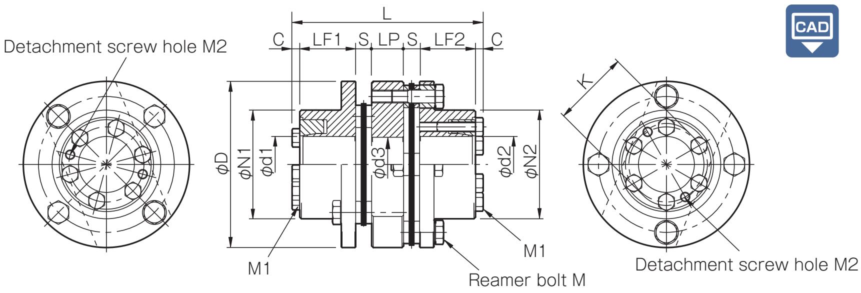
Type: W
Double element

Surface finishing options
Blank: Black coating
-C: Electroless nickel plating

Bore diameter: d1 (Small diameter) - d2 (Large diameter)

Bore specifications
Blank: Pilot bore
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
J: Compliant with the new JIS standards Js9
P: Compliant with the new JIS standards P9
N: Compliant with the new motor standards

Dimensions (SFS-☐W-☐M-☐M) Frictional Coupling



Unit [mm]

Model	Bore diameter	d1	d2	D	N1	N2	L	LF1	LF2	LP	S	C	d3	K	M	M1	M2
SFS-06W	☐M-☐M	12･14･15	12･14･15	68	40	40	83.6	25	25	12	6	4.8	24	30	8-M6 × 18	4-M5	2-M5
SFS-08W	☐M-☐M	15･16･20･22	15･16･20･22	82	54	54	93.6	30	30	12	6	4.8	28	38	8-M6 × 20	4-M6	2-M6
SFS-09W	☐M-☐M	25･28	25･28	94	58	58	107.6	30	30	22	8	4.8	32	42	8-M8 × 27	6-M6	2-M6
	☐M-35M	25･28	35			68	115.6		38								
SFS-10W	☐M-☐M	25･28･30･35	25･28･30･35	104	68	68	119.6	35	35	20	10	4.8	34	48	8-M8 × 27	6-M6	2-M6
SFS-12W	☐M-☐M *1	30･35	30･35	126	78	78	137.6	40	40	25	11	5.3	40	54	8-M10 × 32	4-M8	2-M8
SFS-14W	35M-35M	35	35	144	88	88	154.6	45	45	30	12	5.3	46	61	8-M12 × 38	6-M8	2-M8

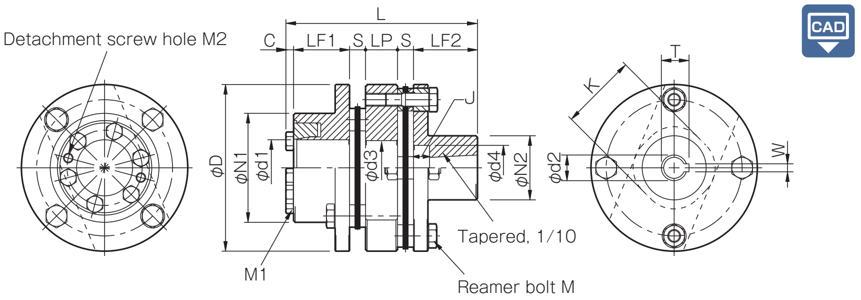
* For a standard bore diameter, consult Miki Pulley as restrictions may apply to the permitted torque.
* The nominal diameters of each bolt and tap are equal to the quantity minus the nominal diameter of the screw threads times the nominal length. The quantities for the pressure bolt M1 and detachment screw hole M2 are quantities for the hub on one side.
* The rated torque of SFS-12W-30M-☐M in note *1 is limited by the ø35 shaft coupling mechanism and is 380 N·m.
* The machining tolerance for paired mounting shafts is h7 (h6 or g6) class.

How to Place an Order

SFS-10W-25M-30M

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
M: Frictional coupling
Type: W
Double element
Size

Dimension (SFS-☐W-☐M-☐C) Frictional Coupling/Tapered Shaft Supported



Unit [mm]

Model	Bore diameter	d1	d2	W $^{+0.030}_{0}$	T $^{+0.3}_{0}$	d4	J	D	N1	N2	L	LF1	LF2	LP	S	C	d3	K	M	M1	M2
SFS-06W	☐M-11C	12･14･15	11	4	12.2	18	9	68	40	30	78.8	25	25	12	6	4.8	24	30	8-M6 × 18	4-M5	2-M5
	15M-16C	15	16	5	17.3	28	10			40	93.8		40								
SFS-08W	☐M-16C	15･16･20･22	16	5	17.3	28	10	82	54	40	98.8	30	40	12	6	4.8	28	38	8-M6 × 20	4-M6	2-M6
SFS-09W	☐M-16C	25･28	16	5	17.3	28	10	94	58	40	112.8	30	40	22	8	4.8	32	42	8-M8 × 27	6-M6	2-M6

* For a standard bore diameter, consult Miki Pulley as restrictions may apply to the permitted torque.
* The nominal diameters of each bolt and tap are equal to the quantity minus the nominal diameter of the screw threads times the nominal length.
* The machining tolerance for paired mounting shafts of the hub on the friction-coupled side is h7 (h6 or g6) class.

How to Place an Order

SFS-08W-20M-16C

Bore diameter: d1 - d2
M: Frictional coupling
C: Tapered shaft supported
Type: W
Double element
Size

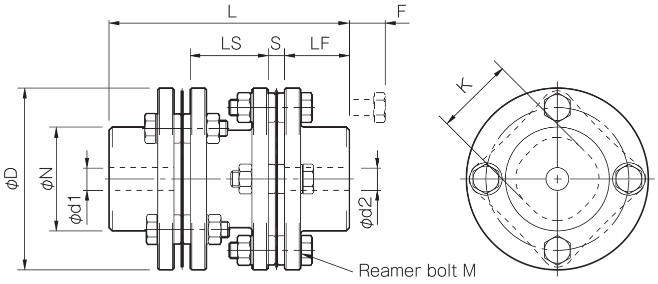
SFS G Types Double Element/Floating Shaft Type

Specifications

Model	Rated torque [N·m]	Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFS-05G	20	0.5	1 (On one side)	± 1.2	20000	8000	21	0.20×10^{-3}	0.50
SFS-06G	40	0.5	1 (On one side)	± 1.6	16000	14000	22	0.55×10^{-3}	0.90
SFS-08G	80	0.5	1 (On one side)	± 2.0	13000	41000	30	1.50×10^{-3}	1.70
SFS-09G	180	0.6	1 (On one side)	± 2.4	12000	85000	61	2.90×10^{-3}	2.40
SFS-10G	250	0.6	1 (On one side)	± 2.8	10000	125000	80	4.60×10^{-3}	3.30
SFS-12G	450	0.8	1 (On one side)	± 3.2	8000	215000	98	11.80×10^{-3}	5.80
SFS-14G	800	0.9	1 (On one side)	± 3.6	7000	390000	156	21.20×10^{-3}	8.60
SFS-05G-C	15	0.5	1 (On one side)	± 1.2	20000	8000	21	0.20×10^{-3}	0.50
SFS-06G-C	30	0.5	1 (On one side)	± 1.6	16000	14000	22	0.55×10^{-3}	0.90
SFS-08G-C	60	0.5	1 (On one side)	± 2.0	13000	41000	30	1.50×10^{-3}	1.70
SFS-09G-C	135	0.6	1 (On one side)	± 2.4	12000	85000	61	2.90×10^{-3}	2.40
SFS-10G-C	190	0.6	1 (On one side)	± 2.8	10000	125000	80	4.60×10^{-3}	3.30
SFS-12G-C	340	0.8	1 (On one side)	± 3.2	8000	215000	98	11.80×10^{-3}	5.80
SFS-14G-C	600	0.9	1 (On one side)	± 3.6	7000	390000	156	21.20×10^{-3}	8.60
SFS-06G-□M-□M	40	0.5	1 (On one side)	± 1.6	5000	14000	22	0.55×10^{-3}	1.10
SFS-08G-□M-□M	80	0.5	1 (On one side)	± 2.0	5000	41000	30	1.56×10^{-3}	2.00
SFS-09G-□M-□M	180	0.6	1 (On one side)	± 2.4	5000	85000	61	3.10×10^{-3}	2.80
SFS-10G-□M-□M	250	0.6	1 (On one side)	± 2.8	5000	125000	80	4.70×10^{-3}	3.50
SFS-12G-□M-□M	450	0.8	1 (On one side)	± 3.2	5000	215000	98	12.10×10^{-3}	6.50
SFS-14G-35M-35M	580	0.9	1 (On one side)	± 3.6	5000	390000	156	25.31×10^{-3}	10.10
SFS-06G-□M-11C	40	0.5	1 (On one side)	± 1.6	5000	14000	22	0.54×10^{-3}	1.00
SFS-06G-15M-16C	40	0.5	1 (On one side)	± 1.6	5000	14000	22	0.59×10^{-3}	1.10
SFS-08G-□M-16C	80	0.5	1 (On one side)	± 2.0	5000	41000	30	1.47×10^{-3}	1.90
SFS-09G-□M-16C	180	0.6	1 (On one side)	± 2.4	5000	85000	61	2.80×10^{-3}	2.60

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimension (SFS-□G) Pilot Bore/Key or Set Screw



Unit [mm]

Model	d1 • d2			D	N	L	LF	LS	S	F	K	M
	Pilot bore	Min.	Max.									
SFS-05G	7	8	20	56	32	74	20	24	5	11	24	8-M5 × 22
SFS-06G	7	8	25	68	40	86	25	24	6	10	30	8-M6 × 25
SFS-08G	10	11	35	82	54	98	30	26	6	11	38	8-M6 × 29
SFS-09G	10	11	38	94	58	106	30	30	8	21	42	8-M8 × 36
SFS-10G	15	16	42	104	68	120	35	30	10	16	48	8-M8 × 36
SFS-12G	18	19	50	126	78	140	40	38	11	23	54	8-M10 × 45
SFS-14G	20	22	60	144	88	160	45	46	12	31	61	8-M12 × 54

* Pilot bores are to be drilled into the part. See the standard hole-drilling standards of P.54 for information on bore drilling.
* If you require a product with an LS dimension other than that above, contact Miki Pulley with your required dimension. Please contact Miki Pulley for assistance if LS ≧ 1000.
* Please note that when the LS dimension exceeds 100 mm with the electroless nickel plating option (SFS-□G-C), the insertion length of the shaft cannot exceed the LS dimension.
* The nominal diameter of the reamer bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

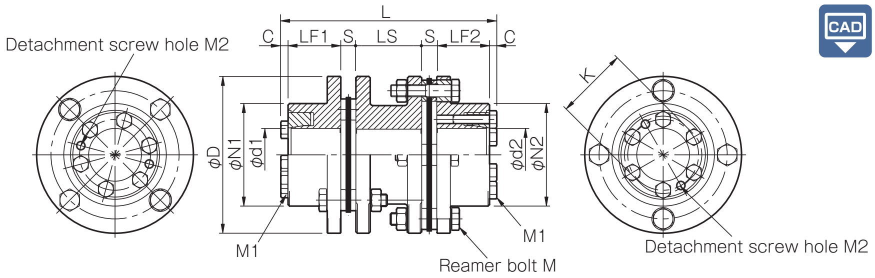
How to Place an Order

SFS-10G-C-25H-30H LS=500

Size
Type: G
Double element
Floating shaft
Surface finishing options
Blank: Black coating
-C: Electroless nickel plating
Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore
Spacer length
* Use mm units for LS dimensions.
* Leave blank for standard spacers.

Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
J: Compliant with the new JIS standards Js9
P: Compliant with the new JIS standards P9
N: Compliant with the new motor standards

Dimensions (SFS-☐G-☐M-☐M) Frictional Coupling



Unit [mm]

Model	Bore diameter	d1	d2	D	N1	N2	L	LF1	LF2	LS	S	C	K	M	M1	M2
SFS-06G	☐M-☐M	12·14·15	12·14·15	68	40	40	95.6	25	25	24	6	4.8	30	8-M6 × 18	4-M5	2-M5
SFS-08G	☐M-☐M	15·16·20·22	15·16·20·22	82	54	54	107.6	30	30	26	6	4.8	38	8-M6 × 20	4-M6	2-M6
SFS-09G	☐M-☐M	25·28	25·28	94	58	58	115.6	30	30	30	8	4.8	42	8-M8 × 27	6-M6	2-M6
	☐M-35M	25·28	35			68	123.6		38							
SFS-10G	☐M-☐M	25·28·30·35	25·28·30·35	104	68	68	129.6	35	35	30	10	4.8	48	8-M8 × 27	6-M6	2-M6
SFS-12G	☐M-☐M*1	30·35	30·35	126	78	78	150.6	40	40	38	11	5.3	54	8-M10 × 32	4-M8	2-M8
SFS-14G	35M-35M	35	35	144	88	88	170.6	45	45	46	12	5.3	61	8-M12 × 38	6-M8	2-M8

* For a standard bore diameter, consult Miki Pulley as restrictions may apply to the permitted torque.

* If you require a product with an LS dimension other than that above, contact Miki Pulley with your required dimension. Please contact Miki Pulley for assistance if LS ≧ 1000.

* The nominal diameters of each bolt and tap are equal to the quantity minus the nominal diameter of the screw threads times the nominal length. The quantities for the pressure bolt M1 and detachment screw hole M2 are quantities for the hub on one side.

* The rated torque of SFS-12G-30M-☐M in note *1 is limited by the ø30 shaft coupling mechanism and is 380 N·m.

* The machining tolerance for paired mounting shafts is h7 (h6 or g6) class. However, for a shaft diameter of 35 mm, the tolerance is $^{+0.010}_{-0.025}$.

How to Place an Order

SFS-10G-25M-30M LS=500

Size

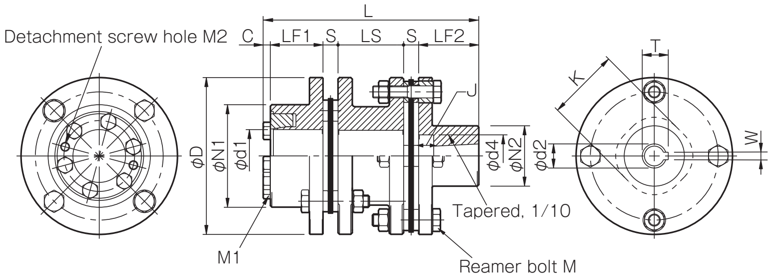
Type: G
Double element
Floating shaft

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
M: Frictional coupling

Spacer length

*Use mm units for LS dimensions.
*Leave blank for standard spacers.

Dimension (SFS-☐G-☐M-☐C) Frictional Coupling/Tapered Shaft Supported



Unit [mm]

Model	Bore diameter	d1	d2	W $^{+0.030}_{0}$	T $^{+0.3}_{0}$	d4	J	D	N1	N2	L	LF1	LF2	LS	S	C	K	M	M1	M2
SFS-06G	☐M-11C	12·14·15	11	4	12.2	18	9	68	40	30	90.8	25	25	24	6	4.8	30	8-M6 × 18	4-M5	2-M5
	15M-16C	15	16	5	17.3	28	10			40	105.8		40							
SFS-08G	☐M-16C	15·16·20·22	16	5	17.3	28	10	82	54	40	112.8	30	40	26	6	4.8	38	8-M6 × 20	4-M6	2-M6
SFS-09G	☐M-16C	25·28	16	5	17.3	28	10	94	58	40	120.8	30	40	30	8	4.8	42	8-M8 × 27	6-M6	2-M6

* For a standard bore diameter, consult Miki Pulley as restrictions may apply to the permitted torque.

* If you require a product with an LS dimension other than that above, contact Miki Pulley with your required dimension. Please contact Miki Pulley for assistance if LS ≧ 1000.

* The nominal diameters of each bolt and tap are equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

* The machining tolerance for paired mounting shafts of the hub on the friction-coupled side is h7 (h6 or g6) class.

How to Place an Order

SFS-08G-20M-16C LS=500

Size

Type: G
Double element
Floating shaft

Bore diameter: d1 - d2
M: Frictional coupling
C: Tapered shaft supported

Spacer length

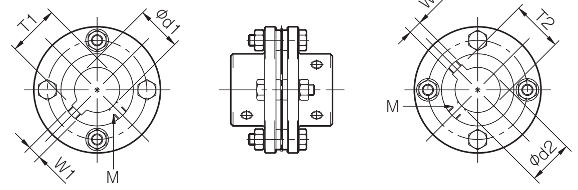
*Use mm units for LS dimensions.
*Leave blank for standard spacers.

SFS Models

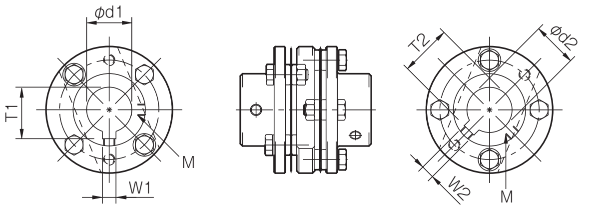
Standard Hole-Drilling Standards

- Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular flange hub.
- Set screw positions are not on the same plane.
- The set screws are included with the product.
- Consult the technical documentation at the end of this volume for standard dimensions for bore drilling other than those given here.

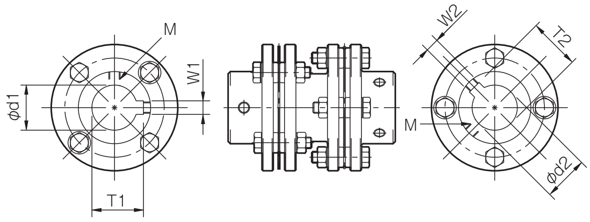
■ SFH S



■ SFS W



■ SFH G



Unit [mm]

Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards (H9)					Models compliant with the new JIS standards (Js9)					Models compliant with the new JIS standards (P9)				
Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]
Toler-ance	H7, H8	E9	$^{+0.3}_{0}$	–	Toler-ance	H7, H8	H9	$^{+0.3}_{0}$	–	Toler-ance	H7, H8	Js9	$^{+0.3}_{0}$	–	Toler-ance	H7, H8	P9	$^{+0.3}_{0}$	–
8	$8^{+0.022}_{0}$	–	–	2-M4	8H	$8^{+0.022}_{0}$	$3^{+0.025}_{0}$	9.4	2-M4	8J	$8^{+0.022}_{0}$	3 ± 0.0125	9.4	2-M4	8P	$8^{+0.022}_{0}$	$3^{-0.006}_{-0.031}$	9.4	2-M4
9	$9^{+0.022}_{0}$	–	–	2-M4	9H	$9^{+0.022}_{0}$	$3^{+0.025}_{0}$	10.4	2-M4	9J	$9^{+0.022}_{0}$	3 ± 0.0125	10.4	2-M4	9P	$9^{+0.022}_{0}$	$3^{-0.006}_{-0.031}$	10.4	2-M4
10	$10^{+0.022}_{0}$	–	–	2-M4	10H	$10^{+0.022}_{0}$	$3^{+0.025}_{0}$	11.4	2-M4	10J	$10^{+0.022}_{0}$	3 ± 0.0125	11.4	2-M4	10P	$10^{+0.022}_{0}$	$3^{-0.006}_{-0.031}$	11.4	2-M4
11	$11^{+0.018}_{0}$	–	–	2-M4	11H	$11^{+0.018}_{0}$	$4^{+0.030}_{0}$	12.8	2-M4	11J	$11^{+0.018}_{0}$	4 ± 0.0150	12.8	2-M4	11P	$11^{+0.018}_{0}$	$4^{-0.012}_{-0.042}$	12.8	2-M4
12	$12^{+0.018}_{0}$	$4^{+0.050}_{+0.020}$	13.5	2-M4	12H	$12^{+0.018}_{0}$	$4^{+0.030}_{0}$	13.8	2-M4	12J	$12^{+0.018}_{0}$	4 ± 0.0150	13.8	2-M4	12P	$12^{+0.018}_{0}$	$4^{-0.012}_{-0.042}$	13.8	2-M4
14	$14^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	16.0	2-M4	14H	$14^{+0.018}_{0}$	$5^{+0.030}_{0}$	16.3	2-M4	14J	$14^{+0.018}_{0}$	5 ± 0.0150	16.3	2-M4	14P	$14^{+0.018}_{0}$	$5^{-0.012}_{-0.042}$	16.3	2-M4
15	$15^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	17.0	2-M4	15H	$15^{+0.018}_{0}$	$5^{+0.030}_{0}$	17.3	2-M4	15J	$15^{+0.018}_{0}$	5 ± 0.0150	17.3	2-M4	15P	$15^{+0.018}_{0}$	$5^{-0.012}_{-0.042}$	17.3	2-M4
16	$16^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	18.0	2-M4	16H	$16^{+0.018}_{0}$	$5^{+0.030}_{0}$	18.3	2-M4	16J	$16^{+0.018}_{0}$	5 ± 0.0150	18.3	2-M4	16P	$16^{+0.018}_{0}$	$5^{-0.012}_{-0.042}$	18.3	2-M4
17	$17^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	19.0	2-M4	17H	$17^{+0.018}_{0}$	$5^{+0.030}_{0}$	19.3	2-M4	17J	$17^{+0.018}_{0}$	5 ± 0.0150	19.3	2-M4	17P	$17^{+0.018}_{0}$	$5^{-0.012}_{-0.042}$	19.3	2-M4
18	$18^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	20.0	2-M4	18H	$18^{+0.018}_{0}$	$6^{+0.030}_{0}$	20.8	2-M5	18J	$18^{+0.018}_{0}$	6 ± 0.0150	20.8	2-M5	18P	$18^{+0.018}_{0}$	$6^{-0.012}_{-0.042}$	20.8	2-M5
19	$19^{+0.021}_{0}$	$5^{+0.050}_{+0.020}$	21.0	2-M4	19H	$19^{+0.021}_{0}$	$6^{+0.030}_{0}$	21.8	2-M5	19J	$19^{+0.021}_{0}$	6 ± 0.0150	21.8	2-M5	19P	$19^{+0.021}_{0}$	$6^{-0.012}_{-0.042}$	21.8	2-M5
20	$20^{+0.021}_{0}$	$5^{+0.050}_{+0.020}$	22.0	2-M4	20H	$20^{+0.021}_{0}$	$6^{+0.030}_{0}$	22.8	2-M5	20J	$20^{+0.021}_{0}$	6 ± 0.0150	22.8	2-M5	20P	$20^{+0.021}_{0}$	$6^{-0.012}_{-0.042}$	22.8	2-M5
22	$22^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	25.0	2-M6	22H	$22^{+0.021}_{0}$	$6^{+0.030}_{0}$	24.8	2-M5	22J	$22^{+0.021}_{0}$	6 ± 0.0150	24.8	2-M5	22P	$22^{+0.021}_{0}$	$6^{-0.012}_{-0.042}$	24.8	2-M5
24	$24^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	27.0	2-M6	24H	$24^{+0.021}_{0}$	$8^{+0.036}_{0}$	27.3	2-M6	24J	$24^{+0.021}_{0}$	8 ± 0.0180	27.3	2-M6	24P	$24^{+0.021}_{0}$	$8^{-0.015}_{-0.051}$	27.3	2-M6
25	$25^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	28.0	2-M6	25H	$25^{+0.021}_{0}$	$8^{+0.036}_{0}$	28.3	2-M6	25J	$25^{+0.021}_{0}$	8 ± 0.0180	28.3	2-M6	25P	$25^{+0.021}_{0}$	$8^{-0.015}_{-0.051}$	28.3	2-M6
28	$28^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	31.0	2-M6	28H	$28^{+0.021}_{0}$	$8^{+0.036}_{0}$	31.3	2-M6	28J	$28^{+0.021}_{0}$	8 ± 0.0180	31.3	2-M6	28P	$28^{+0.021}_{0}$	$8^{-0.015}_{-0.051}$	31.3	2-M6
30	$30^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	33.0	2-M6	30H	$30^{+0.021}_{0}$	$8^{+0.036}_{0}$	33.3	2-M6	30J	$30^{+0.021}_{0}$	8 ± 0.0180	33.3	2-M6	30P	$30^{+0.021}_{0}$	$8^{-0.015}_{-0.051}$	33.3	2-M6
32	$32^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	35.5	2-M8	32H	$32^{+0.025}_{0}$	$10^{+0.036}_{0}$	35.3	2-M8	32J	$32^{+0.025}_{0}$	10 ± 0.0180	35.3	2-M8	32P	$32^{+0.025}_{0}$	$10^{-0.015}_{-0.051}$	35.3	2-M8
35	$35^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	38.5	2-M8	35H	$35^{+0.025}_{0}$	$10^{+0.036}_{0}$	38.3	2-M8	35J	$35^{+0.025}_{0}$	10 ± 0.0180	38.3	2-M8	35P	$35^{+0.025}_{0}$	$10^{-0.015}_{-0.051}$	38.3	2-M8
38	$38^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	41.5	2-M8	38H	$38^{+0.025}_{0}$	$10^{+0.036}_{0}$	41.3	2-M8	38J	$38^{+0.025}_{0}$	10 ± 0.0180	41.3	2-M8	38P	$38^{+0.025}_{0}$	$10^{-0.015}_{-0.051}$	41.3	2-M8
40	$40^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	43.5	2-M8	40H	$40^{+0.025}_{0}$	$12^{+0.043}_{0}$	43.3	2-M8	40J	$40^{+0.025}_{0}$	12 ± 0.0215	43.3	2-M8	40P	$40^{+0.025}_{0}$	$12^{-0.018}_{-0.061}$	43.3	2-M8
42	$42^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	45.5	2-M8	42H	$42^{+0.025}_{0}$	$12^{+0.043}_{0}$	45.3	2-M8	42J	$42^{+0.025}_{0}$	12 ± 0.0215	45.3	2-M8	42P	$42^{+0.025}_{0}$	$12^{-0.018}_{-0.061}$	45.3	2-M8
45	$45^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	48.5	2-M8	45H	$45^{+0.025}_{0}$	$14^{+0.043}_{0}$	48.8	2-M10	45J	$45^{+0.025}_{0}$	14 ± 0.0215	48.8	2-M10	45P	$45^{+0.025}_{0}$	$14^{-0.018}_{-0.061}$	48.8	2-M10
48	$48^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	51.5	2-M8	48H	$48^{+0.025}_{0}$	$14^{+0.043}_{0}$	51.8	2-M10	48J	$48^{+0.025}_{0}$	14 ± 0.0215	51.8	2-M10	48P	$48^{+0.025}_{0}$	$14^{-0.018}_{-0.061}$	51.8	2-M10
50	$50^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	53.5	2-M8	50H	$50^{+0.025}_{0}$	$14^{+0.043}_{0}$	53.8	2-M10	50J	$50^{+0.025}_{0}$	14 ± 0.0215	53.8	2-M10	50P	$50^{+0.025}_{0}$	$14^{-0.018}_{-0.061}$	53.8	2-M10
55	$55^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	60.0	2-M10	55H	$55^{+0.030}_{0}$	$16^{+0.043}_{0}$	59.3	2-M10	55J	$55^{+0.030}_{0}$	16 ± 0.0215	59.3	2-M10	55P	$55^{+0.030}_{0}$	$16^{-0.018}_{-0.061}$	59.3	2-M10
56	$56^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	61.0	2-M10	56H	$56^{+0.030}_{0}$	$16^{+0.043}_{0}$	60.3	2-M10	56J	$56^{+0.030}_{0}$	16 ± 0.0215	60.3	2-M10	56P	$56^{+0.030}_{0}$	$16^{-0.018}_{-0.061}$	60.3	2-M10
60	$60^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	65.0	2-M10	60H	$60^{+0.030}_{0}$	$18^{+0.043}_{0}$	64.4	2-M10	60J	$60^{+0.030}_{0}$	18 ± 0.0215	64.4	2-M10	60P	$60^{+0.030}_{0}$	$18^{-0.018}_{-0.061}$	64.4	2-M10

Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]
Tolerance	G7, F7	H9	$^{+0.3}_{0}$	–
14N	$14^{+0.024}_{+0.006}$	$5^{+0.030}_{0}$	16.3	2-M4
19N	$19^{+0.028}_{+0.007}$	$6^{+0.030}_{0}$	21.8	2-M5
24N	$24^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	27.3	2-M6
28N	$28^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	31.3	2-M6
38N	$38^{+0.050}_{+0.025}$	$10^{+0.036}_{0}$	41.3	2-M8
42N	$42^{+0.050}_{+0.025}$	$12^{+0.043}_{0}$	45.3	2-M8
48N	$48^{+0.050}_{+0.025}$	$14^{+0.043}_{0}$	51.8	2-M10
55N	$55^{+0.060}_{+0.030}$	$16^{+0.043}_{0}$	59.3	2-M10
60N	$60^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	64.4	2-M10

Distance from Set Screw Edge

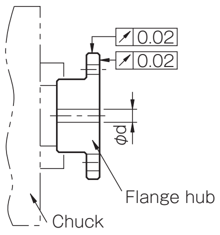
Model	Distance from set screw edge [mm]
SFS-05	7
SFS-06	9
SFS-08	10
SFS-09	10
SFS-10	12
SFS-12	12
SFS-14	15

Centering and Finishing When Drilling Bores in Flange Hubs

Keep the following in mind when processing bore diameters in pilot-bore products.

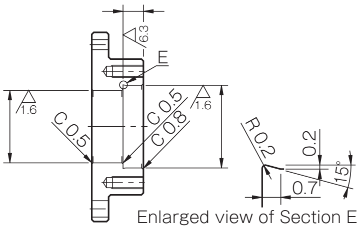
■ Centering

After adjusting the chuck so that runout of each flange hub is no more than the precision of the figure below, finish the inner diameter, guided by Figure A.



■ Locking collar specifications

Finish as shown in Figure B if you are processing for a connection by means of locking collar.



Standard Bore Diameter Combinations

The standard bore diameter combinations for the types that use frictional coupling to mount on the shaft (SFS-☐S/W/G-☐M-☐M) are as follows.

SFS-06		Standard bore diameter d2 [mm]									
		12M	14M	15M	16M	20M	22M	25M	28M	30M	35M
Standard bore diameter d1 [mm]	12M	●	●	●							
	14M		●	●							
	15M			●							

SFS-08		Standard bore diameter d2 [mm]									
		12M	14M	15M	16M	20M	22M	25M	28M	30M	35M
Standard bore diameter d1 [mm]	15M			●	●	●	●				
	16M				●	●	●				
	20M					●	●				
	22M						●				

SFS-09		Standard bore diameter d2 [mm]									
		12M	14M	15M	16M	20M	22M	25M	28M	30M	35M
Standard bore diameter d1 [mm]	25M							●	●		●
	28M								●		●

SFS-10		Standard bore diameter d2 [mm]									
		12M	14M	15M	16M	20M	22M	25M	28M	30M	35M
Standard bore diameter d1 [mm]	25M							●	●	●	●
	28M								●	●	●
	30M									●	●
	35M										●

SFS-12		Standard bore diameter d2 [mm]									
		12M	14M	15M	16M	20M	22M	25M	28M	30M	35M
Standard bore diameter d1 [mm]	30M									380	380
	35M										●

SFS-14		Standard bore diameter d2 [mm]									
		12M	14M	15M	16M	20M	22M	25M	28M	30M	35M
Standard bore diameter d1 [mm]	35M										●

* Bore diameters marked with ● and numbers are supported as standard bore diameter.
* Bore diameters whose fields contain numbers are restricted in their rated torque by the holding power of the shaft connection component because the bore diameter is small. The numbers indicate the rated torque value [N·m].
* Consult Miki Pulley regarding special arrangements for other bore diameters. For small bore diameters, consult Miki Pulley as restrictions may apply to the permitted torque.

SFS Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

SFS S/ W / G types are delivered as components. Select whether to assemble by mounting flange hubs on each shaft and coupling shafts in both directions by mounting the element last, while centering, or to assemble by completing couplings first and then inserting them onto the shafts.
When using the assembly method that completes couplings first, take extra precautions when handling couplings. Subjecting assembled couplings to strong shocks may affect mounting accuracy and cause the parts to break during use.

(1) Couplings are designed for use within an operating temperature range of -30° C to 120℃ . Although the couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water and oil as it may cause part deterioration.

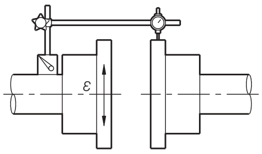
(2) Handle the element with care as it is made of a thin stainless steel metal disc, also making sure to be careful so as not to injure yourself.

(3) For frictional coupling types, do not tighten up pressure bolts until after inserting the mounting shaft.

Centering

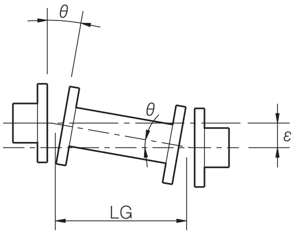
■ Parallel misalignment (ε)

Lock the dial gauge in place on one shaft and then measure the runout of the paired flange hub's outer periphery while rotating that shaft.
Since couplings on which the elements (discs) are a set (SFS S types) do not allow parallel misalignment, get as close to zero as possible. For couplings that allow the entire length to be freely set (SFS G types), use the following formula to calculate allowable parallel misalignment.



$$\varepsilon = \tan\theta \times LG$$

ε : Allowable parallel misalignment
θ : 1°

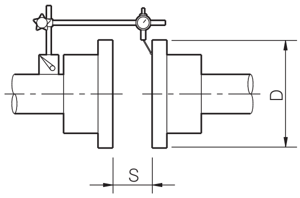


$$LG = LS + S$$

LS: Total length of spacer
S: Dimension of gap between flange hub and spacer

■ Angular deflection(θ)

Lock the dial gauge in place on one shaft and then measure the runout of the end surface near the paired flange hub's outer periphery while rotating that shaft.
Adjust runout B so that $\theta \leqq 1°$ in the following formula.



$$B = D \times \tan\theta$$

B: Runout
D: Flange hub outer diameter
θ : 1°

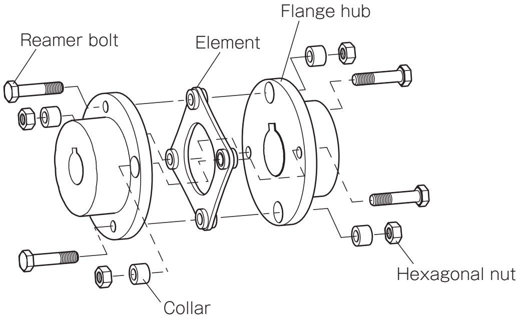
■ Axial displacement (S)

In addition, restrict the dimension between flange hub faces (S in the diagram) within the allowable error range for axial displacement with respect to a reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.

*On the SFS S, this is the dimension of the gap between two flange hubs. On the SFS W/G, dimension S is the gap between the flange hub and the spacer.

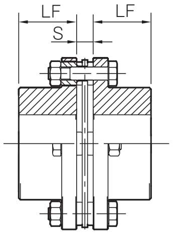
Mounting (SFS S/W/G Types)

This assembly method mounts a flange hub on each shaft of the SFS S/ W/G and couples shafts in both directions by mounting the element last, while centering.



(1) Remove any rust, dust, oil residue, etc. from inner diameter surfaces of the shaft and flange hubs. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Insert each shaft far enough into the flange hub that the paired mounting shaft touches the shaft along the entire length of the flange hub (LF dimension), as shown in the diagram below, and does not interfere with the elements, spacers or the other shaft.



(3) Mount the other flange hub on the paired mounting shaft as described in steps (1) and (2).

(4) Keep the width of the dimension between flange hub faces (S dimension in the diagram) within the allowable error range for axial misalignment with respect to the reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.

Coupling size	05	06	08	09	10	12	14
S [mm]	5	6	6	8	10	11	12

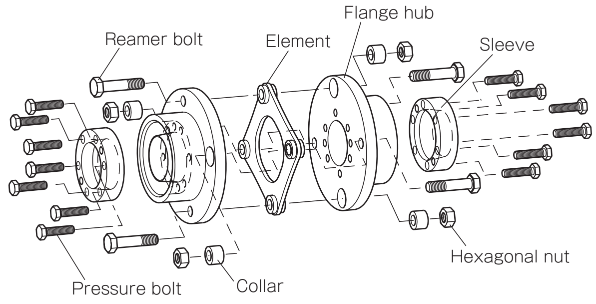
(5) Insert the element into the gap between the two flange hubs, and then mount it with the reamer bolt for locking the element in place. Check that the element is not deformed. If it is, it may be under an axial force or there may be insufficient lubrication between the collar, bolt, and disc, so adjust to bring it to normal. The situation may be improved by applying a small amount of machine oil to the bearing surface of the reamer bolt. However, never use any oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based) which would dramatically affect the friction coefficient.

(6) Use a calibrated torque wrench to tighten all the reamer bolts to the tightening torques of the table below.

Coupling size	05	06	08	09	10	12	14
Reamer bolt size	M5	M6	M6	M8	M8	M10	M12
Tightening torque [N•m] Black oxide finish (standard) specification	8	14	14	34	34	68	118
Tightening torque [N•m] Electroless nickel plating [° C] specification	6	11	11	26	26	51	90

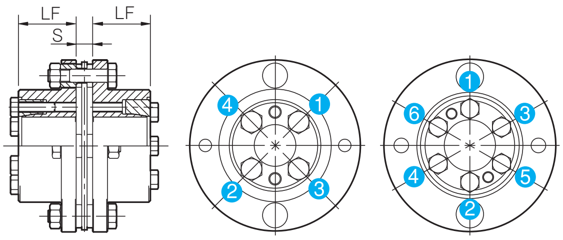
Mounting (SFS S/W/G-☐M-☐M Types)

This assembly method mounts a flange hub on each shaft of the SFS S/W/G-☐M-☐M type and couples both shafts by mounting the element last while centering.



(1) Loosen the pressure bolts of the flange hubs, check that the sleeve can move freely, and then remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and flange hubs. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Insert each shaft far enough into the flange hub that the paired mounting shaft touches the shaft along the entire length of the flange hub (LF dimension), as shown in the diagram below, and does not interfere with the elements, spacers or the other shaft. Then, holding them in place, tighten the pressure bolts evenly, a little at a time on the diagonal, following the tightening sequence shown in the figure below.



(3) Mount the other flange hub on the paired mounting shaft as described in steps (1) and (2).

(4) Keep the width of the dimension between flange hub faces (S dimension in the diagram) within the allowable error range for axial misalignment with respect to the reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.

Coupling size	06	08	09	10	12	14
S [mm]	6	6	8	10	11	12

(5) Insert the element into the gap between the two flange hubs, and then mount it with the reamer bolt for locking the element in place. Check that the element is not deformed. If it is, it may be under an axial force or there may be insufficient lubrication between the collar, bolt, and disc, so adjust to bring it to normal. The situation may be improved by applying a small amount of machine oil to the bearing surface of the reamer bolt. However, never use any oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based) which would dramatically affect the friction coefficient.

(6) Use a calibrated torque wrench to tighten all the reamer and pressure bolts to the tightening torques of the table below.

Coupling size	06	08	09	10	12	14
Reamer bolt size	M6	M6	M8	M8	M10	M12
Tightening torque [N·m]	14	14	34	34	68	118
Pressure bolt size	M5	M6	M6	M6	M8	M8
Tightening torque [N·m]	8	14	14	14	34	34

Mounting (When Mounted After Coupling Is Completed)

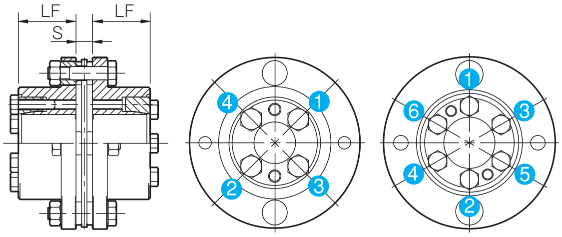
This SFS S/W/G type assembly method first completes the coupling and then inserts it onto the shaft.

(1) Remove any rust, dust, oil or the like from the inner diameter surfaces of the shaft and flange hubs. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.
For types that use frictional coupling, loosen the flange hub's pressure bolt and check that the sleeve can move freely.

(2) Be careful when inserting the couplings into the shaft so as not to apply excessive force of compression or tensile force to the element.
Be particularly careful not to mistakenly apply excessive compression force when inserting couplings into the paired shaft after mounting on one shaft.

(3) For frictional coupling types, with the pressure bolts loosened, make sure that couplings move gently in the axial and rotational directions.
Readjust the centering of the two shafts if the couplings fail to move smoothly enough.

(4) Insert each shaft far enough into the flange hub that the paired mounting shaft touches the shaft along the entire length of the flange hub (LF dimension), as shown in the diagram below. Then position it so that it does not interfere with the elements, spacers or the other shaft and lock it in place. For frictional coupling types, tighten the pressure bolts evenly, a little at a time on the diagonal, following the tightening sequence shown in the figure below.



(5) Keep the width of the dimension between flange hub faces (S dimension in the diagram) within the allowable error range for axial misalignment with respect to the reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.

Coupling size	05	06	08	09	10	12	14
S [mm]	5	6	6	8	10	11	12

(6) Use a calibrated torque wrench to tighten all the pressure bolts to the appropriate tightening torques of the table below.

Coupling size	06	08	09	10	12	14
Pressure bolt size	M5	M6	M6	M6	M8	M8
Tightening torque [N·m]	8	14	14	14	34	34

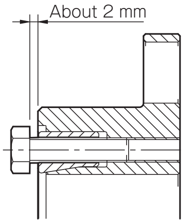
SFS Models

Items Checked for Design Purposes

Removal

(1) Check to confirm that there is no torque or axial direction load being applied to the coupling. There may be cases where a torque is applied to the coupling, particularly when the safety brake is being used. Make sure to verify that this is not occurring before removing parts.

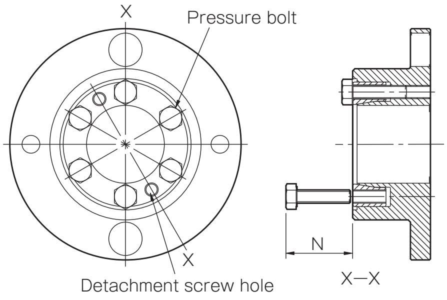
(2) Loosen all the pressure bolts placing pressure on the sleeve until the gap between bearing seat and sleeve is about 2 mm.



In the case of a tapered coupling system that tightens a pressure bolt from the axial direction, the sleeve will be self-locking, so the coupling between flange hub and shaft cannot be released simply by loosening the pressure bolt. (Note that in some cases, a coupling can be released by loosening a pressure bolt.)
For that reason, when designing couplings, a space must be installed for inserting a detachment screw.
If there is no space in the axial direction, consult Miki Pulley.

(3) Pull out two of the pressure bolts loosened in step (2), insert them into detachment screw holes at two locations on the sleeve, and tighten them alternately, a little at a time. The coupling between the flange hub and shaft will be released.

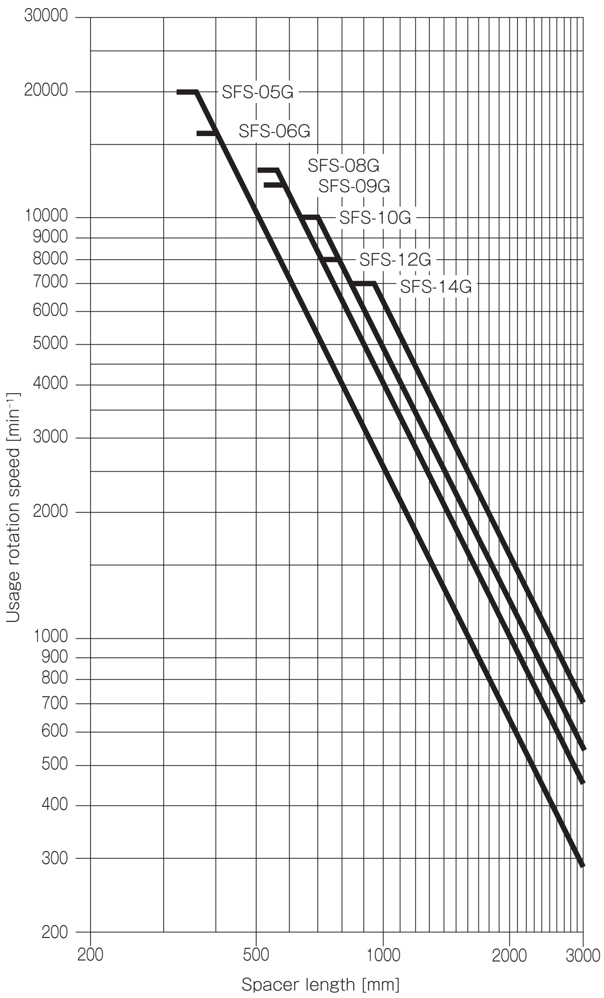
■ SFS-S/W/G type



Coupling size	06	08	09	10	12	14
Nominal diameter of pressure bolt × Length	M5 × 20	M6 × 24	M6 × 24	M6 × 24	M8 × 25	M8 × 25
Recommended N dimension [mm]	26	30	30	30	31.5	31.5

Limit Rotation Speed

For SFS G long spacer types, the speed at which the coupling can be used will vary with the length of spacer selected. Use the following table to confirm that the speed you will use is at or below the limit rotation speed. When a max. rotation speed is set for a specific type, that speed is the upper limit.



Points to Consider Regarding the Feed Screw System

■ Servo motor oscillation

Gain adjustment on the servo motor may cause the servo motor to oscillate.
Oscillation in the servo motor during operation can cause problems particularly with the overall natural frequency and electrical control systems of the feed screw system.
In order for these issues to be resolved, the torsional stiffness for the coupling and feed screw section and the moment of inertia and other characteristics for the system overall will need to be adjusted and the torsional natural frequency for the mechanical system raised or the tuning function (filter function) for the electrical control system in the servo motor adjusted during the design stage.

■ Stepper motor resonance

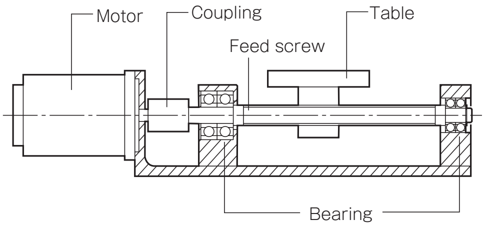
Stepper motors resonate at certain rotation speeds due to the pulsation frequency of the stepper motor and the torsional natural frequency of the system as a whole. To avoid resonance, either the resonant rotation speed must be simply skipped or the torsional natural frequency considered at the design stage.

Please contact Miki Pulley with any questions regarding servo motor oscillation or stepper motor resonance.

How to Find the Natural Frequency of a Feed Screw System

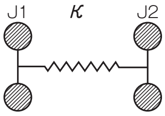
(1) Select a coupling based on the nominal and maximum torque of the servo motor or stepper motor.

(2) Find the overall natural frequency, Nf, from the torsional stiffness of the coupling and feed screw, κ, the moment of inertia of driving side, J1, and the moment of inertia of driven side, J2, for the feed screw system shown below.



$$Nf=\frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{J1}+\frac{1}{J2}\right)}$$

Nf: Overall natural frequency of a feed screw system [Hz]
κ : Torsional stiffness of the coupling and feed screw [N·m/rad]
J1: Moment of inertia of driving side [kg·m²]
J2: Moment of inertia of driven side [kg·m²]



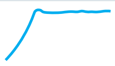
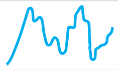
Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$\text{Ta [N·m]} = 9550 \times \frac{\text{P [kW]}}{\text{n[min}^{-1}\text{]}}$$

(2) Determine the factor κ from the load properties, and find the corrected torque, Td, applied to the coupling.

Td = Ta × K (Refer to the table below for values)

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K	1.0	1.25	1.75	2.25

For servo motor drive, multiply the maximum torque, Ts, by the usage factor K = 1.2 to 1.5.

Td = Ts × (1.2 to 1.5)

(3) Set the size so that the rated coupling torque, Tn, is higher than the corrected torque, Td.

Tn ≧ Td

(4) The rated torque of the coupling may be limited by the bore diameter of the coupling. See the table showing the bore diameters that limit rated torque.

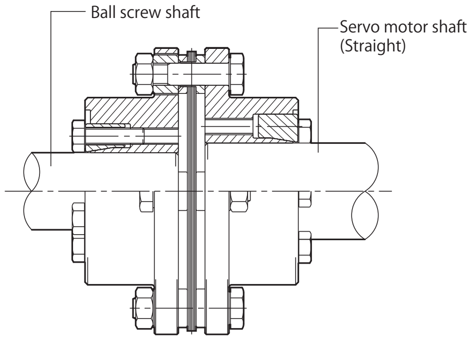
(5) Check that the mount shaft is no larger than the maximum bore diameter of the coupling.

Contact Miki Pulley for assistance with any device experiencing extreme periodic vibrations.

Mounting Example

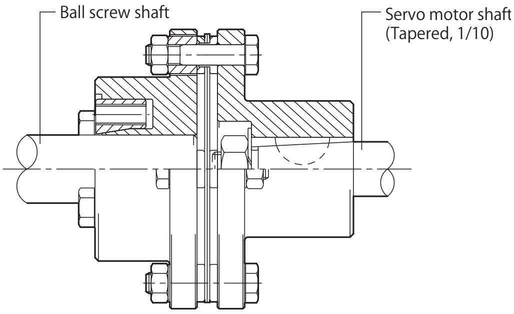
■ SFS S-□M-□M

These are combinations of multiple high-precision frictional-coupling flange hubs. When these are used, shafts can be connected to each other after couplings are finished.



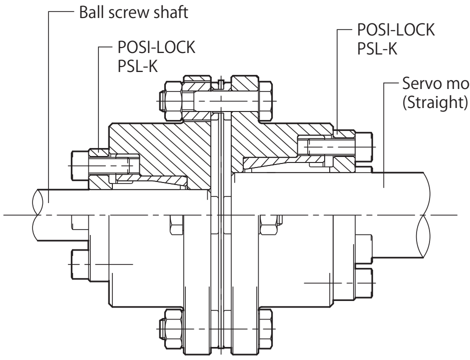
■ SFS S-□M-□C

These are combinations of high-precision frictional-coupling flange hubs with flange hubs for tapered shafts.. They are assembled by tightening the end of the servo motor shaft with a nut.



■ SFS S

The example shows a pilot-bore type of flange hub processed for a POSI-LOCK PSL-K, a shaft lock made by Miki Pulley, and connected to a straight shaft.



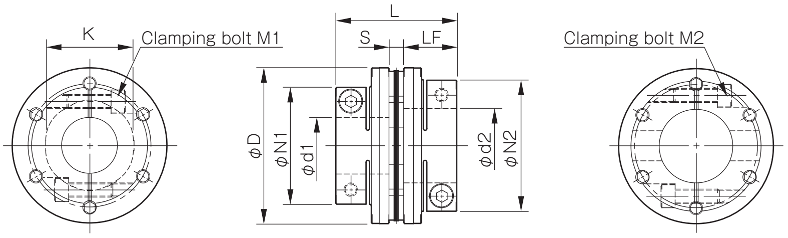
SFF SS Types Single Element/Clamping

Specifications

Model	Rated torque [N·m]	Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFF-040SS-□B-□B-8N	8	0.02	1	±0.2	18000	15000	174	0.03×10^{-3}	0.17
SFF-040SS-□B-□B-12N	12	0.02	1	±0.2	18000	15000	174	0.03×10^{-3}	0.17
SFF-050SS-□B-□B-25N	25	0.02	1	±0.3	18000	32000	145	0.10×10^{-3}	0.36
SFF-060SS-□B-□B-60N	60	0.02	1	±0.3	18000	104000	399	0.22×10^{-3}	0.52
SFF-060SS-□B-□B-80N	80	0.02	1	±0.3	18000	104000	399	0.23×10^{-3}	0.49
SFF-070SS-□B-□B-90N	90	0.02	1	±0.5	18000	240000	484	0.40×10^{-3}	0.72
SFF-070SS-□B-□B-100N	100	0.02	1	±0.5	18000	240000	484	0.42×10^{-3}	0.67
SFF-080SS-□B-□B-150N	150	0.02	1	±0.5	17000	120000	96	0.79×10^{-3}	1.04
SFF-080SS-□B-□B-200N	200	0.02	1	±0.5	17000	310000	546	1.25×10^{-3}	1.40
SFF-090SS-□B-□B-250N	250	0.02	1	±0.6	15000	520000	321	1.54×10^{-3}	1.62
SFF-090SS-□B-□B-300N	300	0.02	1	±0.6	15000	520000	321	1.58×10^{-3}	1.53
SFF-100SS-□B-□B-450N	450	0.02	1	±0.65	13000	740000	540	3.27×10^{-3}	2.53
SFF-120SS-□B-□B-600N	600	0.02	1	±0.8	11000	970000	360	6.90×10^{-3}	3.78

* Max. rotation speed does not take into account dynamic balance.
* Torsional stiffness values given are measured values for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Model	d1 [mm]	d2 [mm]	D [mm]	L [mm]	N1・N2 [mm]	LF [mm]	S [mm]	K [mm]	M1・M2 Qty - Nominal dia.	M1・M2 Tightening torque [N・m]
SFF-040SS-□B-□B-8N	8・9・9.525	8・9・9.525・10・11・12・14・15・16	38	38.9	33	17.5	3.9	17	2-M4	3.4
SFF-040SS-□B-□B-12N	10・11・12・14・15・16	10・11・12・14・15・16	38	38.9	33	17.5	3.9	17	2-M4	3.4
SFF-050SS-□B-□B-25N	10・11・12・14・15・16・17・18・19	10・11・12・14・15・16・17・18・19	48	48.4	42	21.5	5.4	20	2-M5	7
SFF-060SS-□B-□B-60N	12・14・15・16・17・18・19	12・14・15・16・17・18・19・20・22	58	53.4	44	24	5.4	32	2-M6	14
	—	24・25・28			48				2-M5	7
	—	30			52					
SFF-060SS-□B-□B-80N	20・22	20・22	58	53.4	44	24	5.4	32	2-M6	14
	24・25・28	24・25・28			48				2-M5	7
	30	30			52					
SFF-070SS-□B-□B-90N	18・19	18・19・20・22・24・25	68	55.9	47	25	5.9	38	2-M6	14
	—	28・30・32・35			56					
SFF-070SS-□B-□B-100N	20・22・24・25	20・22・24・25	68	55.9	47	25	5.9	38	2-M6	14
	28・30・32・35	28・30・32・35			56					
SFF-080SS-□B-□B-150N	22・24・25	22・24・25	78	68.3	53	30	8.3	37	2-M8	34
	28・30・32・35	28・30・32・35			56				2-M6	14
SFF-080SS-□B-□B-200N	22・24・25	22・24・25	78	67.7	53	30	7.7	42	2-M8	34
	28・30・32・35	28・30・32・35			70					
	38	38			74					
SFF-090SS-□B-□B-250N	25・28	25・28・30・32	88	68.3	66	30	8.3	50	2-M8	34
	—	35・38・40・42			74					
SFF-090SS-□B-□B-300N	30・32	30・32	88	68.3	66	30	8.3	50	2-M8	34
	35・38・40・42	35・38・40・42			74					
SFF-100SS-□B-□B-450N	32・35・38・40・42・45・48	32・35・38・40・42・45・48	98	90.2	84	40	10.2	56	2-M10	68
SFF-120SS-□B-□B-600N	32・35・38・40・42・45	32・35・38・40・42・45	118	90.2	84	40	10.2	68	2-M10	68
	48・50・55	48・50・55			100					

* Nominal diameter of clamping bolt M1/M2 is given as number of bolts - nominal diameter, and the number is the number for one hub.

Standard Bore Diameter

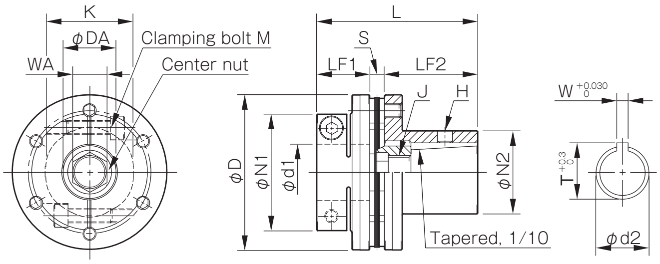
Model	Standard bore diameter d1 • d2 [mm]																											
	Nominal diameter	8	9	9.525	10	11	12	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55
SFF-040SS-□B-□B-8N	d1	●	●	●																								
	d2	●	●	●	●	●	●	●	●	●																		
SFF-040SS-□B-□B-12N	d1				●	●	●	●	●	●																		
	d2				●	●	●	●	●	●																		
SFF-050SS-□B-□B-25N	d1				●	●	●	●	●	●	●	●	●															
	d2				●	●	●	●	●	●	●	●	●															
SFF-060SS-□B-□B-60N	d1						●	●	●	●	●	●	●															
	d2						●	●	●	●	●	●	●	●	●	●	●	●	●									
SFF-060SS-□B-□B-80N	d1													●	●	●	●	●	●									
	d2													●	●	●	●	●	●									
SFF-070SS-□B-□B-90N	d1											●	●															
	d2											●	●	●	●	●	●	●	●	●	●							
SFF-070SS-□B-□B-100N	d1													●	●	●	●	●	●	●	●							
	d2													●	●	●	●	●	●	●	●							
SFF-080SS-□B-□B-150N	d1														●	●	●	●	●	●	●							
	d2														●	●	●	●	●	●	●							
SFF-080SS-□B-□B-200N	d1														●	●	●	●	●	●	●	●						
	d2														●	●	●	●	●	●	●	●						
SFF-090SS-□B-□B-250N	d1																●	●										
	d2																●	●	●	●	●	●	●	●				
SFF-090SS-□B-□B-300N	d1																		●	●	●	●	●	●				
	d2																		●	●	●	●	●	●				
SFF-100SS-□B-□B-450N	d1																			●	●	●	●	●	●	●		
	d2																			●	●	●	●	●	●	●		
SFF-120SS-□B-□B-600N	d1																			●	●	●	●	●	●	●	●	●
	d2																			●	●	●	●	●	●	●	●	●

* The bore diameters marked with ● are supported as standard bore diameter.

Tapered shaft supported　Option

Model	Rated torque [N・m]	Moment of inertia [kg・m²]	Mass [kg]
SFF-040SS-□B-11CN-8N	8	0.03 × 10⁻³	0.20
SFF-040SS-□B-11CN-12N	12	0.03 × 10⁻³	0.18
SFF-050SS-□B-14CN-25N	25	0.09 × 10⁻³	0.36
SFF-050SS-□B-16CN-25N	25	0.10 × 10⁻³	0.41
SFF-060SS-□B-16CN-60N	60	0.18 × 10⁻³	0.54
SFF-060SS-□B-16CN-80N	80	0.19 × 10⁻³	0.52

* The moment of inertia and mass are measured for the maximum bore diameter.
* For other "Specifications", see "Specifications" for Single Element Clamping.



Model	d1 [mm]	d2 [mm]	W [mm]	T [mm]	D [mm]	L [mm]	N1 [mm]	N 2 [mm]	LF1 [mm]	LF2 [mm]	S [mm]	K [mm]	H [mm]	M Qty - Nominal dia.	MTightening torque [N・m]	DA [mm]	W A [mm]	J Nominal × pitch	J Tightening torque [N・m]
SFF-040SS-□B-11CN-8N	8 ～ 9.525	11	4	12.2	38	46.4	33	22	17.5	25	3.9	17	5.1	2-M4	3.4	12	6	M6 × 1.0	10
SFF-040SS-□B-11CN-12N	10 ～ 16	11	4	12.2	38	46.4	33	22	17.5	25	3.9	17	5.1	2-M4	3.4	12	6	M6 × 1.0	10
SFF-050SS-□B-14CN-25N	10 ～ 19	14	4	15.1	48	56.9	42	27.5	21.5	30	5.4	20	5.1	2-M5	7	15	8	M8 × 1.0	20
SFF-050SS-□B-16CN-25N	10 ～ 19	16	5	17.3	48	67.9	42	29.5	21.5	41	5.4	20	6.8	2-M5	7	16	10	M 10 × 1.25	30
SFF-060SS-□B-16CN-60N	12 ～ 19	16	5	17.3	58	70.4	44	29.5	24	41	5.4	32	6.8	2-M6	14	16	10	M 10 × 1.25	30
SFF-060SS-□B-16CN-80N	20 ～ 22	16	5	17.3	58	70.4	44	29.5	24	41	5.4	32	6.8	2-M6	14	16	10	M 10 × 1.25	30
	24 ～ 28						48							2-M5	7				
	30						52												

How to Place an Order

SFF-080SS-25BK-30BK-200N

Size
Type
S: Single element
Material
S: Steel
Bore dia. d1 (Small dia.)
Bore dia. d2 (Large dia.)
Nominal rated torque
(Refer to the specifications)
Countershaft tolerance
Blank: h7, K: k6, M: m6, J: j6, S: 35 $^{+0.010}_{0}$
Affixing method
B: Clamp
* Tapered shaft option: specify CN for d2 nominal diameter.

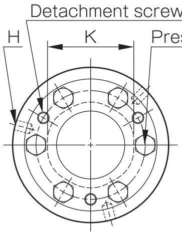
SFF SS Types Single Element/Wedge Coupling

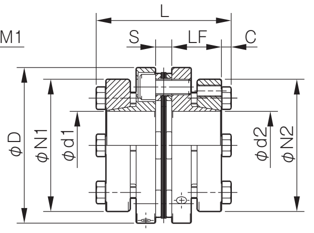
Specifications

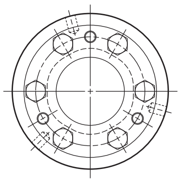
Model	Rated torque [N•m]	Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N•m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg•m^2]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFF-070SS-□K-□K-100N	100	0.02	1	± 0.5	18000	240000	484	0.66×10^{-3}	0.92
SFF-080SS-□K-□K-150N	150	0.02	1	± 0.5	17000	120000	96	1.21×10^{-3}	1.03
SFF-080SS-□K-□K-200N	200	0.02	1	± 0.5	17000	310000	546	1.11×10^{-3}	1.26
SFF-090SS-□K-□K-300N	300	0.02	1	± 0.6	15000	520000	321	1.75×10^{-3}	1.48
SFF-100SS-□K-□K-450N	450	0.02	1	± 0.65	13000	740000	540	2.56×10^{-3}	1.87
SFF-120SS-□K-□K-600N	600	0.02	1	± 0.8	11000	970000	360	5.33×10^{-3}	2.50
SFF-140SS-□K-□K-800N	800	0.02	1	± 1.0	10000	1400000	360	10.28×10^{-3}	4.66
SFF-140SS-□K-□K-1000N	1000	0.02	1	± 1.0	10000	1400000	360	14.70×10^{-3}	5.01

* Max. rotation speed does not take into account dynamic balance.
* Torsional stiffness values given are measured values for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions







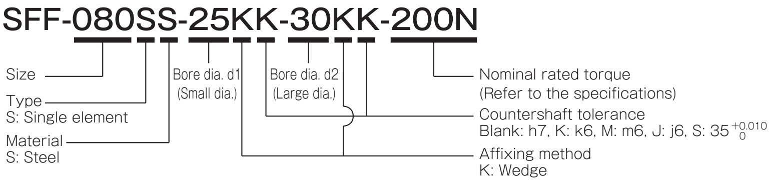
Model	d1 [mm]	d2 [mm]	D [mm]	L [mm]	N1 • N 2 [mm]	LF [mm]	S [mm]	C [mm]	K [mm]	H [mm]	M 1 Qty - Nominal dia.	M1 Tightening torque [N • m]	M 2 Qty - Nominal dia.
SFF-070SS-□K-□K-100N	18 • 19	18 • 19	68	62.9	53	23.5	5.9	5	38	3-5.1	6-M6	10	3-M6
	20 • 22 • 24 • 25	20 • 22 • 24 • 25			58								
	28 • 30	28 • 30			63								
	32 • 35	32 • 35			68								
SFF-080SS-□K-□K-150N	22 • 24 • 25	22 • 24 • 25	78	69.3	58	25.5	8.3	5	37	4-5.1	4-M6	10	2-M6
	28 • 30	28 • 30			63								
	32 • 35	32 • 35			68								
	–	38			73								
SFF-080SS-□K-□K-200N	22 • 24 • 25	22 • 24 • 25	78	68.7	58	25.5	7.7	5	42	3-5.1	6-M6	10	3-M6
	28 • 30	28 • 30			63								
	32 • 35	32 • 35			68								
	38	38			73								
SFF-090SS-□K-□K-300N	28 • 30	28 • 30	88	69.3	63	25.5	8.3	5	50	3-6.8	6-M6	10	3-M6
	32 • 35	32 • 35			68								
	38 • 40 • 42	38 • 40 • 42			73								
	45	45			78								
	48	48			83								
SFF-100SS-□K-□K-450N	32 • 35	32 • 35	98	75.2	68	27.5	10.2	5	56	3-6.8	6-M6	10	3-M6
	38 • 40 • 42	38 • 40 • 42			73								
	45	45			78								
	48 • 50	48 • 50			83								
SFF-120SS-□K-□K-600N	35	35	118	75.2	68	27.5	10.2	5	68	3-6.8	6-M6	10	3-M6
	38 • 40 • 42	38 • 40 • 42			73								
	45	45			78								
	48 • 50 • 52	48 • 50 • 52			83								
	55	55			88								
	60 • 62 • 65	60 • 62 • 65			98								
	–	70			108								
SFF-140SS-□K-□K-800N	35 • 38	35 • 38	138	94.6	83	36.5	10.6	5.5	78	3-8.6	6-M8	24	3-M8
	40 • 42 • 45	40 • 42 • 45			88								
	–	48 • 50 • 52			98								
	–	55 • 60			108								
	–	62 • 65 • 70			118								
	–	75 • 80			128								
SFF-140SS-□K-□K-1000N	48 • 50 • 52	48 • 50 • 52	138	94.6	98	36.5	10.6	5.5	78	3-8.6	6-M8	24	3-M8
	55 • 60	55 • 60			108								
	62 • 65 • 70	62 • 65 • 70			118								
	75	75 • 80			128								

* The nominal diameters of the pressure bolt M1 and detachment screw hole M2 are equal to the quantity minus the nominal diameter of the screw threads. The quantities of H, M1 and M2 are the same as the quantity for a hub on one side.

Standard Bore Diameter

Model	Standard bore diameter d1 • d2 [mm]																								
	Nominal diameter	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	52	55	60	62	65	70	75	80
SFF-070SS-☐K-☐K-100N	d1	●	●	●	●	●	●	●	●	●	●														
	d2	●	●	●	●	●	●	●	●	●	●														
SFF-080SS-☐K-☐K-150N	d1				●	●	●	●	●	●	●														
	d2				●	●	●	●	●	●	●	●													
SFF-080SS-☐K-☐K-200N	d1				●	●	●	●	●	●	●	●													
	d2				●	●	●	●	●	●	●	●													
SFF-090SS-☐K-☐K-300N	d1							●	●	●	●	●	●	●	●	●									
	d2							●	●	●	●	●	●	●	●	●									
SFF-100SS-☐K-☐K-450N	d1									●	●	●	●	●	●	●	●								
	d2									●	●	●	●	●	●	●	●								
SFF-120SS-☐K-☐K-600N	d1										●	●	●	●	●	●	●	●	●	●	●	●			
	d2										●	●	●	●	●	●	●	●	●	●	●	●	●		
SFF-140SS-☐K-☐K-800N	d1										●	●	●	●	●										
	d2										●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SFF-140SS-☐K-☐K-1000N	d1															●	●	●	●	●	●	●	●	●	
	d2															●	●	●	●	●	●	●	●	●	●

How to Place an Order



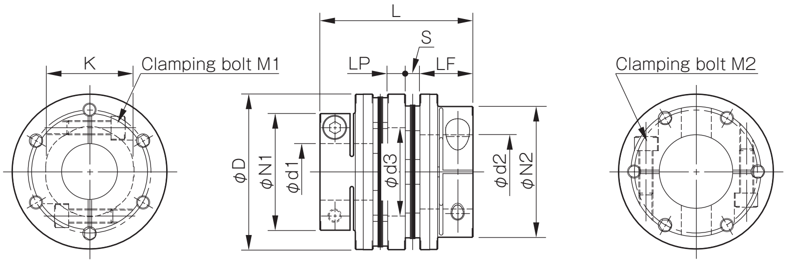
SFF DS Types Double Element/Clamping

Specifications

Model	Rated torque [N·m]	Misalignment			Max. rotation speed [$\min^{-1}$]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [$kg·m^2$]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFF-040DS-☐B-☐B-8N	8	0.10	1(On one side)	±0.4	14000	7500	87	0.04×10^{-3}	0.22
SFF-040DS-☐B-☐B-12N	12	0.10	1(On one side)	±0.4	14000	7500	87	0.04×10^{-3}	0.22
SFF-050DS-☐B-☐B-25N	25	0.20	1(On one side)	±0.6	14000	16000	72.5	0.13×10^{-3}	0.46
SFF-060DS-☐B-☐B-60N	60	0.20	1(On one side)	±0.6	14000	52000	199.5	0.28×10^{-3}	0.64
SFF-060DS-☐B-☐B-80N	80	0.20	1(On one side)	±0.6	14000	52000	199.5	0.29×10^{-3}	0.61
SFF-070DS-☐B-☐B-90N	90	0.25	1(On one side)	±1.0	14000	120000	242	0.53×10^{-3}	0.90
SFF-070DS-☐B-☐B-100N	100	0.25	1(On one side)	±1.0	14000	120000	242	0.55×10^{-3}	0.85
SFF-080DS-☐B-☐B-150N	150	0.32	1(On one side)	±1.0	13000	60000	48	1.10×10^{-3}	1.37
SFF-080DS-☐B-☐B-200N	200	0.31	1(On one side)	±1.0	13000	155000	273	1.50×10^{-3}	1.72
SFF-090DS-☐B-☐B-250N	250	0.32	1(On one side)	±1.2	12000	260000	160.5	2.03×10^{-3}	2.02
SFF-090DS-☐B-☐B-300N	300	0.32	1(On one side)	±1.2	12000	260000	160.5	2.10×10^{-3}	1.92
SFF-100DS-☐B-☐B-450N	450	0.38	1(On one side)	±1.3	10000	370000	270	4.18×10^{-3}	3.12
SFF-120DS-☐B-☐B-600N	600	0.38	1(On one side)	±1.6	9000	485000	180	8.87×10^{-3}	4.60

* Max. rotation speed does not take into account dynamic balance.
* Torsional stiffness values given are measured values for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Model	d1 [mm]	d2 [mm]	D [mm]	L [mm]	N1・N2 [mm]	LF [mm]	LP [mm]	S [mm]	d3 [mm]	K [mm]	M1・M2 Qty - Nominal dia.	M1・M2 Tightening torque [N・m]
SFF-040DS-☐B-☐B-8N	8・9・9.525	8・9・9.525・10・11・12・14・15・16	38	48.8	33	17.5	6	3.9	17	17	2-M4	3.4
SFF-040DS-☐B-☐B-12N	10・11・12・14・15・16	10・11・12・14・15・16	38	48.8	33	17.5	6	3.9	17	17	2-M4	3.4
SFF-050DS-☐B-☐B-25N	10・11・12・14・15・16・17・18・19	10・11・12・14・15・16・17・18・19	48	60.8	42	21.5	7	5.4	20	20	2-M5	7
SFF-060DS-☐B-☐B-60N	12・14・15・16・17・18・19	12・14・15・16・17・18・19・20・22	58	65.8	44	24	7	5.4	31	32	2-M6	14
	—	24・25・28			48						2-M5	7
	—	30			52							
SFF-060DS-☐B-☐B-80N	20・22	20・22	58	65.8	44	24	7	5.4	31	32	2-M6	14
	24・25・28	24・25・28			48						2-M5	7
	30	30			52							
SFF-070DS-☐B-☐B-90N	18・19	18・19・20・22・24・25	68	69.8	47	25	8	5.9	37	38	2-M6	14
	—	28・30・32・35			56							
SFF-070DS-☐B-☐B-100N	20・22・24・25	20・22・24・25	68	69.8	47	25	8	5.9	37	38	2-M6	14
	28・30・32・35	28・30・32・35			56							
SFF-080DS-☐B-☐B-150N	22・24・25	22・24・25	78	86.6	53	30	10	8.3	40	37	2-M8	34
	28・30・32・35	28・30・32・35			56						2-M6	14
SFF-080DS-☐B-☐B-200N	22・24・25	22・24・25	78	85.4	53	30	10	7.7	40	42	2-M8	34
	28・30・32・35	28・30・32・35			70							
	38	38			74							
SFF-090DS-☐B-☐B-250N	25・28	25・28・30・32	88	86.6	66	30	10	8.3	50	50	2-M8	34
	—	35・38・40・42			74							
SFF-090DS-☐B-☐B-300N	30・32	30・32	88	86.6	66	30	10	8.3	50	50	2-M8	34
	35・38・40・42	35・38・40・42			74							
SFF-100DS-☐B-☐B-450N	32・35・38・40・42・45・48	32・35・38・40・42・45・48	98	112.4	84	40	12	10.2	52	56	2-M10	68
SFF-120DS-☐B-☐B-600N	32・35・38・40・42・45	32・35・38・40・42・45	118	112.4	84	40	12	10.2	72	68	2-M10	68
	48・50・55	48・50・55			100							

* Nominal diameter of clamping bolt M1/M2 is given as number of bolts - nominal diameter, and the number is the number for one hub.

Standard Bore Diameter

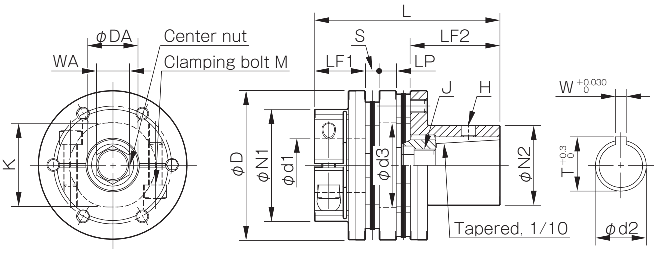
Model	Standard bore diameter d1・d2 [mm]																											
	Nominal diameter	8	9	9.525	10	11	12	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55
SFF-040DS-☐B-☐B-8N	d1	●	●	●																								
	d2	●	●	●	●	●	●	●	●	●																		
SFF-040DS-☐B-☐B-12N	d1				●	●	●	●	●	●																		
	d2				●	●	●	●	●	●																		
SFF-050DS-☐B-☐B-25N	d1				●	●	●	●	●	●	●	●	●															
	d2				●	●	●	●	●	●	●	●	●															
SFF-060DS-☐B-☐B-60N	d1						●	●	●	●	●	●	●															
	d2						●	●	●	●	●	●	●	●	●	●	●	●	●									
SFF-060DS-☐B-☐B-80N	d1													●	●	●	●	●	●									
	d2													●	●	●	●	●	●									
SFF-070DS-☐B-☐B-90N	d1											●	●															
	d2											●	●	●	●	●	●	●	●	●	●							
SFF-070DS-☐B-☐B-100N	d1													●	●	●	●	●	●	●	●							
	d2													●	●	●	●	●	●	●	●							
SFF-080DS-☐B-☐B-150N	d1														●	●	●	●	●	●	●							
	d2														●	●	●	●	●	●	●							
SFF-080DS-☐B-☐B-200N	d1														●	●	●	●	●	●	●	●						
	d2														●	●	●	●	●	●	●	●						
SFF-090DS-☐B-☐B-250N	d1																●	●										
	d2																●	●	●	●	●	●	●	●				
SFF-090DS-☐B-☐B-300N	d1																		●	●	●	●	●	●				
	d2																		●	●	●	●	●	●				
SFF-100DS-☐B-☐B-450N	d1																			●	●	●	●	●	●	●		
	d2																			●	●	●	●	●	●	●		
SFF-120DS-☐B-☐B-600N	d1																			●	●	●	●	●	●	●	●	●
	d2																			●	●	●	●	●	●	●	●	●

* The bore diameters marked with ● are supported as standard bore diameter.

Tapered shaft supported Option

Model	Rated torque [N・m]	Moment of inertia [kg・m²]	Mass [kg]
SFF-040DS-☐B-11CN-8N	8	0.04×10^{-3}	0.25
SFF-040DS-☐B-11CN-12N	12	0.04×10^{-3}	0.23
SFF-050DS-☐B-14CN-25N	25	0.12×10^{-3}	0.45
SFF-050DS-☐B-16CN-25N	25	0.13×10^{-3}	0.49
SFF-060DS-☐B-16CN-60N	60	0.24×10^{-3}	0.67
SFF-060DS-☐B-16CN-80N	80	0.26×10^{-3}	0.64

* The moment of inertia and mass are measured for the maximum bore diameter.
* For other "Specifications", see "Specifications" for Double Element/Clamping.



Model	d1 [mm]	d2 [mm]	W [mm]	T [mm]	D [mm]	L [mm]	N1 [mm]	N 2 [mm]	LF1 [mm]	LF2 [mm]	LP [mm]	S [mm]	d3 [mm]	K [mm]	H [mm]	M Qty-Nominal dia.	M Tightening torque [N・m]	DA [mm]	W A [mm]	J Nominal × pitch	J Tightening torque [N・m]
SFF-040DS-☐B-11CN-8N	8 ～ 9.525	11	4	12.2	38	56.3	33	22	17.5	25	6	3.9	17	17	5.1	2-M4	3.4	12	6	M6 × 1.0	10
SFF-040DS-☐B-11CN-12N	10 ～ 16	11	4	12.2	38	56.3	33	22	17.5	25	6	3.9	17	17	5.1	2-M4	3.4	12	6	M6 × 1.0	10
SFF-050DS-☐B-14CN-25N	10 ～ 19	14	4	15.1	48	69.3	42	27.5	21.5	30	7	5.4	20	20	5.1	2-M5	7	15	8	M8 × 1.0	20
SFF-050DS-☐B-16CN-25N	10 ～ 19	16	5	17.3	48	80.3	42	29.5	21.5	41	7	5.4	20	20	6.8	2-M5	7	16	10	M 10 × 1.25	30
SFF-060DS-☐B-16CN-60N	12 ～ 19	16	5	17.3	58	82.8	44	29.5	24	41	7	5.4	31	32	6.8	2-M6	14	16	10	M 10 × 1.25	30
SFF-060DS-☐B-16CN-80N	20 ～ 22	16	5	17.3	58	82.8	44	29.5	24	41	7	5.4	31	32	6.8	2-M6	14	16	10	M 10 × 1.25	30
	24 ～ 28						48									2-M5	7				
	30						52														

How to Place an Order

SFF-080DS-25BK-30BK-200N

Size
Type
D: Double element
Material
S: Steel
Bore dia. d1 (Small dia.)
Bore dia. d2 (Large dia.)
Nominal rated torque
(Refer to the specifications)
Countershaft tolerance
Blank: h7, K: k6, M: m6, J: j6, S: $35^{+0.010}_{0}$
Affixing method
B: Clamp
* Tapered shaft option: specify CN for d2 nominal diameter.

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
Metal Couplings
Metal Disc Couplings SERVOFLEX
High-rigidity Couplings SERVORIGID
Metal Slit Couplings HELI-CAL
Metal Coil Spring Couplings BAUMANNFLEX
Pin Bushing Couplings PARAFLEX
Link Couplings SCHMIDT
Rubber and Plastic Couplings
Dual Rubber Couplings STEPFLEX
Jaw Couplings MIKI PULLEY STARFLEX
Jaw Couplings SPRFLEX
Plastic Bellows Couplings BELLOWFLEX
Rubber and Plastic Couplings CENTAFLEX
MODELS
SFC
SFS
SFF
SFM
SFH

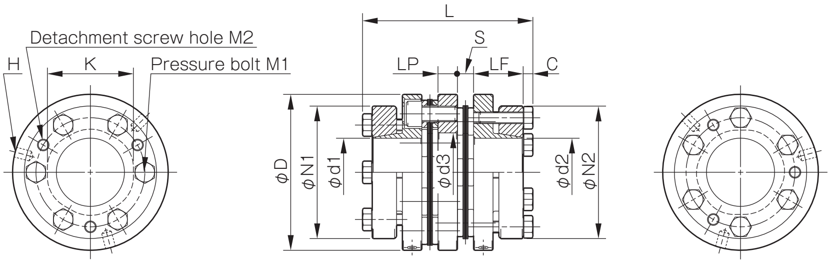
SFF DS Types Double Element/Wedge Coupling

Specifications

Model	Rated torque [N·m]	Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFF-070DS-□K-□K-100N	100	0.25	1(On one side)	± 1.0	14000	120000	242	0.80×10^{-3}	1.10
SFF-080DS-□K-□K-150N	150	0.32	1(On one side)	± 1.0	13000	60000	48	1.36×10^{-3}	1.56
SFF-080DS-□K-□K-200N	200	0.31	1(On one side)	± 1.0	13000	155000	273	1.42×10^{-3}	1.60
SFF-090DS-□K-□K-300N	300	0.32	1(On one side)	± 1.2	12000	260000	160.5	2.24×10^{-3}	1.87
SFF-100DS-□K-□K-450N	450	0.38	1(On one side)	± 1.3	10000	370000	270	3.51×10^{-3}	2.49
SFF-120DS-□K-□K-600N	600	0.38	1(On one side)	± 1.6	9000	485000	180	7.17×10^{-3}	3.29
SFF-140DS-□K-□K-800N	800	0.44	1(On one side)	± 2.0	8000	700000	180	14.68×10^{-3}	6.05
SFF-140DS-□K-□K-1000N	1000	0.44	1(On one side)	± 2.0	8000	700000	180	19.11×10^{-3}	6.39

* Max. rotation speed does not take into account dynamic balance.
* Torsional stiffness values given are measured values for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Model	d1 [mm]	d2 [mm]	D [mm]	L [mm]	N1・N2 [mm]	LF [mm]	LP [mm]	S [mm]	C [mm]	d3 [mm]	K [mm]	H [mm]	M 1 Qty - Nominal dia.	M1 Tightening torque [N・m]	M 2 Qty - Nominal dia.
SFF-070DS-□K-□K-100N	18・19	18・19	68	76.8	53	23.5	8	5.9	5	37	38	3-5.1	6-M6	10	3-M6
	20・22・24・25	20・22・24・25			58										
	28・30	28・30			63										
	32・35	32・35			68										
SFF-080DS-□K-□K-150N	22・24・25	22・24・25	78	87.6	58	25.5	10	8.3	5	40	37	4-5.1	4-M6	10	2-M6
	28・30	28・30			63										
	32・35	32・35			68										
	—	38			73										
SFF-080DS-□K-□K-200N	22・24・25	22・24・25	78	86.4	58	25.5	10	7.7	5	40	42	3-5.1	6-M6	10	3-M6
	28・30	28・30			63										
	32・35	32・35			68										
	38	38			73										
SFF-090DS-□K-□K-300N	28・30	28・30	88	87.6	63	25.5	10	8.3	5	50	50	3-6.8	6-M6	10	3-M6
	32・35	32・35			68										
	38・40・42	38・40・42			73										
	45	45			78										
	48	48			83										
SFF-100DS-□K-□K-450N	32・35	32・35	98	97.4	68	27.5	12	10.2	5	52	56	3-6.8	6-M6	10	3-M6
	38・40・42	38・40・42			73										
	45	45			78										
	48・50	48・50			83										
SFF-120DS-□K-□K-600N	35	35	118	97.4	68	27.5	12	10.2	5	72	68	3-6.8	6-M6	10	3-M6
	38・40・42	38・40・42			73										
	45	45			78										
	48・50・52	48・50・52			83										
	55	55			88										
	60・62・65	60・62・65			98										
	—	70			108										
SFF-140DS-□K-□K-800N	35・38	35・38	138	120.2	83	36.5	15	10.6	5.5	80	78	3-8.6	6-M8	24	3-M8
	40・42・45	40・42・45			88										
	—	48・50・52			98										
	—	55・60			108										
	—	62・65・70			118										
	—	75・80			128										
SFF-140DS-□K-□K-1000N	48・50・52	48・50・52	138	120.2	98	36.5	15	10.6	5.5	80	78	3-8.6	6-M8	24	3-M8
	55・60	55・60			108										
	62・65・70	62・65・70			118										
	75	75・80			128										

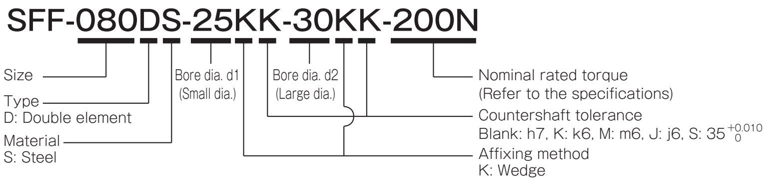
* The nominal diameters of the pressure bolt M1 and detachment screw hole M2 are equal to the quantity minus the nominal diameter of the screw threads. The quantities of H, M1 and M2 are the same as the quantity for a hub on one side.

Standard Bore Diameter

Model	Nominal diameter	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	52	55	60	62	65	70	75	80
SFF-070DS-□K-□K-100N	d1	●	●	●	●	●	●	●	●	●	●														
	d2	●	●	●	●	●	●	●	●	●	●														
SFF-080DS-□K-□K-150N	d1				●	●	●	●	●	●	●														
	d2				●	●	●	●	●	●	●	●													
SFF-080DS-□K-□K-200N	d1				●	●	●	●	●	●	●	●													
	d2				●	●	●	●	●	●	●	●													
SFF-090DS-□K-□K-300N	d1							●	●	●	●	●	●	●	●	●									
	d2							●	●	●	●	●	●	●	●	●									
SFF-100DS-□K-□K-450N	d1									●	●	●	●	●	●	●	●								
	d2									●	●	●	●	●	●	●	●								
SFF-120DS-□K-□K-600N	d1										●	●	●	●	●	●	●	●	●	●	●	●			
	d2										●	●	●	●	●	●	●	●	●	●	●	●	●		
SFF-140DS-□K-□K-800N	d1										●	●	●	●	●										
	d2										●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SFF-140DS-□K-□K-1000N	d1															●	●	●	●	●	●	●	●	●	
	d2															●	●	●	●	●	●	●	●	●	●

Standard bore diameter d1·d2 [mm]

How to Place an Order



SFF-080DS-25KK-30KK-200N

Size

Type
D: Double element

Material
S: Steel

Bore dia. d1
(Small dia.)

Bore dia. d2
(Large dia.)

Nominal rated torque
(Refer to the specifications)

Countershaft tolerance
Blank: h7, K: k6, M: m6, J: j6, S: 35 $^{+0.010}_{0}$

Affixing method
K: Wedge

SFF Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

Couplings are assembled at high accuracy using a special mounting jig to ensure accurate concentricity of left and right internal diameters. Take extra precautions when handling couplings, should strong shocks be given on couplings, it may affect mounting accuracy and cause the parts to break during use.

(1) Couplings are designed for use within an operating temperature range of -30° C to 120℃ . Although the couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water and oil as it may cause part deterioration.

(2) Handle the element with care as it is made of a thin stainless steel metal disc, also making sure to be careful so as not to injure yourself.

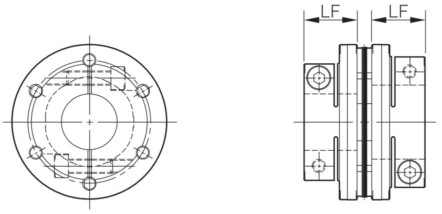
(3) Do not tighten up clamping bolts or pressure bolts until after inserting the mounting shaft.

Mounting (Clamping)

(1) Check that coupling clamping bolts have been loosened and remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

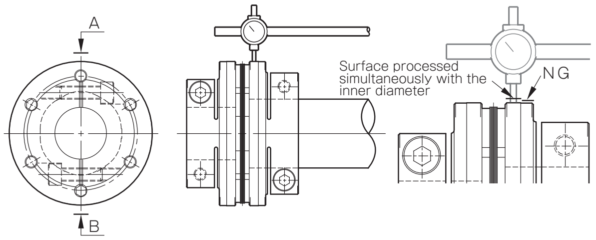
(2) Be careful when inserting the couplings into the shaft so as not to apply excessive force of compression or tensile force to the element.

(3) Ensure that the length of the coupling inserted onto the motor shaft touches the shaft for the entire length of the clamping hub of the coupling (LF dimension), as shown in the diagram below, and position it so that it does not interfere with the elements, spacers or the other shaft. Then temporarily tighten the two clamping bolts, tightening them alternately until the coupling cannot be manually rotated.



Model (Clamping)	LF dimension [mm]
SFF-040	17.5
SFF-050	21.5
SFF-060	24
SFF-070	25
SFF-080	30
SFF-090	30
SFF-100	40
SFF-120	40

(4) Hold a dial gauge against the outer diameter of the clamping hub on the motor shaft side (the surface processed simultaneously with the inner diameter), and then tighten the two clamping bolts while turning the motor shaft by hand and adjusting the difference in the runout values at A and B in the figure below is 0.02 mm or less (and as close to 0 as possible).



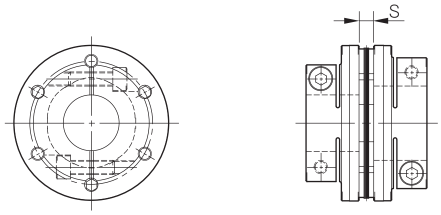
(5) Alternately fasten the two clamping bolts as you adjust them, and finish by tightening both bolts to the appropriate tightening torque of the following table, using a calibrated torque wrench. Since it is fastened by two clamping bolts, tightening one bolt before the other will place more than the prescribed axial force on the bolt tightened first when the other bolt is tightened. Be sure to tighten them alternately, a little at a time.

Clamping bolt nominal diameter	Tightening torque [N·m]
M4	3.4
M5	7
M6	14
M8	34
M10	68

(6) Mount the motor, to which the coupling has already been mounted, on the body of the machinery. At that time, adjust the motor mounting position (centering location) while inserting the coupling onto the driven shaft (a feed screw or the like), being alert to undue forces on the element such as compression or pulling.

(7) Make the length of the driven shaft (feed screw or the like) inserted into the coupling connect to the shaft for the length of the LF dimension (described above), alternately tighten the two clamping bolts, and provisionally tighten enough that the coupling cannot be manually rotated.

(8) In addition, keep the dimension between clamping hub faces (the S dimension in the diagram) to within the allowable misalignment of the axial displacement with respect to a reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.



Model (Clamping)	S dimension [mm]
SFF-040	3.9
SFF-050	5.4
SFF-060	5.4
SFF-070	5.9
SFF-080 (-150N)	8.3
SFF-080 (-200N)	7.7
SFF-090	8.3
SFF-100	10.2
SFF-120	10.2

(9) Adjust runout using the same procedure as for the motor shaft side, and then finish by tightening the clamping bolts to the appropriate tightening torque.

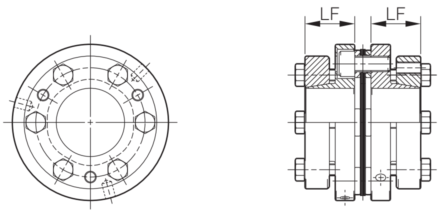
(10) To protect against initial loosening of the clamping bolt, we recommend operating for a set period of time and then retightening to the appropriate tightening torque.

Mounting (Wedge Coupling)

(1) Check that coupling pressure bolts have been loosened and remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Be careful when inserting the couplings into the shaft so as not to apply excessive force of compression or tensile force to the element.

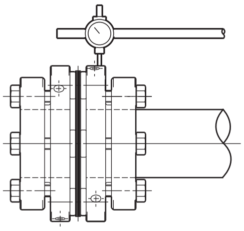
(3) Insert each coupling far enough onto the motor shaft that it touches the shaft along the entire length of the coupling flange (LF dimension), as shown in the diagram below. Position it so that it does not interfere with the elements, spacers or the other shaft and then hold it in place.



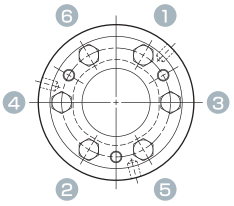
Model (Wedge coupling)	LF dimension [mm]
SFF-070	23.5
SFF-080	25.5
SFF-090	25.5
SFF-100	27.5
SFF-120	27.5
SFF-140	36.5

(4) Using the drive pin hole, lightly tighten the pressure bolt on the diagonal.

(5) Touch the dial gauge to the flange end face or outer diameter on the motor shaft side. Then, while gently rotating the motor shaft manually, adjust the flange periphery and end face by hammering until the runout is as close to zero as possible.



(6) Sequentially fasten the pressure bolts while doing hammering adjustments, and then use a calibrated torque wrench to tighten all the pressure bolts to the appropriate tightening torques below. See the following figure for the tightening procedure for the pressure bolts. Try to tighten them evenly.

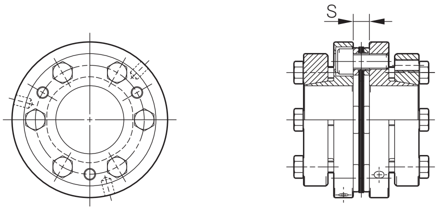


Pressure bolt nominal diameter	Tightening torque [N·m]
M6	10
M8	24

(7) Tighten the motor shaft's pressure bolts at the nominal torque and check that the runout value is low.

(8) Mount the motor, to which the coupling has already been mounted, on the body of the machinery. At that time, adjust the motor mounting position (centering location) while inserting the coupling onto the driven shaft (a feed screw or the like), taking care to not deform the disc. Also insert each coupling far enough onto the paired shaft that it touches the shaft along the entire length of the coupling flange (LF dimension) and then hold it in that position.

(9) Keep the width of the dimension between flange faces (S dimension in the diagram) within the allowable error range for axial misalignment with respect to the reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.



Model	S dimension [mm]
SFF-070	5.9
SFF-080 (-150N)	8.3
SFF-080 (-200N)	7.7
SFF-090	8.3
SFF-100	10.2
SFF-120	10.2
SFF-140	10.6

(10) Sequentially tighten the pressure bolts on the driven shaft (a feed screw or the like) side using the same procedure as for the motor shaft side pressure bolts, and then tighten to the appropriate tightening torque.

(11) To protect against initial loosening of the pressure bolt, we recommend operating for a set period of time and then retightening to the appropriate tightening torque.

SFF Models

Items Checked for Design Purposes

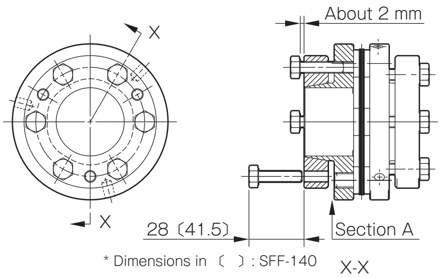
Removal

(1) Check to confirm that there is no torque or axial load being applied to the coupling. There may be cases where a torque is applied to the coupling, particularly when the safety brake is being used. Make sure to verify that this is not occurring before removing parts.

(2) Loosen all the clamping bolts or pressure bolts (loosen pressure bolts until the gap between bearing seat and sleeve is about 2mm).

(3) For clamping type, release the fastening to the shaft by sufficiently loosening all clamping bolts. Note that grease has been applied to the clamping bolts, so do not remove them all the way.

(4) In the case of a wedge coupling system that tightens a pressure bolt from the axial direction, the sleeve will be self-locking, so the coupling between flange and shaft cannot be released simply by loosening the pressure bolt. (Note that in some cases, a coupling can be released by loosening a pressure bolt.) For that reason, when designing devices, a space must be installed for inserting a detachment screw.



* Dimensions in 〔 〕: SFF-140

(5) Pull out three of the pressure bolts (two 080, 150 N) loosened in step (2), insert them into the detachment screw holes on the sleeve, and tighten them in order, a little at a time. The coupling will be released.

(6) If there is no space in the axial direction, insert the tip of a flathead screwdriver or the like into part A and lightly tap perpendicular to the shaft or use it as a lever to pry off the coupling. Use appropriate caution to not damage the coupling body or the pressure bolts.

Suitable Torque Screwdriver/Torque Wrench

■ Clamping bolt

Nominal bolt diameter	Tightening torque [N・m]	Torque screwdriver/ wrench	Hexagon bit/ head	Coupling size
M4	3.4	CN500LTDK	SB 3mm	040
M5	7	N10LTDK	SB 4mm	050・060
M6	14	N25LCK	25HCK 5mm	060・070・080
M8	34	N50LCK	50HCK 6mm	080・090
M10	68	N100SPCK × 68N・m	100HCK 8mm	100・120

* Torque screwdriver (wrench)/bit (head) models are those of Nakamura Mfg. Co., Ltd.

■ Pressure bolt

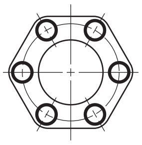
Nominal bolt diameter	Tightening torque [N・m]	Torque wrench	Spanner head	Coupling size
M6	10	N12SPCK × 10N・m	25SCK 10mm	070～120
M8	24	N50SPCK × 24N・m	50SCK 13mm	140

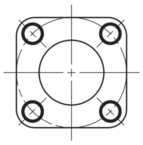
* Torque wrench/spanner head models are those of Nakamura Mfg. Co., Ltd.

Differences in Torsional Stiffness due to Element Shape

Elements used by SFF models may be either square or hexagonal. Since torque is transmitted by coupling the hubs to each other via the element, torsional stiffness is higher in couplings that use hexagonal elements transmitting torque with six bolts, at the expense of some flexibility. Choose your element shape accordingly.

Model (nominal rated torque)	Element shape
SFF-040	Square
SFF-050	Square
SFF-060	Hexagonal
SFF-070	Hexagonal
SFF-080 (-150N)	Square
SFF-080 (-200N)	Hexagonal
SFF-090	Hexagonal
SFF-100	Hexagonal
SFF-120	Hexagonal
SFF-140	Hexagonal





Center Nut for Tapered Shafts

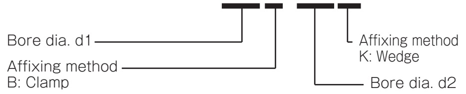
The center nut designated for clamping-type sizes 040/050/060 is shipped pre-installed depending on the opposite coupling-end bore diameter. Check the table below.

Clamping hub type model	Center nut installation
SFF-040□-□B-11CN-8N	All pre-installed
SFF-040□-□B-11CN-12N	Installed where d1<d12
SFF-050□-□B-14CN-25N	Installed where d1<d15
SFF-050□-□B-16CN-25N	Installed where d1<d16
SFF-060□-□B-16CN-60N	Installed where d1<d16
SFF-060□-□B-16CN-80N	All bundled

Clamping and Wedge Coupling in Combination

For the range of common sizes between clamping and wedge coupling (070 - 120), a common element is used per each size allowing you to use them in combination.
When specifying bore diameters in this instance, specify d1: clamping, d2: wedge coupling in that order, regardless of larger and smaller bore diameters.

Example) SFF-080SS-30B-25K-200N



Rated torques after combination are given for the clamping side. See the table below.

d1 clamping (designation B)		d2 wedge coupling (designation K)		Rated torque after combination [N·m]
Model	Bore diameter range [mm]	Model	Bore diameter range [mm]	
SFF-070 (-90N)	18・19	**SFF-070 (-100N)**	18～35	90
SFF-070 (-100N)	20～35	**SFF-070 (-100N)**	18～35	100
SFF-080 (-150N)	22～35	**SFF-080 (-150N)**	22～38	150
SFF-080 (-200N)	22～38	**SFF-080 (-200N)**	22～38	200
SFF-090 (-250N)	25・28	**SFF-090 (-300N)**	28～48	250
SFF-090 (-300N)	30～42	**SFF-090 (-300N)**	28～48	300
SFF-100 (-450N)	32～48	**SFF-100 (-450N)**	32～50	450
SFF-120 (-600N)	32～55	**SFF-120 (-600N)**	35～70	600

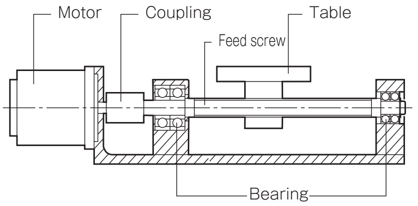
Points to Consider Regarding the Feed Screw System

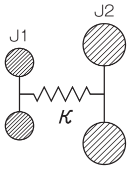
Gain adjustment on the servo motor may cause the servo motor to oscillate. Oscillation in the servo motor during operation can cause problems particularly with the overall natural frequency and electrical control systems of the feed screw system.

In order for these issues to be resolved, the torsional stiffness for the coupling and feed screw section and the moment of inertia and other characteristics for the system overall will need to be adjusted and the torsional natural frequency for the mechanical system raised or the tuning function (filter function) for the electrical control system in the servo motor adjusted during the design stage.

How to Find the Natural Frequency of a Feed Screw System

Select a coupling based on the maximum torque of the servo motor. Next, find the overall natural frequency, Nf, from the torsional stiffness of the coupling and feed screw, κ, the moment of inertia of driving side, J1, and the moment of inertia of driven side, J2, for the feed screw system shown below.





Natural frequency of overall feed screw system Nf

$$Nf=\frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{J1}+\frac{1}{J2}\right)}$$

Nf: Overall natural frequency of a feed screw system [Hz]
κ: Torsional stiffness of the coupling and feed screw [N·m/rad]
J1: Moment of inertia of driving side [kg·m^2]
J2: Moment of inertia of driven side [kg·m^2]

Torsional spring constant of coupling and feed screw κ

$$\frac{1}{\kappa}=\frac{1}{\kappa c}+\frac{1}{\kappa b}$$

κc: Torsional spring constant of coupling [kg·m^2]
κb: Torsional spring constant of feed screw [kg·m^2]

Driving moment of inertia J1

$$J1=Jm+\frac{Jc}{2}$$

Jm: Moment of inertia of servomotor [kg·m^2]
Jc: Moment of inertia of coupling [kg·m^2]

Driven moment of inertia J2

$$J2=Jb+Jt+\frac{Jc}{2}$$

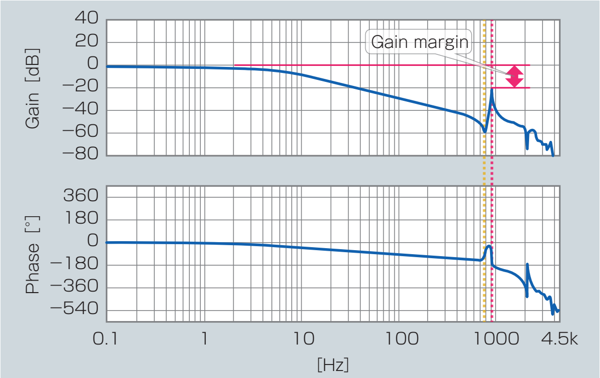
Jb: Moment of inertia of feedscrew [kg·m^2]
Jt: Moment of inertia of table [kg·m^2]
Jc: Moment of inertia of coupling [kg·m^2]

Moment of inertia of table Jt

$$Jt=\frac{M\times P^2}{4\pi^2}$$

M: Mass of table [kg]
P: Lead of feed screw [m]

Since it is easier for oscillation to occur when the gain margin with natural frequency is 10 dB or lower, it is necessary for the natural frequency to be set high with a therefore higher gain margin at the design stage, or to adjust the natural frequency using the servomotor's electric tuning function (filter function) so as to avoid oscillation.



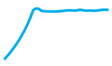
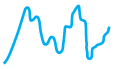
Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\ [N\cdot m]\ =9550\times\frac{P\ [kW]}{n\ [min^{-1}]}$$

(2) Determine the factor K from the load properties, and find the corrected torque, Td, applied to the coupling.

$$Td\ [N\cdot m]\ =Ta\ [N\cdot m]\ \times K(\text{Refer to the table below for values})$$

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K	1.0	1.25	1.75	2.25

For servo motor drive, multiply the maximum torque, Ts, by the usage factor K = 1.2 to 1.5.

$$Td\ [N\cdot m]\ =Ts\ [N\cdot m]\ \times\ (1.2\sim1.5)$$

(3) Set the size so that the rated coupling torque, Tn, is higher than the corrected torque, Td.

$$Tn\ [N\cdot m]\ \geqq Td\ [N\cdot m]$$

(4) Check that the mount shaft is no larger than the maximum bore diameter of the coupling.

* Contact Miki Pulley for assistance with any device experiencing extreme periodic vibrations.

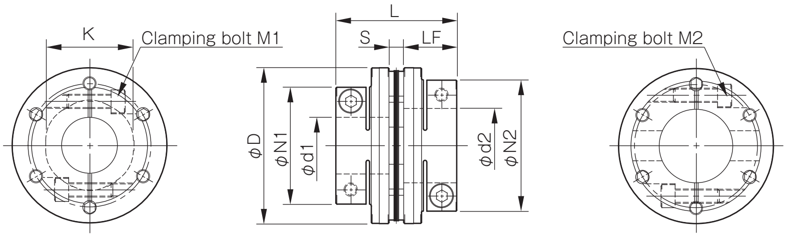
SFM Types Clamping

Specifications

Model	Rated torque [N•m]	Misalignment			Max. rotation speed $[\mathrm{min}^{-1}]$	Torsional stiffness [N•m/rad]	Axial stiffness [N/mm]	Moment of inertia $[\mathrm{kg{\cdot}m^2}]$	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFM-060SS-□B-□B-60N	60	0.02	1	± 0.3	24000	104000	399	0.22×10^{-3}	0.52
SFM-060SS-□B-□B-80N	80	0.02	1	± 0.3	24000	104000	399	0.23×10^{-3}	0.49
SFM-070SS-□B-□B-90N	90	0.02	1	± 0.5	24000	240000	484	0.40×10^{-3}	0.72
SFM-070SS-□B-□B-100N	100	0.02	1	± 0.5	24000	240000	484	0.42×10^{-3}	0.67
SFM-080SS-□B-□B-150N	150	0.02	1	± 0.5	24000	120000	96	0.79×10^{-3}	1.04
SFM-080SS-□B-□B-200N	200	0.02	1	± 0.5	24000	310000	546	1.25×10^{-3}	1.40
SFM-090SS-□B-□B-250N	250	0.02	1	± 0.6	24000	520000	321	1.54×10^{-3}	1.62
SFM-090SS-□B-□B-300N	300	0.02	1	± 0.6	24000	520000	321	1.58×10^{-3}	1.53
SFM-100SS-□B-□B-450N	450	0.02	1	± 0.65	20000	740000	540	3.27×10^{-3}	2.53
SFM-120SS-□B-□B-600N	600	0.02	1	± 0.8	20000	970000	360	6.90×10^{-3}	3.78

* Torsional stiffness values given are calculated for the element alone.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Model	d1 [mm]	d2 [mm]	D [mm]	L [mm]	N1 • N 2 [mm]	LF [mm]	S [mm]	K [mm]	M 1 • M2 Qty - Nominal dia.	M1 • M2 Tightening torque [N • m]
SFM-060SS-□B-□B-60N	12 • 14 • 15 • 16 • 17 • 18 • 19	12 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 22	58	53.4	44	24	5.4	32	2-M6	14
	–	24 • 25 • 28			48				2-M5	7
	–	30			52					
SFM-060SS-□B-□B-80N	20 • 22	20 • 22	58	53.4	44	24	5.4	32	2-M6	14
	24 • 25 • 28	24 • 25 • 28			48				2-M5	7
	30	30			52					
SFM-070SS-□B-□B-90N	18 • 19	18 • 19 • 20 • 22 • 24 • 25	68	55.9	47	25	5.9	38	2-M6	14
	–	28 • 30 • 32 • 35			56					
SFM-070SS-□B-□B-100N	20 • 22 • 24 • 25	20 • 22 • 24 • 25	68	55.9	47	25	5.9	38	2-M6	14
	28 • 30 • 32 • 35	28 • 30 • 32 • 35			56					
SFM-080SS-□B-□B-150N	22 • 24 • 25	22 • 24 • 25	78	68.3	53	30	8.3	37	2-M8	34
	28 • 30 • 32 • 35	28 • 30 • 32 • 35			56				2-M6	14
SFM-080SS-□B-□B-200N	22 • 24 • 25	22 • 24 • 25	78	67.7	53	30	7.7	42	2-M8	34
	28 • 30 • 32 • 35	28 • 30 • 32 • 35			70					
	38	38			74					
SFM-090SS-□B-□B-250N	25 • 28	25 • 28 • 30 • 32	88	68.3	66	30	8.3	50	2-M8	34
	–	35 • 38 • 40 • 42			74					
SFM-090SS-□B-□B-300N	30 • 32	30 • 32	88	68.3	66	30	8.3	50	2-M8	34
	35 • 38 • 40 • 42	35 • 38 • 40 • 42			74					
SFM-100SS-□B-□B-450N	32 • 35 • 38 • 40 • 42 • 45 • 48	32 • 35 • 38 • 40 • 42 • 45 • 48	98	90.2	84	40	10.2	56	2-M10	68
SFM-120SS-□B-□B-600N	32 • 35 • 38 • 40 • 42 • 45	32 • 35 • 38 • 40 • 42 • 45	118	90.2	84	40	10.2	68	2-M10	68
	48 • 50 • 55	48 • 50 • 55			100					

* Nominal diameter of clamping bolt M1/M2 is given as number of bolts - nominal diameter, and the number is the number for one hub.

Standard Bore Diameter

Model		Standard bore diameter d1·d2 [mm]																					
	Nominal diameter	12	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55
SFM-060SS-☐B-☐B-60N	d1	●	●	●	●	●	●	●															
	d2	●	●	●	●	●	●	●	●	●	●	●	●	●									
SFM-060SS-☐B-☐B-80N	d1								●	●	●	●	●	●									
	d2								●	●	●	●	●	●									
SFM-070SS-☐B-☐B-90N	d1						●	●															
	d2						●	●	●	●	●	●	●	●	●	●							
SFM-070SS-☐B-☐B-100N	d1								●	●	●	●	●	●	●	●							
	d2								●	●	●	●	●	●	●	●							
SFM-080SS-☐B-☐B-150N	d1									●	●	●	●	●	●	●							
	d2									●	●	●	●	●	●	●							
SFM-080SS-☐B-☐B-200N	d1									●	●	●	●	●	●	●	●						
	d2									●	●	●	●	●	●	●	●						
SFM-090SS-☐B-☐B-250N	d1											●	●										
	d2											●	●	●	●	●	●	●	●				
SFM-090SS-☐B-☐B-300N	d1													●	●	●	●	●	●				
	d2													●	●	●	●	●	●				
SFM-100SS-☐B-☐B-450N	d1														●	●	●	●	●	●	●		
	d2														●	●	●	●	●	●	●		
SFM-120SS-☐B-☐B-600N	d1														●	●	●	●	●	●	●	●	●
	d2														●	●	●	●	●	●	●	●	●

* The bore diameters marked with ● are supported as standard bore diameter.

Balance correction

Model (size)	Balance classification	Supported rotational speed [min⁻¹]				
		10000 or less	15000 or less	18000 or less	20000 or less	24000 or less
SFM-060SS	G6.3 • G2.5	●	●	●	●	●
SFM-070SS	G6.3 • G2.5	●	●	●	●	●
SFM-080SS	G6.3 • G2.5	●	●	●	●	●
SFM-090SS	G6.3 • G2.5	●	●	●	●	●
SFM-100SS	G6.3 • G2.5	●	●	●	●	
SFM-120SS	G6.3 • G2.5	●	●	●	●	

* We will perform balance correction for supported rotational speeds marked with ●.

How to Place an Order

SFM-080SS-25BK-30BK-200N-G2.5/24000

Size

Type
S : Single element

Material
S : Steel

Bore dia. d1 (Small dia.)

Bore dia. d2 (Large dia.)

Affixing method
B: Clamp

Countershaft tolerance
Blank: h7, K: k6, M: m6, J: j6, S: 35$^{+0.010}_{0}$

Nominal rated torque
(see specifications table)

Balance classification
G6.3, G2.5

Supported rotational speed
10000 or less
15000 or less
18000 or less
20000 or less
24000 or less

SFM Types Wedge Coupling

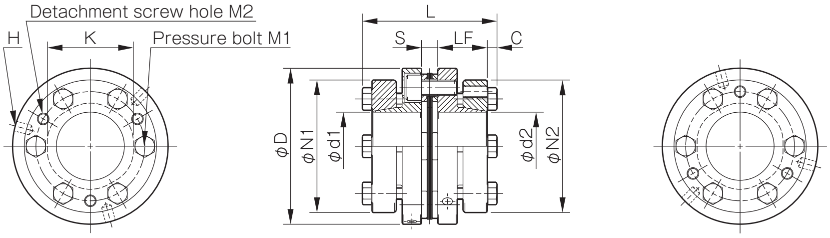
Specifications

Model	Rated torque [N•m]	Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N•m/rad]	Axial stiffness [N/mm]	Moment of inertia [$kg\cdot m^2$]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFM-070SS-□K-□K-100N	100	0.02	1	±0.5	24000	240000	484	0.66×10^{-3}	0.92
SFM-080SS-□K-□K-150N	150	0.02	1	±0.5	24000	120000	96	1.21×10^{-3}	1.03
SFM-080SS-□K-□K-200N	200	0.02	1	±0.5	24000	310000	546	1.11×10^{-3}	1.26
SFM-090SS-□K-□K-300N	300	0.02	1	±0.6	24000	520000	321	1.75×10^{-3}	1.48
SFM-100SS-□K-□K-450N	450	0.02	1	±0.65	20000	740000	540	2.56×10^{-3}	1.87
SFM-120SS-□K-□K-600N	600	0.02	1	±0.8	20000	970000	360	5.33×10^{-3}	2.50
SFM-140SS-□K-□K-800N	800	0.02	1	±1.0	20000	1400000	360	10.28×10^{-3}	4.66
SFM-140SS-□K-□K-1000N	1000	0.02	1	±1.0	20000	1400000	360	14.70×10^{-3}	5.01

* Torsional stiffness values given are calculated for the element alone.

* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Model	d1 [mm]	d2 [mm]	D [mm]	L [mm]	N1・N2 [mm]	LF [mm]	S [mm]	C [mm]	K [mm]	H [mm]	M1 Qty - Nominal dia.	M1 Tightening torque [N・m]	M2 Qty - Nominal dia.
SFM-070SS-□K-□K-100N	18・19	18・19	68	62.9	53	23.5	5.9	5	38	3-5.1	6-M6	10	3-M6
	20・22・24・25	20・22・24・25			58								
	28・30	28・30			63								
	32・35	32・35			68								
SFM-080SS-□K-□K-150N	22・24・25	22・24・25	78	69.3	58	25.5	8.3	5	37	4-5.1	4-M6	10	2-M6
	28・30	28・30			63								
	32・35	32・35			68								
	–	38			73								
SFM-080SS-□K-□K-200N	22・24・25	22・24・25	78	68.7	58	25.5	7.7	5	42	3-5.1	6-M6	10	3-M6
	28・30	28・30			63								
	32・35	32・35			68								
	38	38			73								
SFM-090SS-□K-□K-300N	28・30	28・30	88	69.3	63	25.5	8.3	5	50	3-6.8	6-M6	10	3-M6
	32・35	32・35			68								
	38・40・42	38・40・42			73								
	45	45			78								
	48	48			83								
SFM-100SS-□K-□K-450N	32・35	32・35	98	75.2	68	27.5	10.2	5	56	3-6.8	6-M6	10	3-M6
	38・40・42	38・40・42			73								
	45	45			78								
	48・50	48・50			83								
SFM-120SS-□K-□K-600N	35	35	118	75.2	68	27.5	10.2	5	68	3-6.8	6-M6	10	3-M6
	38・40・42	38・40・42			73								
	45	45			78								
	48・50・52	48・50・52			83								
	55	55			88								
	60・62・65	60・62・65			98								
	–	70			108								
SFM-140SS-□K-□K-800N	35・38	35・38	138	94.6	83	36.5	10.6	5.5	78	3-8.6	6-M8	24	3-M8
	40・42・45	40・42・45			88								
	–	48・50・52			98								
	–	55・60			108								
	–	62・65・70			118								
	–	75・80			128								
SFM-140SS-□K-□K-1000N	48・50・52	48・50・52	138	94.6	98	36.5	10.6	5.5	78	3-8.6	6-M8	24	3-M8
	55・60	55・60			108								
	62・65・70	62・65・70			118								
	75	75・80			128								

* The nominal diameters of the pressure bolt M1 and detachment screw hole M2 are equal to the quantity minus the nominal diameter of the screw threads. The quantities of H, M1 and M2 are the same as the quantity for a hub on one side.

Standard Bore Diameter

Model	Nominal diameter	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	52	55	60	62	65	70	75	80
SFM-070SS-☐K-☐K-100N	d1	●	●	●	●	●	●	●	●	●	●														
	d2	●	●	●	●	●	●	●	●	●	●														
SFM-080SS-☐K-☐K-150N	d1				●	●	●	●	●	●	●														
	d2				●	●	●	●	●	●	●	●													
SFM-080SS-☐K-☐K-200N	d1				●	●	●	●	●	●	●	●													
	d2				●	●	●	●	●	●	●	●													
SFM-090SS-☐K-☐K-300N	d1							●	●	●	●	●	●	●	●	●									
	d2							●	●	●	●	●	●	●	●	●									
SFM-100SS-☐K-☐K-450N	d1									●	●	●	●	●	●	●	●								
	d2									●	●	●	●	●	●	●	●								
SFM-120SS-☐K-☐K-600N	d1										●	●	●	●	●	●	●	●	●	●	●	●			
	d2										●	●	●	●	●	●	●	●	●	●	●	●	●		
SFM-140SS-☐K-☐K-800N	d1										●	●	●	●	●										
	d2										●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SFM-140SS-☐K-☐K-1000N	d1															●	●	●	●	●	●	●	●	●	
	d2															●	●	●	●	●	●	●	●	●	●

Standard bore diameter d1·d2 [mm]

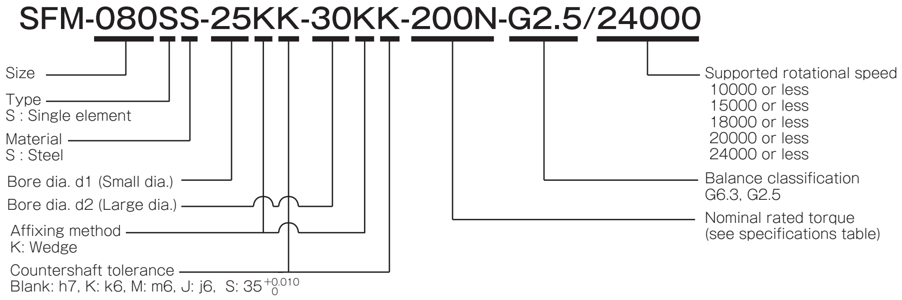
* The bore diameters marked with ● are supported as standard bore diameter.

Balance correction

Model (size)	Balance classification	Supported rotational speed [min⁻¹] 10000 or less	15000 or less	18000 or less	20000 or less	24000 or less
SFM-070SS	G6.3 • G2.5	●	●	●	●	●
SFM-080SS	G6.3 • G2.5	●	●	●	●	●
SFM-090SS	G6.3 • G2.5	●	●	●	●	●
SFM-100SS	G6.3 • G2.5	●	●	●	●	
SFM-120SS	G6.3 • G2.5	●	●	●	●	
SFM-140SS	G6.3 • G2.5	●	●	●	●	

* We will perform balance correction for supported rotational speeds marked with ●.

How to Place an Order


SFM-080SS-25KK-30KK-200N-G2.5/24000

Size

Type
S : Single element

Material
S : Steel

Bore dia. d1 (Small dia.)

Bore dia. d2 (Large dia.)

Affixing method
K: Wedge

Countershaft tolerance
Blank: h7, K: k6, M: m6, J: j6, S: 35$^{+0.010}_{0}$

Supported rotational speed
10000 or less
15000 or less
18000 or less
20000 or less
24000 or less

Balance classification
G6.3, G2.5

Nominal rated torque
(see specifications table)

SFM Types

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

Couplings are assembled at high accuracy using a special mounting jig to ensure accurate concentricity of left and right internal diameters. Take extra precautions when handling couplings, should strong shocks be given on couplings, it may affect mounting accuracy and cause the parts to break during use.

(1) Couplings are designed for use within an operating temperature range of -30° C to 120℃ . Although the couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water and oil as it may cause part deterioration.

(2) Handle the element with care as it is made of a thin stainless steel metal disc, also making sure to be careful so as not to injure yourself.

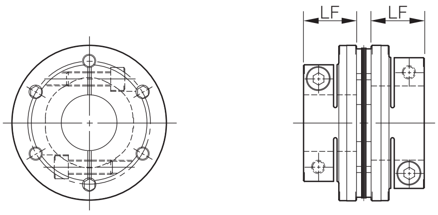
(3) Do not tighten up clamping bolts or pressure bolts until after inserting the mounting shaft.

Mounting (Clamping)

(1) Check that coupling clamping bolts have been loosened and remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

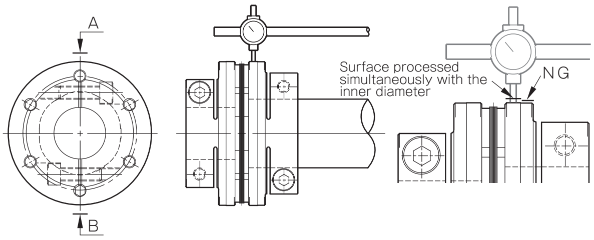
(2) Be careful when inserting the couplings into the shaft so as not to apply excessive force of compression or tensile force to the element.

(3) Ensure that the length of the coupling inserted onto the motor shaft touches the shaft for the entire length of the clamping hub of the coupling (LF dimension), as shown in the diagram below, and position it so that it does not interfere with the elements, spacers or the other shaft. Then temporarily tighten the two clamping bolts, tightening them alternately until the coupling cannot be manually rotated.



Model (Clamping)	LF dimension [mm]
SFM-060	24
SFM-070	25
SFM-080	30
SFM-090	30
SFM-100	40
SFM-120	40

(4) Hold a dial gauge against the outer diameter of the clamping hub on the motor shaft side (the surface processed simultaneously with the inner diameter), and then tighten the two clamping bolts while turning the motor shaft by hand and adjusting the difference in the runout values at A and B in the figure below is 0.02 mm or less (and as close to 0 as possible).



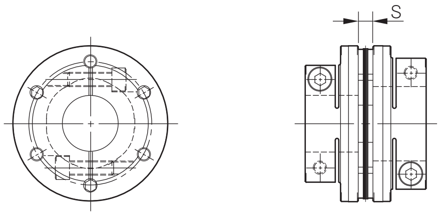
(5) Alternately fasten the two clamping bolts as you adjust them, and finish by tightening both bolts to the appropriate tightening torque of the following table, using a calibrated torque wrench.
Since it is fastened by two clamping bolts, tightening one bolt before the other will place more than the prescribed axial force on the bolt tightened first when the other bolt is tightened. Be sure to tighten them alternately, a little at a time.

Clamping bolt nominal diameter	Tightening torque [N·m]
M5	7
M6	14
M8	34
M10	68

(6) Mount the motor, to which the coupling has already been mounted, on the body of the machinery. At that time, adjust the motor mounting position (centering location) while inserting the coupling onto the driven shaft, being alert to undue forces on the element such as compression or pulling.

(7) Make the length of the driven shaft inserted into the coupling connect to the shaft for the length of the LF dimension (described above), alternately tighten the two clamping bolts, and provisionally tighten enough that the coupling cannot be manually rotated.

(8) In addition, keep the dimension between clamping hub faces (the S dimension in the diagram) to within the allowable misalignment of the axial displacement with respect to a reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.



Model (Clamping)	S dimension [mm]
SFM-060	5.4
SFM-070	5.9
SFM-080 (-150N)	8.3
SFM-080 (-200N)	7.7
SFM-090	8.3
SFM-100	10.2
SFM-120	10.2

(9) Adjust runout using the same procedure as for the motor shaft side, and then finish by tightening the clamping bolts to the appropriate tightening torque.

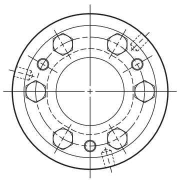
(10) To protect against initial loosening of the clamping bolt, we recommend operating for a set period of time and then retightening to the appropriate tightening torque.

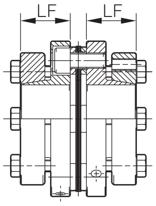
Mounting (Wedge Coupling)

(1) Check that coupling pressure bolts have been loosened and remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Be careful when inserting the couplings into the shaft so as not to apply excessive force of compression or tensile force to the element.

(3) Insert each coupling far enough onto the motor shaft that it touches the shaft along the entire length of the coupling flange (LF dimension), as shown in the diagram below. Position it so that it does not interfere with the elements, spacers or the other shaft and then hold it in place.

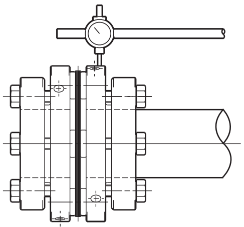




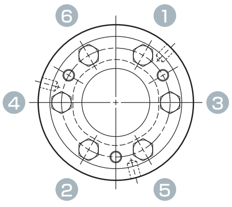
Model (Wedge coupling)	LF dimension [mm]
SFM-070	23.5
SFM-080	25.5
SFM-090	25.5
SFM-100	27.5
SFM-120	27.5
SFM-140	36.5

(4) Using the drive pin hole, lightly tighten the pressure bolt on the diagonal.

(5) Touch the dial gauge to the flange end face or outer diameter on the motor shaft side. Then, while gently rotating the motor shaft manually, adjust the flange periphery and end face by hammering until the runout is as close to zero as possible.



(6) Sequentially fasten the pressure bolts while doing hammering adjustments, and then use a calibrated torque wrench to tighten all the pressure bolts to the appropriate tightening torques below. See the following figure for the tightening procedure for the pressure bolts. Try to tighten them evenly.

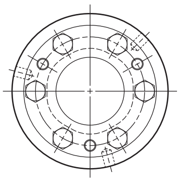


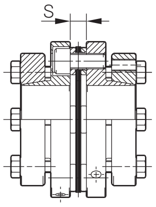
Pressure bolt nominal diameter	Tightening torque [N·m]
M6	10
M8	24

(7) Tighten the motor shaft's pressure bolts at the nominal torque and check that the runout value is low.

(8) Mount the motor, to which the coupling has already been mounted, on the body of the machinery. At that time, adjust the motor mounting position (centering location) while inserting the coupling onto the driven shaft, being alert to any deformation of the disc, etc. Make the length of the driven shaft inserted into the coupling be in contact with the entire length of the coupling flange (LF dimension), and maintain it at that position.

(9) Keep the width of the dimension between flange faces (S dimension in the diagram) within the allowable error range for axial misalignment with respect to the reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.





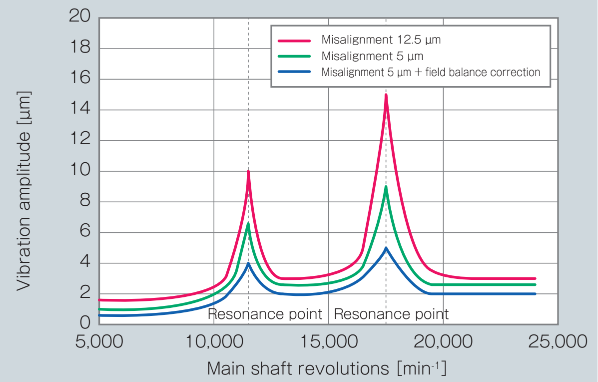
Model	S dimension [mm]
SFM-070	5.9
SFM-080 (-150N)	8.3
SFM-080 (-200N)	7.7
SFM-090	8.3
SFM-100	10.2
SFM-120	10.2
SFM-140	10.6

(10) Tighten the pressure bolts on the driven shaft in order using the same procedure as for the pressure bolts on the motor shaft side, and then finish by tightening to the appropriate tightening torque.

(11) To protect against initial loosening of the pressure bolt, we recommend operating for a set period of time and then retightening to the appropriate tightening torque.

Important when Combining for High-Revolution (Main Shaft) Applications

For high-revolution applications such as a machining center main shaft, vibration can become an issue.
One cause of vibration at high revolutions is misalignment of shaft axes when combining the spindle motor and the main shaft, with vibration still occurring even with balance correction of the coupling itself.
While it is possible to allow for some misalignment occurring as parallel, angular, or axial displacement, it is particularly important to take care with misalignment with high-revolution applications. Be sure to perform axial adjustment during assembly and field balance correction after assembly.



*Couplings used in the above measurements had undergone balance correction on an individual basis.

SFM Types

Items Checked for Design Purposes

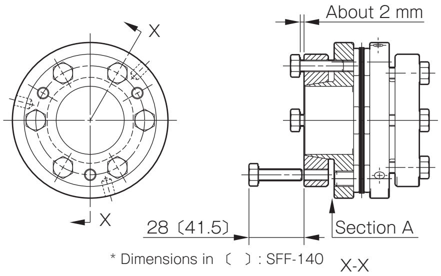
Removal

(1) Check to confirm that there is no torque or axial load being applied to the coupling. There may be cases where a torque is applied to the coupling, particularly when the safety brake is being used. Make sure to verify that this is not occurring before removing parts.

(2) Loosen all the clamping bolts or pressure bolts (loosen pressure bolts until the gap between bearing seat and sleeve is about 2mm).

(3) For clamping type, release the fastening to the shaft by sufficiently loosening all clamping bolts. Note that grease has been applied to the clamping bolts, so do not remove them all the way.

(4) In the case of a wedge coupling system that tightens a pressure bolt from the axial direction, the sleeve will be self-locking, so the coupling between flange and shaft cannot be released simply by loosening the pressure bolt. (Note that in some cases, a coupling can be released by loosening a pressure bolt.) For that reason, when designing devices, a space must be installed for inserting a detachment screw.



(5) Pull out three of the pressure bolts (two 080, 150 N) loosened in step (2), insert them into the detachment screw holes on the sleeve, and tighten them in order, a little at a time. The coupling will be released.

(6) If there is no space in the axial direction, insert the tip of a flathead screwdriver or the like into part A and lightly tap perpendicular to the shaft or use it as a lever to pry off the coupling. Use appropriate caution to not damage the coupling body or the pressure bolts.

Suitable Torque Screwdriver/Torque Wrench

Clamping bolt

Nominal bolt diameter	Tightening torque [N・m]	Torque screwdriver/ wrench	Hexagon bit/ head	Coupling size
M5	7	N10LTDK	SB 4mm	060
M6	14	N25LCK	25HCK 5mm	060・070・080
M8	34	N50LCK	50HCK 6mm	080・090
M10	68	N100SPCK × 68N・m	100HCK 8mm	100・120

* Torque screwdriver (wrench)/bit (head) models are those of Nakamura Mfg. Co., Ltd.

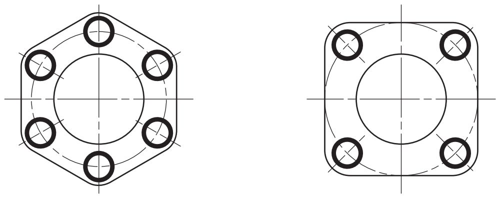
Pressure bolt

Nominal bolt diameter	Tightening torque [N・m]	Torque wrench	Spanner head	Coupling size
M6	10	N12SPCK × 10N・m	25SCK 10mm	070 ～ 120
M8	24	N50SPCK × 24N・m	50SCK 13mm	140

* Torque wrench/spanner head models are those of Nakamura Mfg. Co., Ltd.

Differences in Torsional Stiffness due to Element Shape

Elements used by SFM models may be either square or hexagonal. Since torque is transmitted by coupling the hubs to each other via the element, torsional stiffness is higher in couplings that use hexagonal elements transmitting torque with six bolts, at the expense of some flexibility. Choose your element shape accordingly.



Model (nominal rated torque)	Element shape
SFM-060	Hexagonal
SFM-070	Hexagonal
SFM-080 (-150N)	Square
SFM-080 (-200N)	Hexagonal
SFM-090	Hexagonal
SFM-100	Hexagonal
SFM-120	Hexagonal
SFM-140	Hexagonal

Clamping and Wedge Coupling in Combination

For the range of common sizes between clamping and wedge coupling (070 - 120), a common element is used per each size allowing you to use them in combination.
When specifying bore diameters in this instance, specify d1: clamping, d2: wedge coupling in that order, regardless of larger and smaller bore diameters.

Example) SFM-080SS-30B-25K-200N-G2.5/24000

Bore dia. d1
Affixing method
B : Clamp
Affixing method
K: Wedge
Bore dia. d2

Rated torques after combination are given for the clamping side. See the table below.

d1 clamping (designation B)		d2 wedge coupling (designation K)		Rated torque after combination [N·m]
Model	Bore diameter range [mm]	Model	Bore diameter range [mm]	
SFM-070 (-90N)	18・19	SFM-070 (-100N)	18 ～ 35	90
SFM-070 (-100N)	20 ～ 35	SFM-070 (-100N)	18 ～ 35	100
SFM-080 (-150N)	22 ～ 35	SFM-080 (-150N)	22 ～ 38	150
SFM-080 (-200N)	22 ～ 38	SFM-080 (-200N)	22 ～ 38	200
SFM-090 (-250N)	25・28	SFM-090 (-300N)	28 ～ 48	250
SFM-090 (-300N)	30 ～ 42	SFM-090 (-300N)	28 ～ 48	300
SFM-100 (-450N)	32 ～ 48	SFM-100 (-450N)	32 ～ 50	450
SFM-120 (-600N)	32 ～ 55	SFM-120 (-600N)	35 ～ 70	600

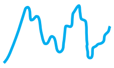
Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\ [N \cdot m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

(2) Determine the factor K from the load properties, and find the corrected torque, Td, applied to the coupling.

$$Td\ [N \cdot m] = Ta\ [N \cdot m] \times K\text{(Refer to the table below for values)}$$

Load properties	Constant 	Vibrations: Small 	Vibrations: Medium 	Vibrations: Large 
K	1.0	1.25	1.75	2.25

For servo motor drive, multiply the maximum torque, Ts, by the usage factor K = 1.2 to 1.5.

$$Td\ [N \cdot m] = Ts\ [N \cdot m] \times (1.2 \sim 1.5)$$

For high-revolution applications such as a machining center main shaft, it is necessary to set a high safety factor unlike common feed screw systems.
Multiply the maximum torque of spindle motor: Ts by the service factor: K=3 to 3.6.

$$Td\ [N \cdot m] = Ts\ [N \cdot m] \times (3 \sim 3.6)$$

(3) Set the size so that the rated coupling torque, Tn, is higher than the corrected torque, Td.

$$Tn\ [N \cdot m] \geqq Td\ [N \cdot m]$$

(4) Check that the mount shaft is no larger than the maximum bore diameter of the coupling.

* Contact Miki Pulley for assistance with any device experiencing extreme periodic vibrations.

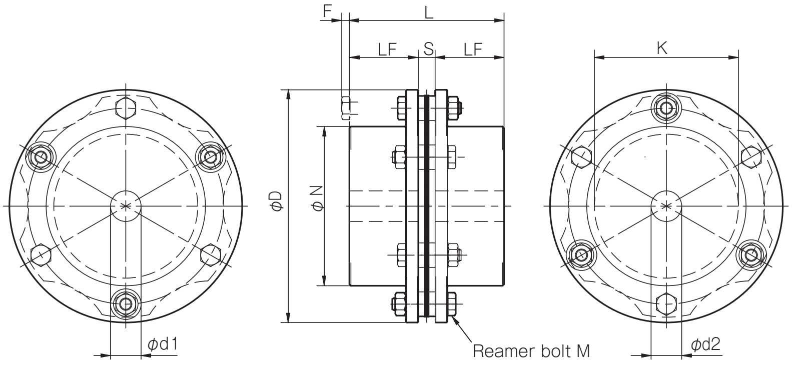
SFH S Types Single Element Type

Specification (SFH-☐S) Pilot Bore/Key or Set Screw

Model	Rated torque [N·m]	Misalignment		Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
		Angular [°]	Axial [mm]					
SFH-150S	1000	1	±0.4	5900	1500000	244	12.60×10^{-3}	4.71
SFH-170S	1300	1	±0.5	5100	2840000	224	26.88×10^{-3}	7.52
SFH-190S	2000	1	±0.5	4700	3400000	244	43.82×10^{-3}	10.57
SFH-210S	4000	1	±0.55	4300	4680000	508	68.48×10^{-3}	13.78
SFH-220S	5000	1	±0.6	4000	5940000	448	102.53×10^{-3}	18.25
SFH-260S	8000	1	±0.7	3400	10780000	612	233.86×10^{-3}	29.66

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (SFH-☐S) Pilot Bore/Key or Set Screw



Unit [mm]

Model	d1·d2			D	N	L	LF	S	F	K	M
	Pilot bore	Min.	Max.								
SFH-150S	20	22	70	152	104	101	45	11	5	94	6-M8 × 36
SFH-170S	25	28	80	178	118	124	55	14	6	108	6-M10 × 45
SFH-190S	30	32	85	190	126	145	65	15	10	116	6-M12 × 54
SFH-210S	35	38	90	210	130	165	75	15	8	124	6-M16 × 60
SFH-220S	45	48	100	225	144	200	90	20	−2	132	6-M16 × 60
SFH-260S	50	55	115	262	166	223	100	23	11	150	6-M20 × 80

* Pilot bores are to be drilled into the part. See the standard hole-drilling standards of P.84 for information on bore drilling.
* The nominal diameter of the reamer bolt is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

How to Place an Order

SFH-150S-38H-38H

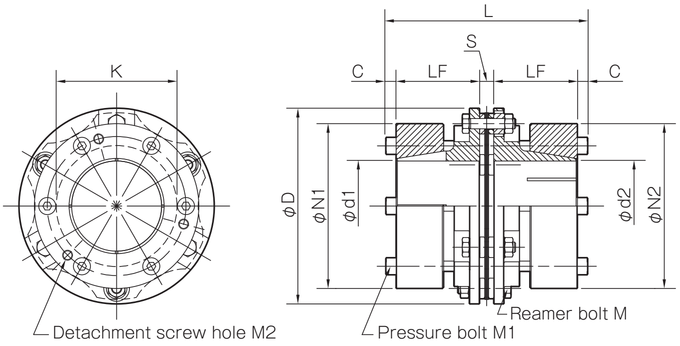
Size
Type: S
Single element
Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore
Bore specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards

Specification (SFH-□S-□K-□K) Frictional Coupling

Model	Rated torque [N·m]	Misalignment		Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg·m²]	Mass [kg]
		Angular [°]	Axial [mm]					
SFH-150S	1000	1	±0.4	5900	1500000	244	25.14×10^{-3}	8.95
SFH-170S	1300	1	±0.5	5100	2840000	224	47.90×10^{-3}	12.53
SFH-190S	2000	1	±0.5	4700	3400000	244	60.40×10^{-3}	14.21
SFH-210S	4000	1	±0.55	4300	4680000	508	80.50×10^{-3}	16.12

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass in the table are measured for the maximum bore diameter.

Dimensions (SFH-□S-□K-□K) Frictional Coupling



Unit [mm]

Model	D	L	d1・d2	N1・N2	LF	S	C	K	M	M1	M2
SFH-150S	152	157	38・40・42・45・50	108	65	11	8	94	6-M8 × 36	6-M8 × 60	3-M8
			55・56・60・65・70	128							
SFH-170S	178	160	38・40・42・45・50	108	65	14	8	108	6-M10 × 45	6-M8 × 60	3-M8
			55・56・60・65・70	128							
			75・80	148							
SFH-190S	190	175	38・40・42・45・50	108	70	15	10	116	6-M12 × 54	6-M10 × 65	3-M10
			55・56・60・65・70	128							
			75・80・85	148							
SFH-210S	210	181	38・40・42・45・50	108	73	15	10	124	6-M16 × 60	6-M10 × 65	3-M10
			55・56・60・65・70	128							
			75・80・85・90	148							

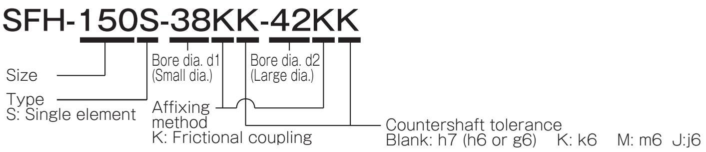
* The nominal diameters of each bolt and tap are equal to the quantity minus the nominal diameter of the screw threads times the nominal length. The quantities for the pressure bolt M1 and detachment screw hole M2 are quantities for the hub on one side.

Standard Bore Diameter

Model	Standard bore diameter d1, d2 [mm]														
	38	40	42	45	48	50	55	56	60	65	70	75	80	85	90
SFH-150S	●	●	●	●	●	●	●	●	●	●	●				
SFH-170S	1100	1200	1250	●	●	●	●	●	●	●	●	●	●		
SFH-190S	1800	1900	●	●	●	●	●	●	●	●	●	●	●	●	
SFH-210S	1800	1900	2000	2150	2300	2400	2600	2650	2850	3100	3350	3600	3800	●	●

* The bore diameters marked with ● or numbers are supported as standard bore diameter.
* Bore diameters whose fields contain numbers are restricted in their rated torque by the holding power of the shaft connection component because the bore diameter is small. The numbers indicate the rated torque value [N·m].

How to Place an Order



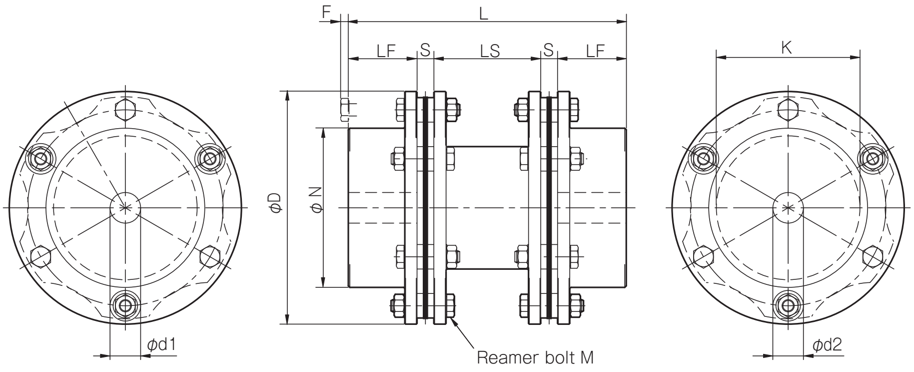
SFH G Types Double Element/Floating Shaft Type

Specification (SFH-□G) Pilot Bore/Key or Set Screw

Model	Rated torque [N·m]	Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFH-150G	1000	1.4	1 (On one side)	± 0.8	5900	750000	122	21.87×10^{-3}	8.72
SFH-170G	1300	1.6	1 (On one side)	± 1.0	5100	1420000	112	51.07×10^{-3}	13.94
SFH-190G	2000	2.0	1 (On one side)	± 1.0	4700	1700000	122	81.58×10^{-3}	19.51
SFH-210G	4000	2.1	1 (On one side)	± 1.1	4300	2340000	254	125.50×10^{-3}	24.26
SFH-220G	5000	2.3	1 (On one side)	± 1.2	4000	2970000	224	176.91×10^{-3}	30.27
SFH-260G	8000	2.9	1 (On one side)	± 1.4	3400	5390000	306	433.47×10^{-3}	53.11

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (SFH-□G) Pilot Bore/Key or Set Screw



Unit [mm]

Model	d1·d2			D	N	L	LF	LS	S	F	K	M
	Pilot bore	Min.	Max.									
SFH-150G	20	22	70	152	104	182	45	70	11	5	94	12-M8 × 36
SFH-170G	25	28	80	178	118	218	55	80	14	6	108	12-M10 × 45
SFH-190G	30	32	85	190	126	260	65	100	15	10	116	12-M12 × 54
SFH-210G	35	38	90	210	130	290	75	110	15	8	124	12-M16 × 60
SFH-220G	45	48	100	225	144	335	90	115	20	−2	132	12-M16 × 60
SFH-260G	50	55	115	262	166	391	100	145	23	11	150	12-M20 × 80

* Pilot bores are to be drilled into the part. See the standard hole-drilling standards of P.84 for information on bore drilling.
* If you require a product with an LS dimension other than that above, contact Miki Pulley with your required dimension [mm]. Please contact Miki Pulley for assistance if LS ≧ 1000.
* The nominal diameter of the reamer bolt is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

How to Place an Order

SFH-150G-38H-38H LS=500

Size
Type: G
Double element
Floating shaft
Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore
Bore specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards
Spacer length
*Use mm units for LS dimensions.
*Leave blank for standard spacers.

Maximum LS Dimension When Used Vertically

Model	LS [mm]
SFH-150G	1100
SFH-170G	800
SFH-190G	900
SFH-210G	2000
SFH-220G	1900
SFH-260G	2500

* When considering vertical use and the LS dimension is greater than that in the above table, consult Miki Pulley.

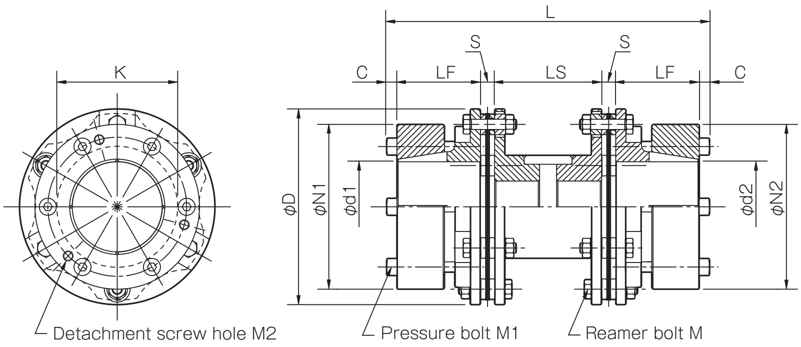
Specification (SFH-□G-□K-□K) Frictional Coupling

Model	Rated torque [N·m]	Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Axial stiffness [N/mm]	Moment of inertia [$kg·m^2$]	Mass [kg]
		Parallel [mm]	Angular [°]	Axial [mm]					
SFH-150G	1000	1.4	1 (On one side)	±0.8	5900	750000	122	34.41×10^{-3}	12.96
SFH-170G	1300	1.6	1 (On one side)	±1.0	5100	1420000	112	72.09×10^{-3}	18.95
SFH-190G	2000	2.0	1 (On one side)	±1.0	4700	1700000	122	98.15×10^{-3}	23.14
SFH-210G	4000	2.1	1 (On one side)	±1.1	4300	2340000	254	137.53×10^{-3}	26.61

* Max. rotation speed does not take into account dynamic balance.

* The moment of inertia and mass in the table are measured for the maximum bore diameter.

Dimensions (SFH-□G-□K-□K) Frictional Coupling



Unit [mm]

Model	D	L	d1・d2	N1・N2	LF	LS	S	C	K	M	M1	M2
SFH-150G	152	238	38・40・42・45・50	108	65	70	11	8	94	12-M8 × 36	6-M8 × 60	3-M8
			55・56・60・65・70	128								
SFH-170G	178	254	38・40・42・45・50	108	65	80	14	8	108	12-M10 × 45	6-M8 × 60	3-M8
			55・56・60・65・70	128								
			75・80	148								
SFH-190G	190	290	38・40・42・45・50	108	70	100	15	10	116	12-M12 × 54	6-M10 × 65	3-M10
			55・56・60・65・70	128								
			75・80・85	148								
SFH-210G	210	306	38・40・42・45・50	108	73	110	15	10	124	12-M16 × 60	6-M10 × 65	3-M10
			55・56・60・65・70	128								
			75・80・85・90	148								

* If you require a product with an LS dimension other than that above, contact Miki Pulley with your required dimension [mm]. Please contact Miki Pulley for assistance if LS ≧ 1000.

* The nominal diameters of each bolt and tap are equal to the quantity minus the nominal diameter of the screw threads times the nominal length. The quantities for the pressure bolt M1 and detachment screw hole M2 are quantities for the hub on one side.

Standard Bore Diameter

Model	Standard bore diameter d1, d2 [mm]														
	38	40	42	45	48	50	55	56	60	65	70	75	80	85	90
SFH-150G	●	●	●	●	●	●	●	●	●	●	●				
SFH-170G	1100	1200	1250	●	●	●	●	●	●	●	●	●	●		
SFH-190G	1800	1900	●	●	●	●	●	●	●	●	●	●	●	●	
SFH-210G	1800	1900	2000	2150	2300	2400	2600	2650	2850	3100	3350	3600	3800	●	●

* The bore diameters marked with ● or numbers are supported as standard bore diameter.

* Bore diameters whose fields contain numbers are restricted in their rated torque by the holding power of the shaft connection component because the bore diameter is small. The numbers indicate the rated torque value [N·m].

How to Place an Order

SFH-150G-38KK-42KK LS=500

Size
Type: G
Double element
Floating shaft
Bore dia. d1 (Small dia.)
Affixing method
K: Frictional coupling
Bore dia. d2 (Large dia.)
Countershaft tolerance
Blank: h7 (h6 or g6)   K: k6   M: m6 J:j6
Spacer length
*Use mm units for LS dimensions.
*Leave blank for standard spacers.

Maximum LS Dimension When Used Vertically

Model	LS [mm]
SFH-150G	1100
SFH-170G	800
SFH-190G	900
SFH-210G	2000

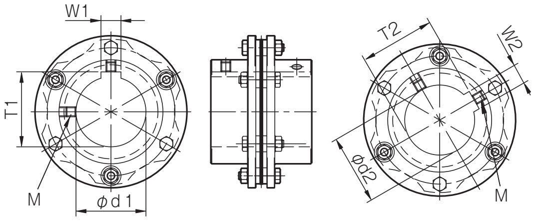
* When considering vertical use and the LS dimension is greater than that in the above table, consult Miki Pulley.

SFH Models

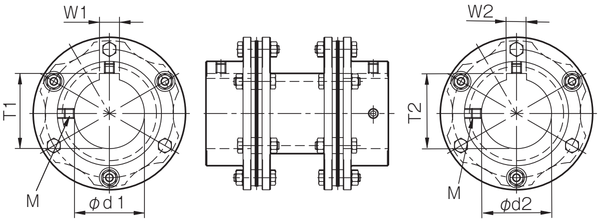
Standard Hole-Drilling Standards

- Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular flange hub.
- Set screw positions are not on the same plane.
- The set screws are included with the product.
- Consult the technical documentation at the end of this volume for standard dimensions for bore processing other than those given here.

■ SFH S



■ SFH G



Unit [mm]

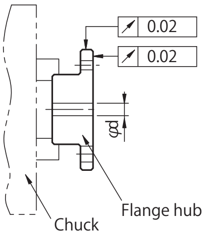
Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]
Tolerance	H7	E9	–	–	Tolerance	H7	H9	–	–	Tolerance	G7, F7	H9	–	–
22	$22^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	$25.0^{+0.3}_{0}$	2-M6	22H	$22^{+0.021}_{0}$	$6^{+0.030}_{0}$	$24.8^{+0.3}_{0}$	2-M5	–	–	–	–	–
24	$24^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	$27.0^{+0.3}_{0}$	2-M6	24H	$24^{+0.021}_{0}$	$8^{+0.036}_{0}$	$27.3^{+0.3}_{0}$	2-M6	24N	$24^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	$27.3^{+0.3}_{0}$	2-M6
25	$25^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	$28.0^{+0.3}_{0}$	2-M6	25H	$25^{+0.021}_{0}$	$8^{+0.036}_{0}$	$28.3^{+0.3}_{0}$	2-M6	–	–	–	–	–
28	$28^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	$31.0^{+0.3}_{0}$	2-M6	28H	$28^{+0.021}_{0}$	$8^{+0.036}_{0}$	$31.3^{+0.3}_{0}$	2-M6	28N	$28^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	$31.3^{+0.3}_{0}$	2-M6
30	$30^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	$33.0^{+0.3}_{0}$	2-M6	30H	$30^{+0.021}_{0}$	$8^{+0.036}_{0}$	$33.3^{+0.3}_{0}$	2-M6	–	–	–	–	–
32	$32^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	$35.5^{+0.3}_{0}$	2-M8	32H	$32^{+0.025}_{0}$	$10^{+0.036}_{0}$	$35.3^{+0.3}_{0}$	2-M8	–	–	–	–	–
35	$35^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	$38.5^{+0.3}_{0}$	2-M8	35H	$35^{+0.025}_{0}$	$10^{+0.036}_{0}$	$38.3^{+0.3}_{0}$	2-M8	–	–	–	–	–
38	$38^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	$41.5^{+0.3}_{0}$	2-M8	38H	$38^{+0.025}_{0}$	$10^{+0.036}_{0}$	$41.3^{+0.3}_{0}$	2-M8	38N	$38^{+0.050}_{+0.025}$	$10^{+0.036}_{0}$	$41.3^{+0.3}_{0}$	2-M8
40	$40^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	$43.5^{+0.3}_{0}$	2-M8	40H	$40^{+0.025}_{0}$	$12^{+0.043}_{0}$	$43.3^{+0.3}_{0}$	2-M8	–	–	–	–	–
42	$42^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	$45.5^{+0.3}_{0}$	2-M8	42H	$42^{+0.025}_{0}$	$12^{+0.043}_{0}$	$45.3^{+0.3}_{0}$	2-M8	42N	$42^{+0.050}_{+0.025}$	$12^{+0.043}_{0}$	$45.3^{+0.3}_{0}$	2-M8
45	$45^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	$48.5^{+0.3}_{0}$	2-M8	45H	$45^{+0.025}_{0}$	$14^{+0.043}_{0}$	$48.8^{+0.3}_{0}$	2-M10	–	–	–	–	–
48	$48^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	$51.5^{+0.3}_{0}$	2-M8	48H	$48^{+0.025}_{0}$	$14^{+0.043}_{0}$	$51.8^{+0.3}_{0}$	2-M10	48N	$48^{+0.050}_{+0.025}$	$14^{+0.043}_{0}$	$51.8^{+0.3}_{0}$	2-M10
50	$50^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	$53.5^{+0.3}_{0}$	2-M8	50H	$50^{+0.025}_{0}$	$14^{+0.043}_{0}$	$53.8^{+0.3}_{0}$	2-M10	–	–	–	–	–
55	$55^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	$60.0^{+0.3}_{0}$	2-M10	55H	$55^{+0.030}_{0}$	$16^{+0.043}_{0}$	$59.3^{+0.3}_{0}$	2-M10	55N	$55^{+0.060}_{+0.030}$	$16^{+0.043}_{0}$	$59.3^{+0.3}_{0}$	2-M10
56	$56^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	$61.0^{+0.3}_{0}$	2-M10	56H	$56^{+0.030}_{0}$	$16^{+0.043}_{0}$	$60.3^{+0.3}_{0}$	2-M10	–	–	–	–	–
60	$60^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	$65.0^{+0.3}_{0}$	2-M10	60H	$60^{+0.030}_{0}$	$18^{+0.043}_{0}$	$64.4^{+0.3}_{0}$	2-M10	60N	$60^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	$64.4^{+0.3}_{0}$	2-M10
65	$65^{+0.030}_{0}$	$18^{+0.075}_{+0.032}$	$71.0^{+0.3}_{0}$	2-M10	65H	$65^{+0.030}_{0}$	$18^{+0.043}_{0}$	$69.4^{+0.3}_{0}$	2-M10	65N	$65^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	$69.4^{+0.3}_{0}$	2-M10
70	$70^{+0.030}_{0}$	$18^{+0.075}_{+0.032}$	$76.0^{+0.3}_{0}$	2-M10	70H	$70^{+0.030}_{0}$	$20^{+0.052}_{0}$	$74.9^{+0.5}_{0}$	2-M10	–	–	–	–	–
75	$75^{+0.030}_{0}$	$20^{+0.092}_{+0.040}$	$81.0^{+0.5}_{0}$	2-M10	75H	$75^{+0.030}_{0}$	$20^{+0.052}_{0}$	$79.9^{+0.5}_{0}$	2-M10	75N	$75^{+0.060}_{+0.030}$	$20^{+0.052}_{0}$	$79.9^{+0.5}_{0}$	2-M10
80	$80^{+0.030}_{0}$	$20^{+0.092}_{+0.040}$	$86.0^{+0.5}_{0}$	2-M10	80H	$80^{+0.030}_{0}$	$22^{+0.052}_{0}$	$85.4^{+0.5}_{0}$	2-M12	–	–	–	–	–
85	$85^{+0.035}_{0}$	$24^{+0.092}_{+0.040}$	$93.0^{+0.5}_{0}$	2-M12	85H	$85^{+0.035}_{0}$	$22^{+0.052}_{0}$	$90.4^{+0.5}_{0}$	2-M12	85N	$85^{+0.071}_{+0.036}$	$22^{+0.052}_{0}$	$90.4^{+0.5}_{0}$	2-M12
90	$90^{+0.035}_{0}$	$24^{+0.092}_{+0.040}$	$98.0^{+0.5}_{0}$	2-M12	90H	$90^{+0.035}_{0}$	$25^{+0.052}_{0}$	$95.4^{+0.5}_{0}$	2-M12	–	–	–	–	–
95	$95^{+0.035}_{0}$	$24^{+0.092}_{+0.040}$	$103.0^{+0.5}_{0}$	2-M12	95H	$95^{+0.035}_{0}$	$25^{+0.052}_{0}$	$100.4^{+0.5}_{0}$	2-M12	95N	$95^{+0.071}_{+0.036}$	$25^{+0.052}_{0}$	$100.4^{+0.5}_{0}$	2-M12
100	$100^{+0.035}_{0}$	$28^{+0.092}_{+0.040}$	$109.0^{+0.5}_{0}$	2-M12	100H	$100^{+0.035}_{0}$	$28^{+0.052}_{0}$	$106.4^{+0.5}_{0}$	2-M12	–	–	–	–	–
115	$115^{+0.035}_{0}$	$32^{+0.112}_{+0.050}$	$125.0^{+0.5}_{0}$	2-M12	115H	$115^{+0.035}_{0}$	$32^{+0.062}_{0}$	$122.4^{+0.5}_{0}$	2-M12	–	–	–	–	–

Distance from Set Screw Edge

Model	SFH-150	SFH-170	SFH-190	SFH-210	SFH-220	SFH-260
Distance from set screw edge [mm]	15	20	25	30	35	40

Centering and Finishing when Drilling Bores in Flange Hubs

SFH models are delivered in component form. When processing bore diameters in pilot-bore products in particular, adjust the chuck so that runout of each flange hub is no more than the precision of the figure at right, and then finish the inner diameter.



Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

SFH models are delivered in component form. This mounts a flange hub on each shaft and couples both shafts by mounting the element (spacer) last, while centering. Also, the SFH S types can first mount an element on the flange hub, then center, and then complete the coupling before inserting it onto the shaft.
When using the assembly method that completes coupling first, take extra precautions when handling couplings. Subjecting assembled couplings to strong shocks may affect mounting accuracy and cause the parts to break during use.

(1) Couplings are designed for use within an operating temperature range of -30° C to 120℃ . Although the couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water and oil as it may cause part deterioration.

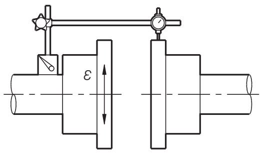
(2) Handle the element with care as it is made of a thin stainless steel metal disc, also making sure to be careful so as not to injure yourself.

(3) For frictional coupling types, do not tighten up pressure bolts until after inserting the mounting shaft.

Centering

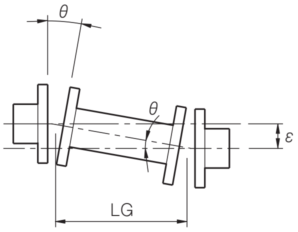
■ Parallel misalignment (ε)

Lock the dial gauge in place on one shaft and then measure the runout of the paired flange hub's outer periphery while rotating that shaft. Since couplings on which the elements (discs) are a set (SFH S types) do not allow parallel misalignment, get as close to zero as possible. For couplings that allow the entire length to be freely set (SFH G types), use the following formula to calculate allowable parallel misalignment.



$$\varepsilon = \tan\theta \times LG$$

ε : Allowable parallel misalignment
θ : 1°

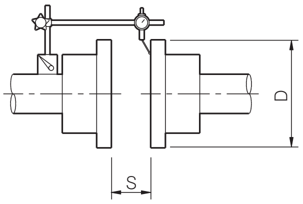


$$LG = LS + S$$

LS: Total length of spacer
S: Dimension of gap between flange hub and spacer

■ Angular deflection(θ)

Lock the dial gauge in place on one shaft and then measure the runout of the end surface near the paired flange hub's outer periphery while rotating that shaft.
Adjust runout B so that θ ≦ 1° in the following formula.



$$B = D \times \tan\theta$$

B: Runout
D: Flange hub outer diameter
θ : 1°

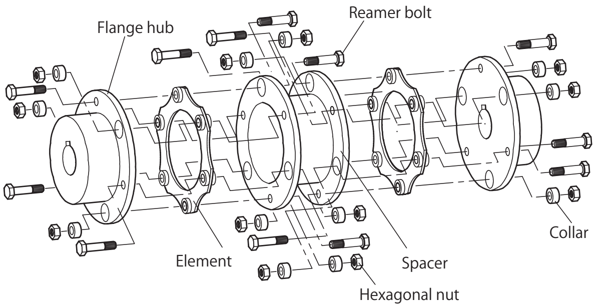
■ Axial displacement (S)

In addition, restrict the dimension between flange hub faces (S in the diagram) within the allowable error range for axial displacement with respect to a reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.

* On the SFH S, this is the dimension of the gap between two flange hubs. On the SFH G, dimension S is the gap between the flange hub and the spacer.

Mounting

This assembly method mounts a flange hub on each shaft of the SFH models and couples both shafts by mounting the element (spacer) last, while centering.

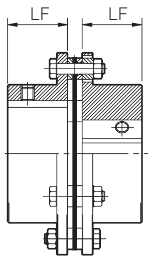


(1) Remove any rust, dust, oil or the like from the inner diameter surfaces of the shaft and flange hubs. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

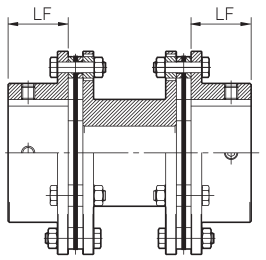
For types that use frictional coupling, loosen the flange hub's pressure bolt and check that the sleeve can move freely.

(2) Insert the flange hub onto the paired mounting shaft. Insert each shaft far enough into the coupling so that the paired mounting shaft touches the shaft along the entire length of the flange hub (LF dimension) as shown in the diagram below, and does not interfere with the elements, spacers or the other shaft.

■ SFH S types



■ SFH G types



Coupling size	150	170	190	210	220	260
LF (key or set screw) [mm]	45	55	65	75	90	100
LF (frictional coupling) [mm]	65	65	70	73	–	–

(3) Mount the other flange hub on the paired mounting shaft as described in steps (1) and (2).

(4) With the flange hub inserted, center (parallel misalignment and angular deflection), and the adjust the distance between shafts.

(5) For SFH S types, translate the flange hubs on the shaft, insert the element between the two flange hubs, and provisionally assemble with the reamer bolt, collar, and hexagonal nut. For SFH G types, insert reamer bolts from the flange side for both flanges, provisionally fasten the element and collar with a hexagonal nut, and then translate the flange hubs on the shaft, insert the spacer between the flange hubs, and provisionally assemble with the reamer bolt, collar and hexagonal nut.

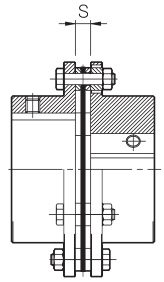
SFH Models

Items Checked for Design Purposes

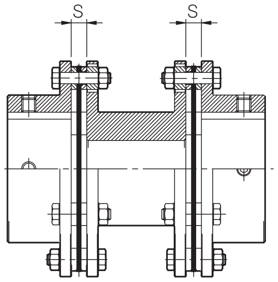
Mounting

(6) Keep the width of the dimension between flange faces (S dimension in the diagram) within the allowable error range for axial misalignment with respect to the reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.

■ SFH S types



■ SFH G types



Coupling size	150	170	190	210	220	260
S [mm]	11	14	15	15	20	23

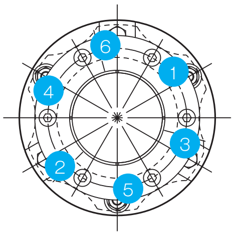
(7) Check that the element is not deformed. If it is, it may be under an axial force or there may be insufficient lubrication between the collar, bolt, and disc, so adjust to bring it to normal. The situation may be improved by applying a small amount of machine oil to the bearing surface of the reamer bolt. However, never use any oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based) which would dramatically affect the friction coefficient.

(8) Use a calibrated torque wrench to tighten all the reamer bolts to the appropriate tightening torques.

Coupling size	150	170	190	210	220	260
Reamer bolt size	M8	M10	M12	M16	M16	M20
Tightening torque [N·m]	34	68	118	300	300	570

(9) When selecting a key system for the mounting on the shaft, lock the flange hub to the shaft with a set screw.

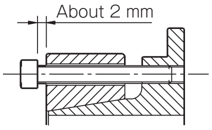
For frictional coupling types, tighten the pressure bolts evenly, a little at a time, on the diagonal, guided by the tightening procedure of the figure below.



Type	Pressure bolt size	Tightening torque [N·m]
SFH-150S/G	M8	34
SFH-170S/G	M8	34
SFH-190S/G	M10	68
SFH-210S/G	M10	68

Removal

(1) Check to confirm that there is no torque or axial load being applied to the coupling. There may be cases where a torque is applied to the coupling, particularly when the safety brake is being used. Make sure to verify that this is not occurring before removing parts.

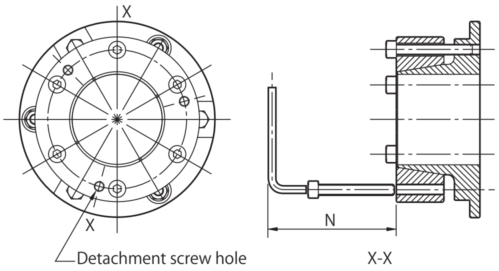


(2) Loosen all the pressure bolts placing pressure on the sleeve until the gap between bearing seat and sleeve is about 2 mm.

For a tapered coupling system that tightens pressure bolts from the axial direction, the sleeve will be self-locking, so the coupling between flange hub and shaft cannot be released simply by loosening the pressure bolt. (Note that in some cases, a coupling can be released by loosening a pressure bolt.) For that reason, when designing devices, a space must be installed for inserting a detachment screw.

If there is no space in the axial direction, consult Miki Pulley.

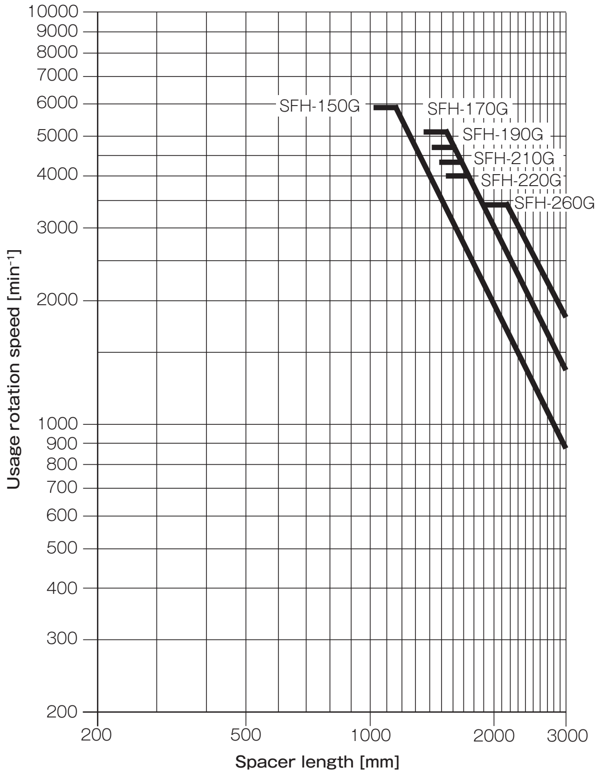
(3) Pull out three of the pressure bolts loosened in step (2), insert them into detachment screw holes at three locations on the sleeve, and tighten them alternately, a little at a time. The link between the flange hub and shaft will be released.



Coupling size	150	170	190	210
Nominal diameter of pressure bolt × Length	M8 × 60	M8 × 60	M10 × 65	M10 × 65
Recommended N dimension [mm]	108	108	121	121

Limit Rotation Speed

For SFH G long spacer types, the speeds at which the coupling can be used will vary with the length of spacer selected. Use the following table to confirm that the speed you will use is at or below the limit rotation speed.



Points to Consider Regarding the Feed Screw System

■ Servo motor oscillation

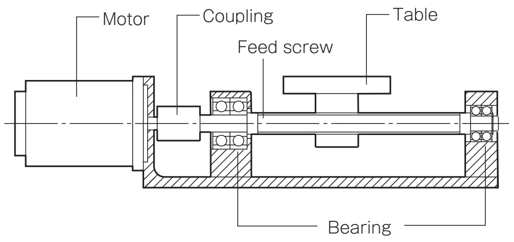
Gain adjustment on the servo motor may cause the servo motor to oscillate.
Oscillation in the servo motor during operation can cause problems particularly with the overall natural frequency and electrical control systems of the feed screw system.
In order for these issues to be resolved, the torsional stiffness for the coupling and feed screw section and the moment of inertia and other characteristics for the system overall will need to be adjusted and the torsional natural frequency for the mechanical system raised or the tuning function (filter function) for the electrical control system in the servo motor adjusted during the design stage.

Please contact Miki Pulley with any questions regarding servo motor oscillation.

How to Find the Natural Frequency of a Feed Screw System

(1) Select a coupling based on the nominal and maximum torque of the servo motor.

(2) Find the overall natural frequency, Nf, from the torsional stiffness of the coupling and feed screw, κ, the moment of inertia of driving side, J1, and the moment of inertia of driven side, J2, for the feed screw system shown below.



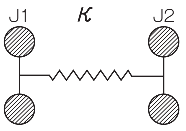
$$Nf=\frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{J1}+\frac{1}{J2}\right)}$$

Nf: Overall natural frequency of a feed screw system [Hz]

κ : Torsional stiffness of the coupling and feed screw [N·m/rad]

J1: Moment of inertia of driving side [kg·m^2]

J2: Moment of inertia of driven side [kg·m^2]



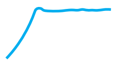
Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\,[N{\cdot}m] = 9550 \times \frac{P\,[kW]}{n[min^{-1}]}$$

(2) Determine the factor κ from the load properties, and find the corrected torque, Td, applied to the coupling.

$$Td = Ta \times K \text{ (Refer to the table below for values)}$$

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K	1.0	1.25	1.75	2.25

For servo motor drive, multiply the maximum torque, Ts, by the usage factor K = 1.2 to 1.5.

$$Td = Ts \times (1.2 \text{ to } 1.5)$$

(3) Set the size so that the rated coupling torque, Tn, is higher than the corrected torque, Td.

$$Tn \geqq Td$$

(4) The rated torque of the coupling may be limited by the bore diameter of the coupling. See the table showing the bore diameters that limit rated torque.

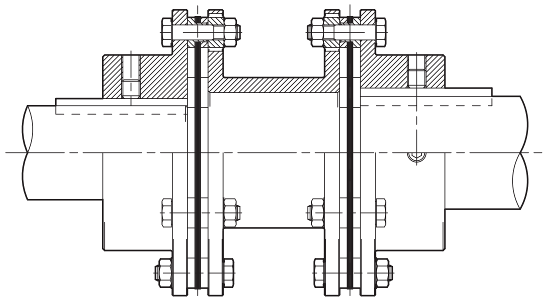
(5) Check that the mount shaft is no larger than the maximum bore diameter of the coupling.

Contact Miki Pulley for assistance with any device experiencing extreme periodic vibrations.

Mounting Example

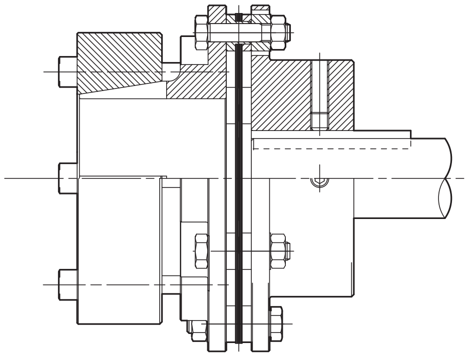
■ SFH G

This is a combination of multiple standard bore-drilled couplings. Either Miki Pulley can do the processing, or you can drill pilot bores however you like.



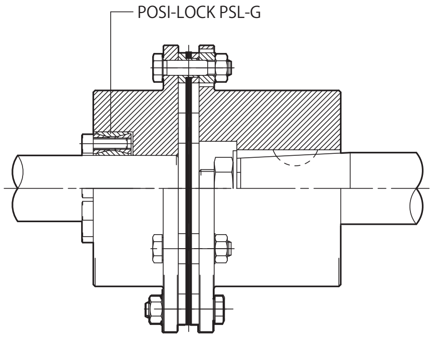
■ SFH S

This example combines a frictional-coupling type flange and a standard bore-drilled flange hub.



■ SFH S special

This combines a flange hub processed for the tapered shaft of a servo motor with a flange hub processed for a Miki Pulley shaft lock PSL-G.



Torque Wrenches

SFC-□ SA2/DA2 (Clamping Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque screwdriver (Preset)	Hexagon bit	Coupling size
M1.6	0.23 ～ 0.28	CN30LTDK	CB 1.5mm	002
M2	0.4 ～ 0.5	CN60LTDK	SB 1.5mm	005,010
M2.5	1.0 ～ 1.1	CN120LTDK	SB 2mm	010,020,025
M3	1.5 ～ 1.9	CN200LTDK	SB 2.5mm	030
M4	3.4 ～ 4.1	CN500LTDK	SB 3mm	035,040
M5	7.0 ～ 8.5	N10LTDK	SB 4mm	050
Nominal bolt diameter	**Tightening torque [N·m]**	**Torque wrenches (Preset)**	**Hexagonal head**	**Coupling size**
M6	14 ～ 15	N25LCK	25HCK 5mm	055,060
M8	27 ～ 30	N50LCK	50HCK 6mm	080,090,100

SFS-□ S/W/G (Pressure Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque wrench (Single-function)	Wrench attachment	Coupling size
M5	8	N12SPCK × 8N • m	230SCK 8mm	05
M6	14	N25SPCK × 14N • m	230SCK 10mm	06,08,09,10
M8	34	N50SPCK × 34N • m	450SCK 13mm	12,14

SFS-□ S/W/G (Reamer Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque wrench (Single-function)	Wrench attachment	Coupling size
M5	8	N12SPCK × 8N • m	25SCK 8mm	05
M6	14	N25SPCK × 14N • m	25SCK 10mm	06,08
M8	34	N50SPCK × 34N • m	50SCK 13mm	09,10
M10	68	N100SPCK × 68N • m	100SCK 17mm	12
M12	118	N200SPCK × 118N • m	200SCK 19mm	14

SFS-□ S/W/G-C (Reamer Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque wrench (Single-function)	Wrench attachment	Coupling size
M5	6	N6SPCK × 6N • m	25SCK 8mm	05
M6	11	N12SPCK × 11N • m	25SCK 10mm	06,08
M8	26	N50SPCK × 26N • m	50SCK 13mm	09,10
M10	51	N100SPCK × 51N • m	100SCK 17mm	12
M12	90	N100SPCK × 90N • m	100SCK 19mm	14

SFF-□ SS/DS (Clamping Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque screwdriver (Preset)	Hexagon bit	Coupling size
M4	3.4	CN500LTDK	SB 3mm	040
M5	7	N10LTDK	SB 4mm	050,060
Nominal bolt diameter	**Tightening torque [N·m]**	**Torque wrenches (Preset)**	**Hexagonal head**	**Coupling size**
M6	14	N25LCK	25HCK 5mm	060,070,080
M8	34	N50LCK	50HCK 6mm	080,090
Nominal bolt diameter	**Tightening torque [N·m]**	**Torque wrench (Single-function)**	**Hexagonal head**	**Coupling size**
M10	68	N100SPCK × 68N • m	100HCK 8mm	100,120

SFF-□ SS/DS (Pressure Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque wrench (Single-function)	Wrench attachment	Coupling size
M6	10	N12SPCK × 10N • m	25SCK 10mm	070,080,090,100,120
M8	24	N50SPCK × 24N • m	50SCK 13mm	140

SFM- □ SS (Clamping Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque screwdriver (Preset)	Hexagon bit	Coupling size
M5	7	N10LTDK	SB 4mm	060
Nominal bolt diameter	**Tightening torque [N·m]**	**Torque wrench (Preset)**	**Hexagonal head**	**Coupling size**
M6	14	N25LCK	25HCK 5mm	060,070,080
M8	34	N50LCK	50HCK 6mm	080,090
Nominal bolt diameter	**Tightening torque [N·m]**	**Torque wrench (Single-function)**	**Hexagonal head**	**Coupling size**
M10	68	N100SPCK × 68N・m	100HCK 8mm	100,120

SFM- □ SS (Pressure Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque wrench (Single-function)	Wrench attachment	Coupling size
M6	10	N12SPCK × 10N・m	25SCK 10mm	070,080,090,100,120
M8	24	N50SPCK × 24N・m	50SCK 13mm	140

SFH- □ S/G (Pressure Bolt)

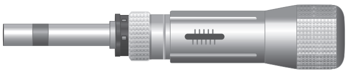
Nominal bolt diameter	Tightening torque [N·m]	Torque wrench (Single-function)	Hexagonal head	Coupling size
M8	34	N50SPCK × 34N・m	50HCK 6mm	150,170
M10	68	N100SPCK × 68N・m	100HCK 8mm	190,210

SFH- □ S/G (Reamer Bolt)

Nominal bolt diameter	Tightening torque [N·m]	Torque wrench (Single-function)	Wrench attachment	Coupling size
M8	34	N50SPCK × 34N・m	50SCK 13mm	150
M10	68	N100SPCK × 68N・m	100SCK 17mm	170
M12	118	N200SPCK × 118N・m	200SCK 19mm	190
M16	300	N4400SPCK × 300N・m	440SCK 24mm	210,220
Nominal bolt diameter	**Tightening torque [N·m]**	**Torque wrenches (Preset)**	**Wrench attachment**	**Coupling size**
M20	570	N700LCK	700SCK 30mm	260

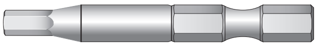
Torque Screwdriver (Preset)

■ N-LTDK



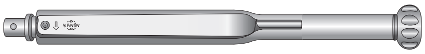
Bit

■ SB



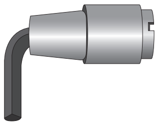
Torque Wrenches (Preset)

■ N-LCK



Hexagonal Head

■ HCK

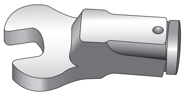


Torque Wrench (Single-function)

■ N-SPCK

Wrench Attachment

■ SCK



* Torque screwdriver (wrench)/bit (head) models are those of Nakamura Mfg. Co., Ltd.

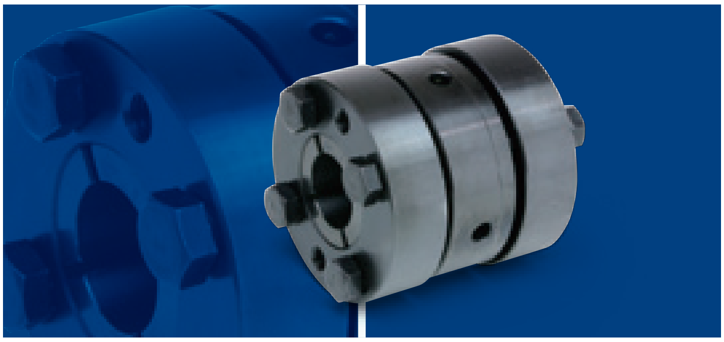
High-rigidity Couplings

SERVORIGID

Ultra-high stiffness Low inertia No backlash

Max. rated torque [N·m]	490
Bore ranges [mm]	ϕ16 ～ 48
Operating temperature [℃]	−30 ～ 120
Driver	Servo motor
Application	Machine tools

Rigid Couplings with Ultra-high Torsional Stiffness

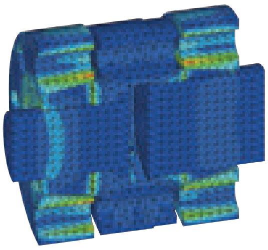


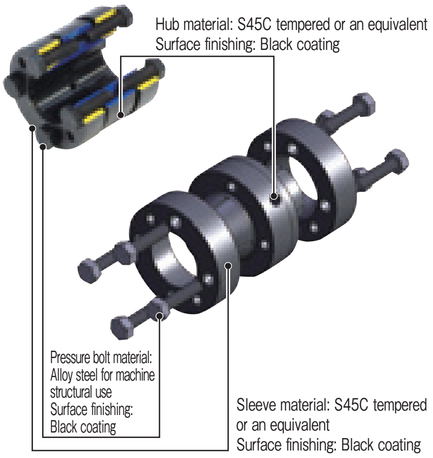
RoHS

Rigid couplings with ultra-high torsional stiffness that were developed for servo motor applications. Unlike flexible couplings, they have no element to absorb differences between the centers of two shafts, so they have very high torsional stiffness. Since the outer diameter relative to torque can be reduced compared to flexible couplings, smaller couplings can be used, which helps reduce the moment of inertia.

Structure and Materials

Modeling uses the latest CAE Systems and 3D-CAD. Shape and hardness was calculated using the support of the latest finite element method (FEM) analysis software for optimal designs.





Other Specifications and Options

Through-bolt Construction

By using a through-bolt construction for the sleeve and hub on one side, the drive shaft and driven shaft can be engaged simply by tightening the pressure bolt on one side.

Taper Adapter

Allows coupling via friction when an optional taper adapter is mounted on the tapered shaft of a servo motor.

Clamp Type

A clamp-type high-rigidity coupling can also be manufactured.

*Specifications may not be identical. Contact Miki Pulley for details.

SRG Models

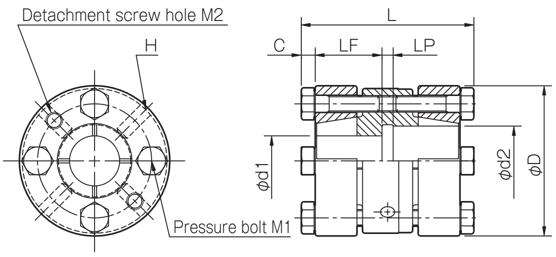
Specifications

Model	d1・d2 [mm]		Rated torque [N·m] compared to the standard bore diameters, d1 and d2 [mm]																		Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m²]	Mass [kg]
	Min.	Max.	16	17	18	19	20	22	24	25	28	30	32	35	36	38	40	42	45	48				
SRG-050DS	16	22	90	100	110	120	130	140													15000	60000	0.16×10^{-3}	0.45
SRG-060DS	18	25			80	100	110	145	180	190											13000	115000	0.29×10^{-3}	0.67
SRG-070DS	22	35						150	200	220	290	340	390	460							12000	340000	0.55×10^{-3}	0.85
SRG-080DS	30	48										180	220	270	290	320	360	390	440	490	9500	1335000	1.21×10^{-3}	1.17

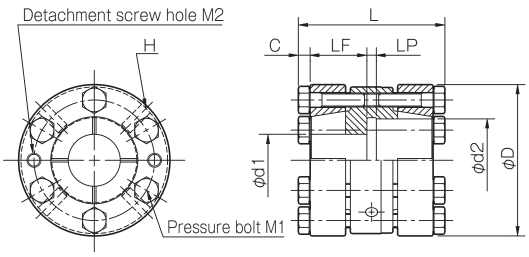
* The shaft coupling employs friction, so rated torque is determined by bore diameter. The rated torque of the side with the smallest diameter serves as the rated torque of the coupling.
* Max. rotation speed does not take into account dynamic balance.
* The torsional stiffness, moment of inertia, and mass are measured for the maximum bore diameter.

Dimensions

■ SRG-050, 060



■ SRG-070, 080

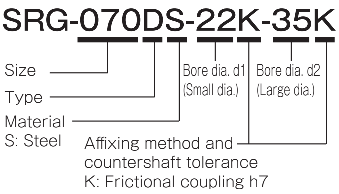


Unit [mm]

Model	Standard bore diameter d1, d2	D	L	LF	LP	C	H	M1	M2
SRG-050DS	16・17・18・19・20・22	48	52.8	20	4	4.4	4-5.1	4-M6	2-M6
SRG-060DS	18・19・20・22・24・25	54	62	24	4	5	4-5.1	4-M6	2-M6
SRG-070DS	22・24・25・28・30・32・35	64	62	24	4	5	4-5.1	6-M6	2-M6
SRG-080DS	30・32・35・36・38・40・42・45・48	78	63	25.5	4	4	4-5.1	6-M6	2-M6

* The nominal diameters of the pressure bolt M1 and detachment screw hole M2 are equal to the quantity minus the nominal diameter of the screw threads. Quantities are for a single side.

How to Place an Order



* For positive tolerances for bore diameters of 35 ($35^{+0.010}_{0}$), use 35KS to distinguish the setting from that of h7 class.

SRG Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

SERVORIGID SRG model is, as the name suggests, a high-rigidity coupling with no element to absorb differences between the centers of two shafts. For that reason, when mounting, the two shafts must be carefully centered. Please keep that in mind and take extra precautions when handling.

(1) Couplings are designed for use within an operating temperature from -30℃ to 120℃ . Although the couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water and oil as it may cause part deterioration.

(2) Do not tighten up pressure bolts until after inserting the mounting shaft.

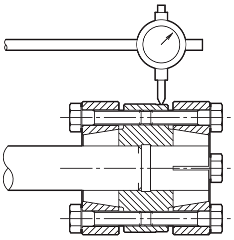
Mounting

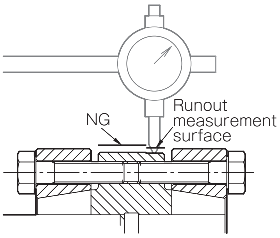
(1) Check that coupling pressure bolts have been loosened and remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Be careful when inserting the couplings into the shaft Insert each shaft for a length listed in the table below measured from the sleeve edge. However, be sure that mounting shafts do not come into contact with each other.

Coupling size	050	060	070	080
Insert length of shaft [mm]	20 or more	24 or more	24 or more	25.5 or more

(3) After deciding the place to insert, hold a dial gauge against the outer diameter uneven surface of coupling as shown below.

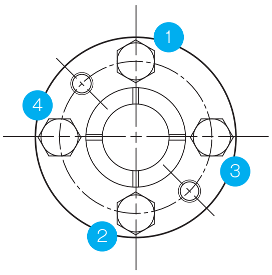




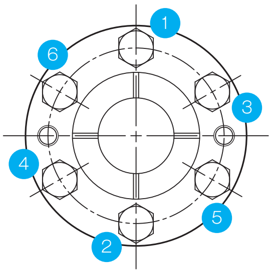
(4) Gently rotate the motor shaft manually and tighten the pressure bolt by adjusting it to make sure the value of dial gauge is zero.

Tighten the pressure bolts evenly, a little at a time, on the diagonal, guided by the tightening procedure of the figure below. However, there is sometimes no need to follow the procedure, depending on the value of dial gauge.

■ SRG-050・060



■ SRG-070・080



(5) Finally, use a calibrated torque wrench to tighten all the pressure bolts to the appropriate tightening torques of the table below, make sure that there is no bolts loosened and that the runout is small (the value almost near to zero), and tighten the driven shaft using the same procedure.

Coupling size	050	060	070	080
Pressure bolt size	M6	M6	M6	M6
Tightening torque [N·m]	14	14	14	14

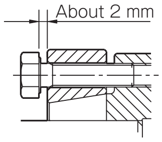
■ Suitable Torque Wrench

Torque wrench (Single-function)	Wrench attachment
N25SPCK × 14N・m	25SCK 10mm

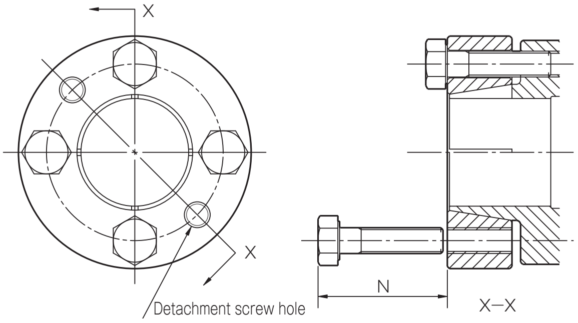
Removal

(1) Be sure to check that the main power of the equipment is off before removing to avoid incorrect operation of the drive. Take extra precautions if any of the components are damaged as it may be sharpened.

(2) Loosen all the pressure bolts placing pressure on the sleeve until the gap between bearing seat and sleeve is about 2 mm.



In the case of a tapered coupling system that tightens a pressure bolt from the axial direction, the sleeve will be self-locking, so the coupling between flange and shaft cannot be released simply by loosening the pressure bolt. (Note that in some cases, a coupling can be released by loosening a pressure bolt.)
For that reason, when designing devices, a space must be installed for inserting a detachment screw.



Coupling size	050	060	070	080
Nominal diameter of pressure bolt × Length	M6 × 20	M6 × 24	M6 × 24	M6 × 25
RecommendedN dimension [mm]	26	30	30	31.5

(3) Insert the bolt into detachment screw holes and tighten them alternately. The coupling will be released. It is recommended to use the bolt whose dimension is same as that of pressure bolt.

Note that if the bolt is too short, couplings may no be able to release.

Points to Consider Regarding the Feed Screw System

Servo motor oscillation

Gain adjustment on the servo motor may cause the servo motor to oscillate.

Oscillation in the servo motor during operation can cause problems particularly with the overall natural frequency and electrical control systems of the feed screw system.

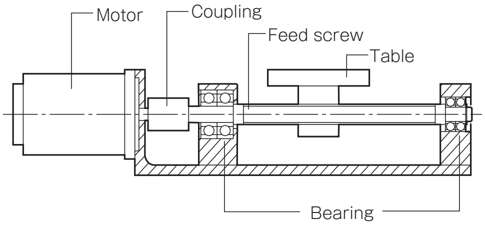
In order for these issues to be resolved, the torsional stiffness for the coupling and feed screw section and the moment of inertia and other characteristics for the system overall will need to be adjusted and the torsional natural frequency for the mechanical system raised or the tuning function (filter function) for the electrical control system in the servo motor adjusted during the design stage.

Please contact Miki Pulley with any questions regarding servo motor oscillation.

How to Find the Natural Frequency of a Feed Screw System

(1) Select a coupling based on the nominal and maximum torque of the servo motor.

(2) Find the overall natural frequency, Nf, from the torsional stiffness of the coupling and feed screw, κ , the moment of inertia of driving side, J1, and the moment of inertia of driven side, J2, for the feed screw system shown below.



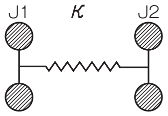
$$Nf = \frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{J1}+\frac{1}{J2}\right)}$$

Nf: Overall natural frequency of a feed screw system[Hz]

κ : Torsional stiffness of the coupling and feed screw [N·m/rad]

J1: Moment of inertia of driving side [kg·m^2]

J2: Moment of inertia of driven side [kg·m^2]



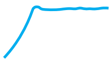
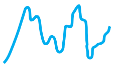
Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\,[N\cdot m] = 9550 \times \frac{P\,[kW]}{n[min^{-1}]}$$

(2) Determine the factor κ from the load properties, and find the corrected torque, Td, applied to the coupling.

$$Td = Ta \times K \text{ (Refer to the table below for values)}$$

	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
Load properties				
K	1.0	1.25	1.75	2.25

Service factor based on operating time: K2

Hrs./day	~ 8	~ 16	~ 24
K2	1.0	1.12	1.25

For servo motor drive, multiply the maximum torque, Ts, by the usage factor K = 1.2 to 1.5.

$$Td = Ts \times (1.2 \text{ to } 1.5)$$

(3) Set the size so that the rated coupling torque, Tn, is higher than the corrected torque, Td.

$$Tn \geqq Td$$

(4) Check that the mount shaft is no larger than the maximum bore diameter of the coupling.

Contact Miki Pulley for assistance with any device experiencing extreme periodic vibrations.

Metal Slit Couplings

HELI-CAL

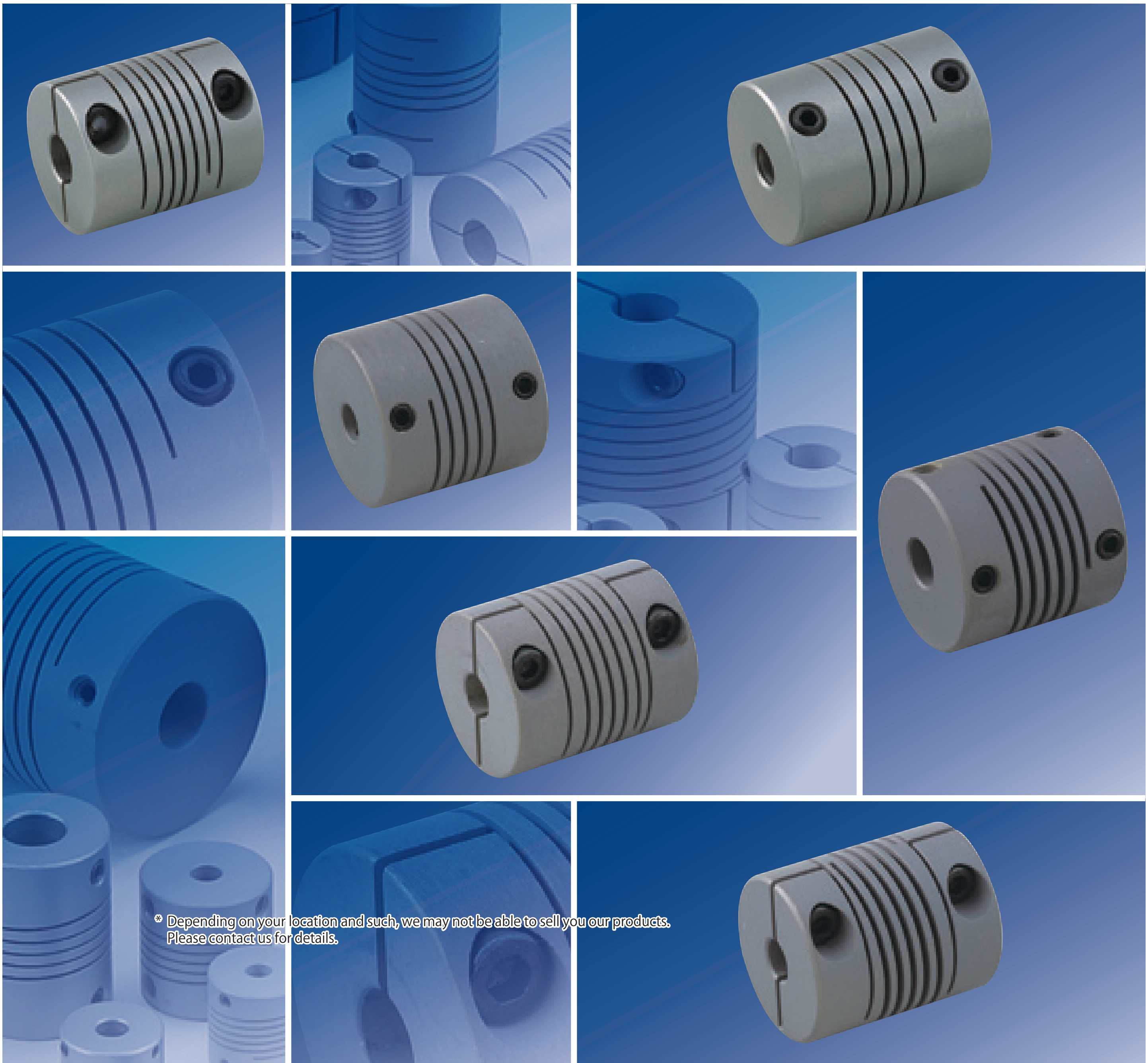
High flexibility | Easy to mount and remove | No backlash | Ultra-compact | Stainless steel

Max. nominal torque [N·m]	19.5
Bore ranges [mm]	ϕ 1.5 ～ 16
Operating temperature [℃]	− 40 ～ 120
Driver	Servo motor, stepper motor
Application	Encoders, medical equipment, optical equipment, precision stages

Couplings with Excellent Flexibility and Helical Slit in Unitized Construction

Metal couplings with a fully unitized construction that place slits in the material of the cylinder in a helical pattern for excellent flexibility with no backlash. They are made of stainless steel or high-strength aluminum alloy. Aluminum alloy couplings may have either one or two slits. Select by flexibility and torsional stiffness.

RoHS



* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Available Models

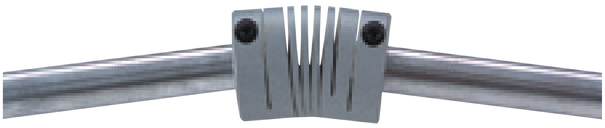
Series	Features	Affixing Methods	Lineup
HELI-CAL	Stainless steel/high flexibility	Set screw	**1441 • 3□□2M**
		Clamp	**3□□5M**
	Aluminum alloy/high flexibility	Set screw	**ARM**
		Clamp	**ACRM**
	Aluminum alloy/high torsional stiffness	Set screw	**DSR**
		Clamp	**DSCR**

*An ultra-small, high-strength aluminum model, the HELI-CAL MINI, is also available, featuring an outer diameter of 6.35 mm, a bore diameter of 1.5 mm and a mass of 0.5 g (made to order).

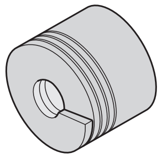

Actual size

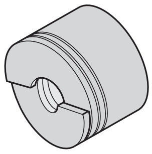
Main Features

Allows angular deflection up to 5°


1441 • 3000 • ARM • ACRM

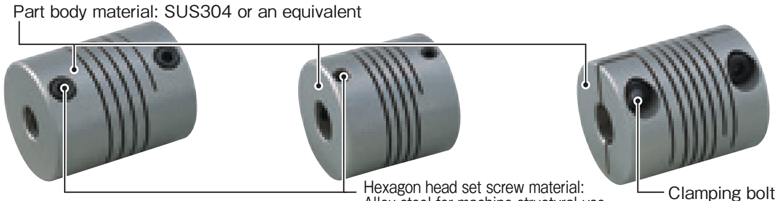
Select one or two slits


1441 • 3000 • ARM • ACRM


DSR • DSCR

Structure and Materials

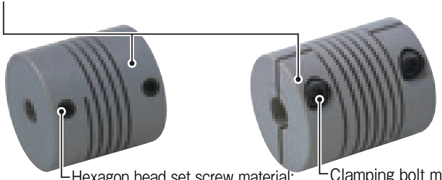
■ 1441 ■ 3□□2M ■ 3□□5M


Part body material: SUS304 or an equivalent

Hexagon head set screw material: Alloy steel for machine structural use
Surface finishing: Black coating

Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Black coating

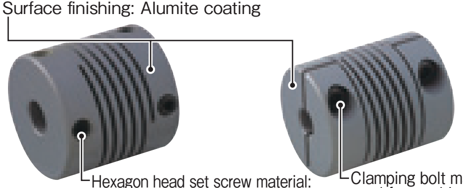
■ ARM ■ ACRM


Part body material: High-tensile aluminum alloy (7075 material or an equivalent)
Surface finishing: Alumite coating

Hexagon head set screw material: Alloy steel for machine structural use
Surface finishing: Black coating

Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Black coating

■ DSR ■ DSCR


Part body material: High-tensile aluminum alloy (7075 material or an equivalent)
Surface finishing: Alumite coating

Hexagon head set screw material: Alloy steel for machine structural use
Surface finishing: Black coating

Clamping bolt material: Alloy steel for machine structural use
Surface finishing: Black coating

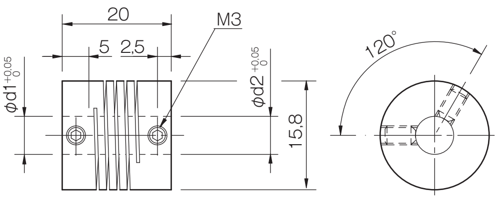
1441 and HELI-CAL MINI Models

Specifications (1441)

Nominal torque: 0.4 N·m		Torsional stiffness: 21.2 [N·m]/rad
Max. torque: 0.8 N·m		Moment of inertia: 9.82 × 10^{-7} kg·m^2
Misalign-ment	Parallel: 0.25 mm	Standard bore diameter, d1 to d2: 4-4, 5-5, 6-6
	Angular: 5°	Set screw tightening torque: 0.7 N·m
	Axial: ± 0.12 mm	Mass: 0.022 kg
Max. rotation speed: 25000 min^{-1}		

* The nominal torque is 1/2 during reverse operation.
* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (1441)



CAD

How to Place an Order

1441 6-6

Size
Bore diameter 2: d2
Bore diameter 1: d1

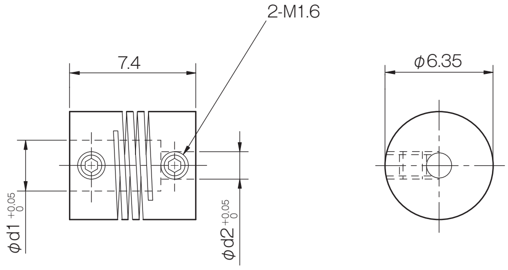
* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Specifications (HELI-CAL MINI), Made to Order

Nominal torque: 0.017 N·m		Torsional stiffness: 0.31 [N·m]/rad
Max. torque: 0.034 N·m		Moment of inertia: 0.003 × 10^{-6} kg·m^2
Misalign-ment	Parallel: 0.05mm	Standard bore diameter, d1 to d2: 1.5-1.5, 3-1.5, 3-3
	Angular: 1°	Set screw tightening torque: 0.04 N·m
	Axial: ± 0.05mm	Mass: 0.0005kg
Max. rotation speed: 10000min^{-1}		

*The nominal torque is 1/2 during reverse operation.
*Max. rotation speed does not take into account dynamic balance.
*The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (HELI-CAL MINI)



How to Place an Order

8652 3-1.5

Size
Bore diameter 2: d2
Bore diameter 1: d1

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

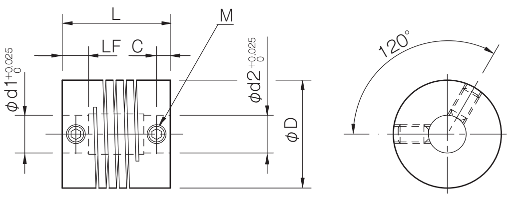
3000 Models

Specifications (3 □□ 2M)

Model	Torque		Misalignment			Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m²]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
3042M	0.4	0.8	0.25	5	± 0.25	25000	11.5	2.95×10^{-7}	0.012
3082M	1.3	2.6	0.25	5	± 0.25	25000	22.0	2.01×10^{-6}	0.034
3002M	1.9	3.8	0.25	5	± 0.25	25000	31.8	1.03×10^{-5}	0.101
3012M	2.5	5.0	0.25	5	± 0.25	25000	52.1	1.97×10^{-5}	0.154

* The nominal torque is 1/2 during reverse operation.
* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (3 □□ 2M)



CAD

Unit [mm]

Model	Max. bore diameter	D	L	LF	C	M	Tightening torque [N·m]
3042M	3.17	12.7	14.2	3.2	1.8	M2	0.09
3082M	6.35	19.1	19.1	4.6	2.2	M3	0.7
3002M	10	25.4	31.8	7.9	3.8	M5	3.6
3012M	12.7	28.6	38.1	11.4	5.1	M5	3.6

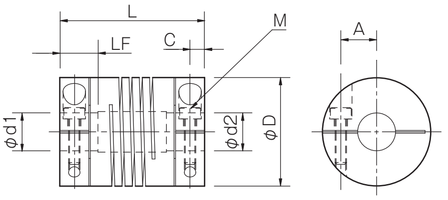
* For a 3042 M with a bore diameter of ⌀ 2, the set screw size is M1.6 and the tightening torque is 0.04 N·m
* For a 3082 M with a bore diameter of ø3, the set screw size is M2 and the tightening torque is 0.09 N·m

Specifications (3 □□ 5M)

Model	Torque		Misalignment			Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m²]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
3045M	0.4	0.8	0.25	5	± 0.25	10000	11.5	3.97×10^{-7}	0.015
3085M	1.3	2.6	0.25	5	± 0.25	10000	22.0	2.41×10^{-6}	0.039
3005M	1.9	3.8	0.25	5	± 0.25	10000	31.8	1.03×10^{-5}	0.101
3015M	2.5	5.0	0.25	5	± 0.25	10000	52.1	1.97×10^{-5}	0.134

* The nominal torque is 1/2 during reverse operation.
* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (3 □□ 5M)



CAD

Unit [mm]

Model	Max. bore diameter	D	L	LF	A	C	M	Tightening torque [N·m]
3045M	3.17	12.7	19.1	4.9	3.6	2.3	M1.6	0.25
3085M	6.35	19.1	22.9	6.5	5.6	3.1	M2.5	1.0
3005M	10	25.4	31.8	7.9	7.9	3.8	M3	1.5
3015M	12.7	28.6	38.1	11.4	9.5	3.8	M3	1.5

* The recommended processing tolerance for paired mounting shafts is the h7 class.

Standard Bore Diameter

Standard bore diameter [mm]	d1	3	3	4	4	5	5	6	6	6	6.35	6.35	6.35	7	8	8	8	8	9.5	9.525	9.525	10	10	10	10	10	10	11	11	12	12	12	12	12
	d2	2	3	3	4	4	5	4	5	6	5	6	6.35	7	6	6.35	7	8	8	8	9.525	6	6.35	8	9.5	9.525	10	10	11	8	9.5	9.525	10	12
Model	3042M, 3045M	●	●																															
	3082M, 3085M		●	●	●	●	●	●	●	●	●	●	●																					
	3002M, 3005M									●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
	3012M, 3015M														●			●	●	●	●			●	●	●	●	●	●	●	●	●	●	●

How to Place an Order

3085M 6-6

Size
Affixing method
2: Set screw method
5: Clamp method
Bore diameter 2: d2
Bore diameter 1: d1

* d1 is the larger bore diameter.
* Contact Miki Pulley regarding non-standard bore diameters.

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

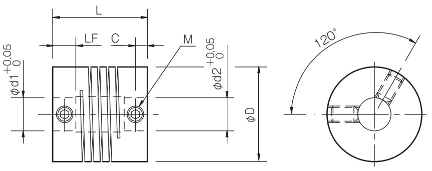
ARM/ACRM Models

Specifications (ARM)

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
ARM-050	0.3	0.6	0.25	5	± 0.25	25000	4.1	9.20×10^{-8}	0.004
ARM-075	1.0	2.0	0.25	5	± 0.25	25000	8.2	7.02×10^{-7}	0.013
ARM-100	1.6	3.2	0.25	5	± 0.25	25000	14.3	2.87×10^{-6}	0.031
ARM-112	2.3	4.6	0.25	5	± 0.25	25000	18.5	5.16×10^{-6}	0.038

* The nominal torque is 1/2 during reverse operation.
* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (ARM)



CAD

Unit [mm]

Model	Max. bore diameter	D	L	LF	C	M	Tightening torque [N·m]
ARM-050	3.17	12.7	12.7	3.2	1.6	M2	0.09
ARM-075	6.35	19.1	19.1	4.6	2.4	M3	0.7
ARM-100	10	25.4	25.4	6.6	3.8	M5	3.6
ARM-112	12.7	28.6	28.6	7	3.6	M5	3.6

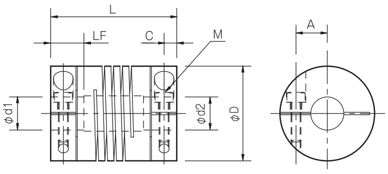
* For an ARM-050 with a bore diameter of ⌀ 2, the set screw size is M1.6 and the tightening torque is 0.04 N·m
* For an ARM-075 with a bore diameter of ⌀ 3, the set screw size is M2 and the tightening torque is 0.09 N·m

Specifications (ACRM)

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
ACRM-050	0.3	0.6	0.25	5	± 0.25	10000	4.1	1.38×10^{-7}	0.006
ACRM-075	1.0	2.0	0.25	5	± 0.25	10000	8.2	8.39×10^{-7}	0.015
ACRM-100	1.6	3.2	0.25	5	± 0.25	10000	14.3	3.60×10^{-6}	0.035
ACRM-112	2.3	4.6	0.25	5	± 0.25	10000	18.5	6.87×10^{-6}	0.050

* The nominal torque is 1/2 during reverse operation.
* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (ACRM)



CAD

Unit [mm]

Model	Max. bore diameter	D	L	LF	A	C	M	Tightening torque [N·m]
ACRM-050	3.17	12.7	19.1	4.9	3.6	2.3	M1.6	0.25
ACRM-075	6.35	19.1	22.9	6.5	5.6	3.1	M2.5	1.0
ACRM-100	10	25.4	31.8	7.9	7.9	3.8	M3	1.5
ACRM-112	12.7	28.6	38.1	11.4	9.5	3.8	M3	1.5

*The recommended processing tolerance for paired mounting shafts is the h7 class.

Standard Bore Diameter

Standard bore diameter [mm]	d1	3	3	4	4	5	5	6	6	6	6.35	6.35	6.35	7	8	8	8	8	9.5	9.525	9.525	10	10	10	10	10	10	11	11	12	12	12	12	12
	d2	2	3	3	4	4	5	4	5	6	5	6	6.35	7	6	6.35	7	8	8	8	9.525	6	6.35	8	9.5	9.525	10	10	11	8	9.5	9.525	10	12
Model	**ARM, ACRM-050**	●	●																															
	ARM, ACRM-075		●	●	●	●	●	●	●	●	●	●	●																					
	ARM, ACRM-100									●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
	ARM, ACRM-112														●			●	●	●	●			●	●	●	●	●	●	●	●	●	●	●

How to Place an Order

ACRM-075 6-4

Affixing method
Blank: Set screw method
C: Clamp method

Size

Bore diameter 1: d1

Bore diameter 2: d2

* d1 is the larger bore diameter.
* Contact Miki Pulley regarding non-standard bore diameters.

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

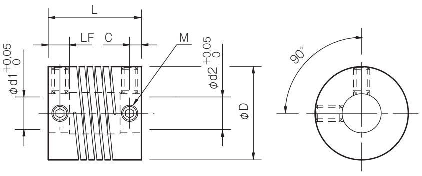
DSR/DSCR Models

Specifications (DSR)

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
DSR-075	0.8	1.6	0.15	3	± 0.15	25000	26.0	7.00×10^{-7}	0.012
DSR-100	1.8	3.6	0.15	3	± 0.15	25000	50.3	2.87×10^{-6}	0.030
DSR-112	2.7	5.4	0.15	3	± 0.15	25000	70.7	5.16×10^{-6}	0.037
DSR-150	6.3	12.6	0.15	3	± 0.15	25000	204.6	2.20×10^{-5}	0.082
DSR-200	19.5	39.0	0.15	3	± 0.15	25000	784.9	9.38×10^{-5}	0.200

* The nominal torque is 1/2 during reverse operation.
* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (DSR)



CAD

Unit [mm]

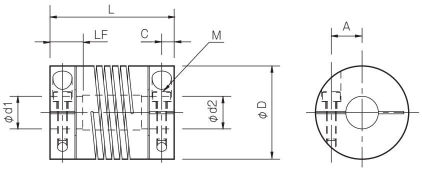
Model	Max. bore diameter	D	L	LF	C	M	Tightening torque [N·m]
DSR-075	6.35	19.1	19.1	4.6	2.4	M3	0.7
DSR-100	10	25.4	25.4	6.6	3.8	M5	3.6
DSR-112	12.7	28.6	28.6	7	3.6	M5	3.6
DSR-150	15	38.1	38.1	10	5	M6	6.0
DSR-200	19	50.8	50.8	13.6	7	M6	6.0

Specifications (DSCR)

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
DSCR-075	0.8	1.6	0.15	3	± 0.15	10000	26.0	8.39×10^{-7}	0.014
DSCR-100	1.8	3.6	0.15	3	± 0.15	10000	50.3	3.60×10^{-6}	0.036
DSCR-112	2.7	5.4	0.15	3	± 0.15	10000	70.7	6.87×10^{-6}	0.050
DSCR-150	6.3	12.6	0.15	3	± 0.15	10000	204.6	2.39×10^{-5}	0.091
DSCR-200	19.5	39.0	0.15	3	± 0.15	10000	784.9	9.38×10^{-5}	0.200

* The nominal torque is 1/2 during reverse operation.
* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (DSCR)



CAD

Unit [mm]

Model	Max. bore diameter	D	L	LF	A	C	M	Tightening torque [N·m]
DSCR-075	6.35	19.1	22.9	6.4	5.6	3.1	M2.5	1.0
DSCR-100	10	25.4	31.8	7.9	7.9	3.8	M3	1.5
DSCR-112	12.7	28.6	38.1	11.4	9.5	3.8	M3	1.5
DSCR-150	15	38.1	41.3	12	11.6	5.9	M5	7.0
DSCR-200	19	50.8	50.8	13.6	16.7	6.7	M6	11.7

* The recommended processing tolerance for paired mounting shafts is the h7 class.

Standard Bore Diameter

Standard bore diameter [mm]	d1	4	5	5	6	6	6	6.35	6.35	6.35	7	8	8	8	9.5	9.525	9.525	10	10	10	10	11	11	12	12	12	12	14	14	14	15	16	16
	d2	4	4	5	4	5	6	5	6	6.35	7	6	6.35	8	8	8	9.525	8	9.5	9.525	10	10	11	9.5	10	11	12	10	12	14	15	14	16
Model	DSR, DSCR-075	●	●	●	●	●	●	●	●	●																							
	DSR, DSCR-100						●			●	●	●	●	●	●	●	●	●	●	●	●												
	DSR, DSCR-112													●	●	●	●	●	●	●	●	●	●	●	●		●						
	DSR, DSCR-150																					●	●			●	●	●	●	●	●		
	DSR, DSCR-200																												●	●	●	●	●

How to Place an Order

DSCR-075 6-6

Affixing method
Blank: Set screw method
C: Clamp method

Size

Bore diameter 1: d1

Bore diameter 2: d2

* d1 is the larger bore diameter.
* Contact Miki Pulley regarding non-standard bore diameters.

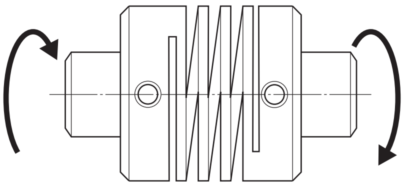
* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

3000/ARM/ACRM/DSR/DSCR Models

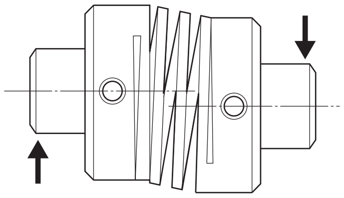
Items Checked for Design Purposes

Spring Characteristic

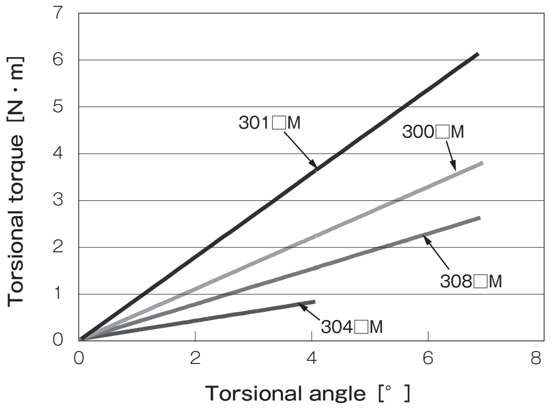
■ Torsional torque and torsional angle



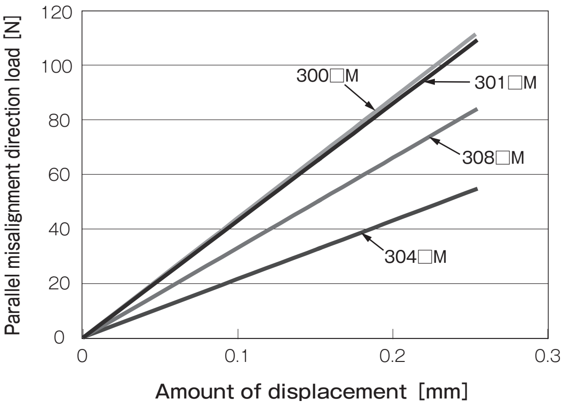
■ Parallel misalignment direction load and amount of displacement



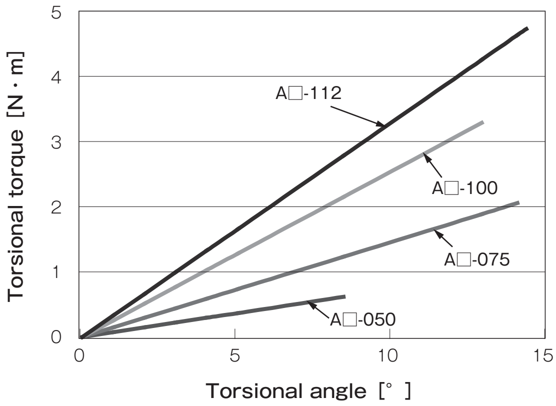
■ 3000 Models



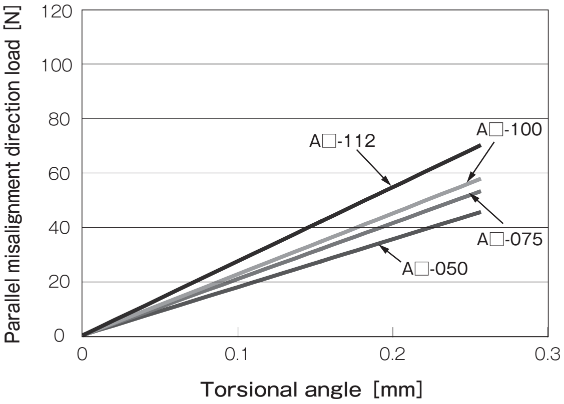
■ 3000 Models



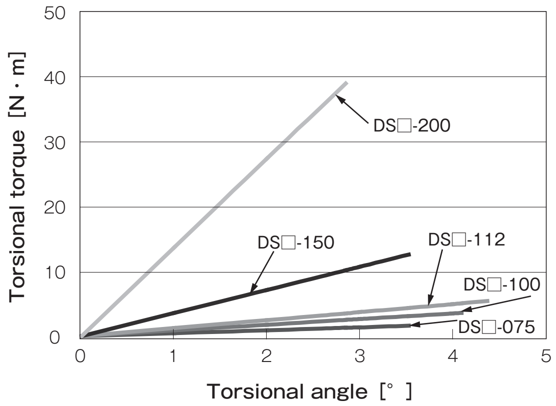
■ ARM/ACRM Models



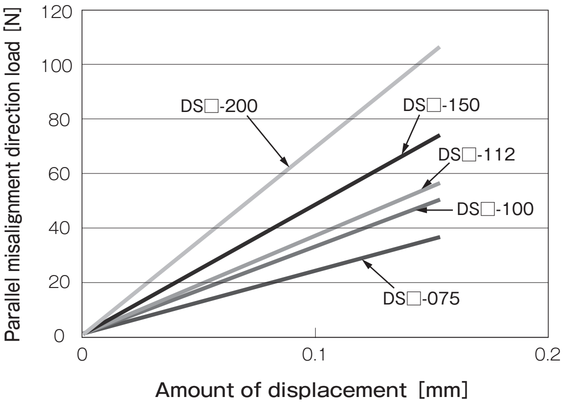
■ ARM/ACRM Models



■ DSR/DSCR Models



■ DSR/DSCR Models



Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Mounting

(1) Couplings are designed for use within an operating temperature from -40℃ to 120℃. HELI-CAL couplings are water and oil resistant, but should not be used in extreme atmospheres.

(2) Make sure to be careful so as not to injure yourself with a slit of HELI-CAL coupling.

(3) Added work for inner diameter surfaces of the coupling, etc. basically cannot be done by customer as it may affect concentrically on holes of right and left or notches on the inner diameter surface of slit. It is also not recommended to do a keyway milling as the stress get centered on angle of keyway and slit part will get easy to break down.

(4) For the clamp-type HELI-CAL coupling, never tighten the clamping bolt prior to inserting the shaft into the coupling.

(5) To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table. The coupling should be mounted, however, so that the difference between centers is 50% or below of that misalignment value if rotation speed exceeds 2000 min^{-1}.

(6) Remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

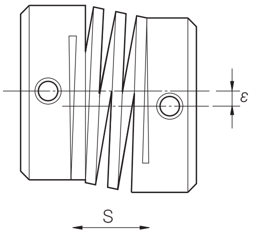
(7) Be careful not to place more bending, tensile, or compressive load on the coupling than necessary when inserting a shaft into a coupling.

(8) The length of insertion of the shaft into the coupling should be the LF dimension in the dimensions table. But make sure that the depth of insertion for 1441 model is between 5 mm to 6 mm measured from the end face.

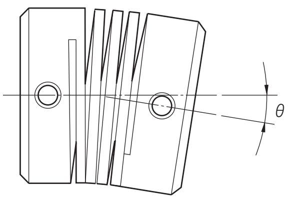
(9) We recommend matching of centering locations as the method for centering two shafts. As a mounting accuracy guide, loosen the hex-socket-head set screw or clamping bolt after fixing both shafts, and check that coupling rotates smoothly in rotation direction or axial direction.

(10) After mounting, check that there are no excessive deformation like shown below and if there is, find the centers again.

■ Parallel misalignment (ε)/ axial displacement (S)



■ Angular deflection (θ)



(11)Tighten set screws with hex socket heads and clamping bolts to the tightening torques shown below using a calibrated torque screwdriver or torque wrench.

Size of hex-socket-head set screw	M1.6	M2	M3	M5	M6
Tightening torque [N·m]	0.04	0.09	0.7	3.6	6.0

Clamping bolt size	M1.6	M2.5	M3	M5	M6
Tightening torque [N·m]	0.25	1.0	1.5	7.0	11.7

(12)Do not use any hex-socket-head set screw or clamping bolt other than those specified by Miki Pulley.

Selection Procedures

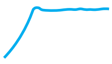
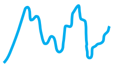
(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\,[\mathrm{N\cdot m}] = 9550 \times \frac{P\,[\mathrm{kW}]}{n[\mathrm{min}^{-1}]}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$Td\,[\mathrm{N\cdot m}] = Ta \times K1 \times K2 \times K3$$

■ Service factor based on load property: K1

Load properties	Constant 	Vibrations: Small 	Vibrations: Medium 	Vibrations: Large 
K1	1.0	1.25	1.75	2.25

■ Service factor based on operating time: K2

Hrs./day	～8	～16	～24
K2	1.0	1.12	1.25

■ Service factor based on starting/braking frequency: K3

Times/hr.	～10	～30	～60	～120	～240	Over 240
K3	1.0	1.1	1.3	1.5	2.0	∗

* Items marked with asterisks require consultations.

(3) Set the size so that the nominal coupling torque, Tn, is at least equal to the corrected torque, Td.

$$Tn \geqq Td$$

(4) Select a size that results in a maximum torque, Tm, for the coupling that is at least equal to the peak torque, Ts, generated by the driver, follower or both. Maximum torque refers to the maximum amount of torque that can be applied for a set amount of time considering eight hours of operation per day and up to around ten instances.

$$Tm \geqq Ts$$

(5) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling.

Metal Coil Spring Couplings

BAUMANNFLEX

Max. nominal torque [N·m]	220
Pilot bore/added work ranges [mm]	φ3～35
Operating temperature [℃]	BAUMANN MINI FLEX: -40 to 120, BAUMANNFLEX: -30 to 100
Backlash	Insignificant
Driver	Induction motor
Application	Vacuum equipment, medical equipment, printing machinery

High flexibility

High torque

Stainless steel

Metal Coil Spring Couplings with Excellent Flexibility

These couplings connect hubs that mount on shafts to other hubs, separated by a metal coil spring. They achieve excellent flexibility, compact size, and high torque.

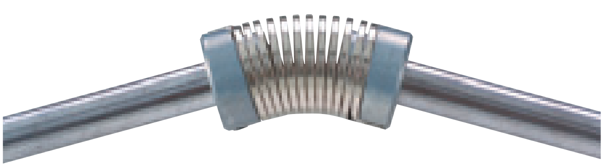
RoHS

Available Models

Series	Features	Spring Materials and Features		Lineup
BAUMANNFLEX	Small-capacity type	Spring steel		ZG
		Stainless steel	Standard	LM
			Ultra-flexible	LM-□-1
	Standard/Coupling type	Spring steel		MM-□K
		Stainless steel		MM-□K-S
	Standard/Single-flange Type	Spring steel		MF

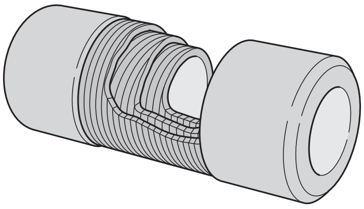
Main Features

Allows angular deflection up to 14°



ZG • LM

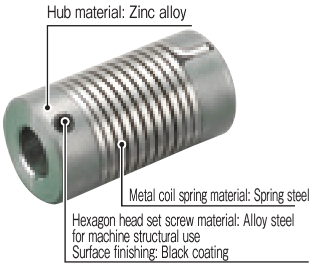
Three-layer coil makes it compact with high torque



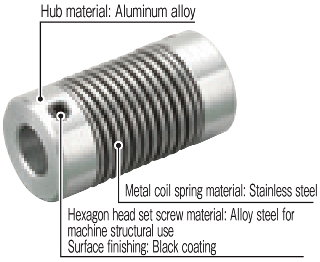
MM • MF

Structure and Materials

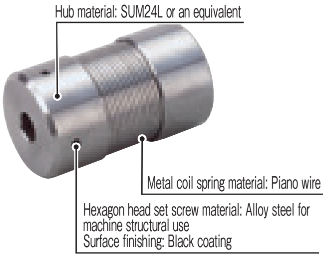
■ BAUMANN MINI FLEX ZG



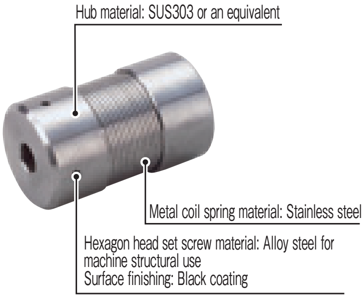
■ BAUMANN MINI FLEX LM



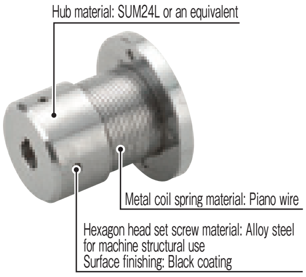
■ BAUMANNFLEX MM-K



■ BAUMANNFLEX MM-K-S



■ BAUMANNFLEX MF-K



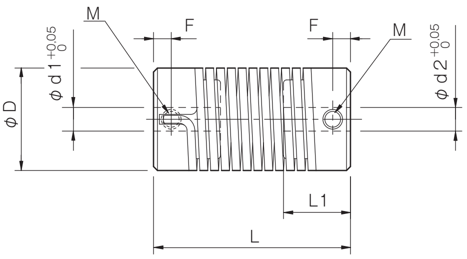
ZG Models

Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
ZG-6	0.15	0.3	0.5	5	± 0.5	3000	0.17	1.95×10^{-7}	0.020
ZG-8	0.5	1.0	1.0	8	± 1.0	3000	0.48	1.02×10^{-6}	0.070
ZG-14	1.5	3.0	1.2	8	± 1.0	3000	1.70	1.15×10^{-5}	0.130

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Unit [mm]

Model	d1 • d2			D	L	L1	F	M
	Pilot bore	Min.	Max.					
ZG-6	2	3	6	12	25	9	2.4	M3
ZG-8	3	4	8	16	35	12.5	3.5	M4
ZG-14	6	7	14	26	50	17	4.5	M5

* Pilot bores are to be drilled into the part.
* Left and right tap positions may be shifted slightly.

Standard Bore Diameter

Model	Standard bore diameter d1, d2												
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	14
ZG-6	●	●	●	●									
ZG-8		●	●	●	●	●	●						
ZG-14						●	●	●	●	●	●	●	●

* Standard bore-drilled products do not have keyways. Keyways may be possible under some conditions. Contact Miki Pulley for details.

How to Place an Order

ZG-14 10-14

Size
Bore diameter: d1 (Small diameter)
- d2 (Large diameter)
Blank: Pilot bore

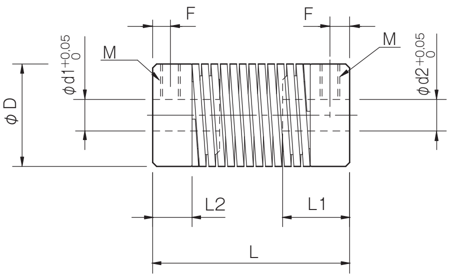
LM Models

Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
LM-6	0.5	1.0	1.0	8	± 1.0	6000	0.77	5.10×10^{-7}	0.020
LM-6-1	0.5	1.0	3.0	14	± 1.5	6000	0.40	7.65×10^{-7}	0.030
LM-9	1.0	2.0	2.5	8	± 1.0	6000	1.55	2.55×10^{-6}	0.050
LM-9-1	1.0	2.0	4.0	14	± 1.5	6000	0.80	3.06×10^{-6}	0.060
LM-14	2.0	4.0	3.0	8	± 1.0	6000	3.10	7.65×10^{-6}	0.090
LM-14-1	2.0	4.0	4.5	14	± 1.5	6000	1.60	9.44×10^{-6}	0.110

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Unit [mm]

Model	d1 • d2			D	L	L1	L2	F	M
	Pilot bore	Min.	Max.						
LM-6	4	5	6	14	35	12	6.5	3.5	M4
LM-6-1	4	5	6	14	50	12	6.5	3.5	M4
LM-9	5	6	9	20	40	14	7.5	4	M4
LM-9-1	5	6	9	20	60	14	7.5	4	M4
LM-14	8	9	14	26	50	17	10	5	M5
LM-14-1	8	9	14	26	70	17	10	5	M5

* Pilot bores are to be drilled into the part.
* The left and right tap positions are not correlated as shown in the diagram.

Standard Bore Diameter

Model	Standard bore diameter d1, d2										
	5	6	6.35	7	8	9	9.525	10	11	12	14
LM-6 (-1)	●	●									
LM-9 (-1)		●	●	●	●	●					
LM-14 (-1)						●	●	●	●	●	●

* Standard bore-drilled products do not have keyways. Keyways may be possible under some conditions. Contact Miki Pulley for details.

How to Place an Order

LM-14-1 12-12

Size

Total length
Blank: Standard part
1: Long type

Bore diameter: d1 (Small diameter)
- d2 (Large diameter)
Blank: Pilot bore

MM Models

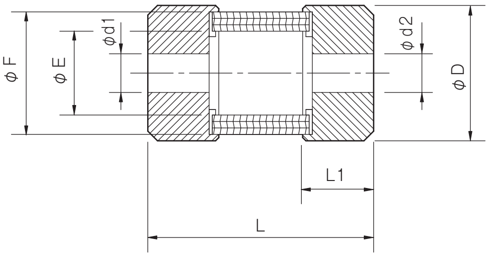
Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
MM-6K	2.5	5	0.3	3	+0.6	20000	143	7.65×10^{-7}	0.03
MM-8K	5	10	0.3	3	+0.8	15000	286.5	4.08×10^{-6}	0.07
MM-12K	10	20	0.4	3	+1.0	12000	573	1.43×10^{-5}	0.14
MM-14K	10	20	0.5	3	+1.0	10000	573	2.47×10^{-5}	0.15
MM-16K	20	40	0.6	3	+1.2	9000	1146	6.12×10^{-5}	0.30
MM-19K	20	40	0.7	3	+1.2	8000	1146	8.42×10^{-5}	0.32
MM-20K	40	80	0.7	3	+1.6	7000	2292	1.99×10^{-4}	0.70
MM-24K	40	80	0.9	3	+1.6	7000	2292	2.63×10^{-4}	0.75
MM-25K	90	180	0.9	3	+2.0	6000	3438	5.66×10^{-4}	1.25
MM-28K	90	180	1.0	3	+2.0	6000	2865	5.77×10^{-4}	1.35
MM-30K	150	300	1.1	3	+2.5	5000	4297.5	1.39×10^{-4}	2.10
MM-35K	220	440	1.2	3	+3.2	4500	6303	3.01×10^{-4}	3.50

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
MM-6K-S	2.5	5	0.3	3	+0.6	20000	143	7.65×10^{-7}	0.03
MM-8K-S	5	10	0.3	3	+0.8	15000	286.5	4.08×10^{-6}	0.07
MM-12K-S	10	20	0.4	3	+1.0	12000	573	1.43×10^{-5}	0.14
MM-16K-S	20	40	0.6	3	+1.2	9000	1146	6.12×10^{-5}	0.30
MM-20K-S	40	80	0.7	3	+1.6	7000	2292	1.99×10^{-4}	0.70
MM-25K-S	90	180	0.9	3	+2.0	6000	3438	5.66×10^{-4}	1.25

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Unit [mm]

Model	d1・d2			D	L	L1	E	F
	Pilot bore	Min.	Max.					
MM-6K	2.5	3	8	16	20	6	11	15.5
MM-8K	3.5	4	8	21	35	11	13	19
MM-12K	5.5	6	12	26	50	16.5	16.5	24
MM-14K	5.5	7	14	30	50	16.5	20.5	28
MM-16K	5.5	10	16	35	65	22	22.4	32
MM-19K	5.5	10	19	38	65	22	26.4	36
MM-20K	5.5	10	20	45	80	27	28	40
MM-24K	5.5	14	24	48	80	27	33	45
MM-25K	5.5	14	25	55	100	33.5	35	50
MM-28K	5.5	14	28	55	100	33.5	37	52
MM-30K	5.5	16	30	65	125	40	40.8	60
MM-35K	5.5	20	35	75	150	48	46	70

Model	d1・d2			D	L	L1	E	F
	Pilot bore	Min.	Max.					
MM-6K-S	2.5	3	8	17	25	9	11	15.5
MM-8K-S	3.5	4	8	21	35	11	13	19
MM-12K-S	5.5	6	12	26	50	16.5	16.5	24
MM-16K-S	5.5	10	16	35	65	22	22.4	32
MM-20K-S	5.5	10	20	45	80	27	28	40
MM-25K-S	5.5	14	25	55	100	32.5	35	50

*Pilot bores are to be drilled into the part.

How to Place an Order

MM-16K-S 12H-14N

Size
Materials
Blank: Carbon steel and spring steel
-S : Stainless steel

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore

Bore specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards

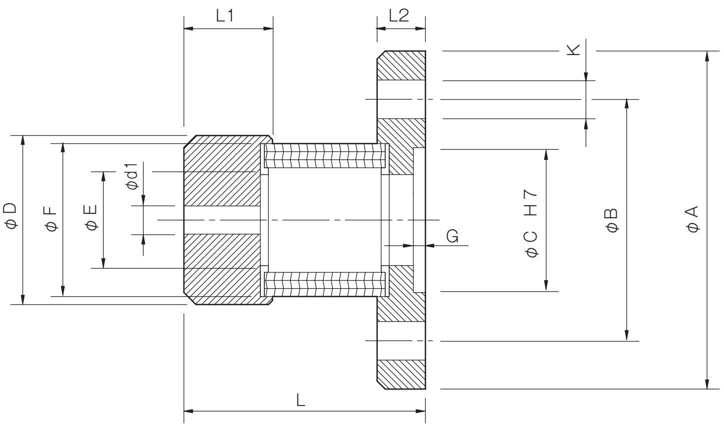
MF Models

Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
MF-8K	5	10	0.3	3	+ 0.8	15000	286.5	1.66 × 10^{-5}	0.1
MF-12K	10	20	0.4	3	+ 1.0	12000	573	3.32 × 10^{-5}	0.16
MF-16K	20	40	0.6	3	+ 1.2	9000	1146	9.18 × 10^{-5}	0.31
MF-20K	40	80	0.8	3	+ 1.6	7000	2292	2.12 × 10^{-4}	0.5
MF-25K	90	180	0.9	3	+ 2.0	6000	3438	5.33 × 10^{-4}	0.9
MF-30K	150	300	1.1	3	+ 2.5	5000	4297.5	1.35 × 10^{-3}	1.7
MF-35K	220	440	1.2	3	+ 3.2	4500	6303	2.86 × 10^{-3}	2.8

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



CAD

Unit [mm]

Model	d1			D	L	L1	L2	A	B	C	E	F	G	K
	Pilot bore	Min.	Max.											
MF-8K	3.5	4	8	21	30	11	6	42	30	18	13	19	1.5	3- φ 4.8
MF-12K	5.5	6	12	26	40	16.5	6	48	37	22	16.5	24	1.5	3- φ 4.8
MF-16K	5.5	10	16	35	50	22	6.5	58	47	30	22.4	32	1.5	4- φ 4.8
MF-20K	5.5	12	20	45	60	27	7	65	52	35	28	40	1.5	4- φ 4.8
MF-25K	5.5	14	25	55	75	33.5	8.5	75	62	42	35	50	1.5	6- φ 5.8
MF-30K	5.5	16	30	65	95	40	10	90	74.5	47	40.8	60	2.5	4- φ 7.0
MF-35K	5.5	20	35	75	115	48	13	100	84	57	46	70	2.5	6- φ 7.0

* Pilot bores are to be drilled into the part.

How to Place an Order

MF-16K 12H

Bore diameter: d1
Blank: Pilot bore

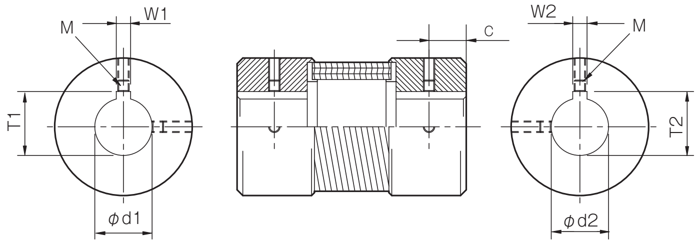
Size

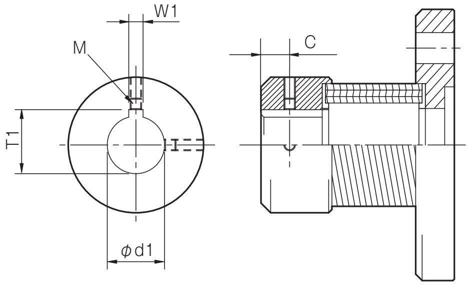
Bore specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards

MM/MF Models

Standard Hole-Drilling Standards

- These standard hole-drilling standards apply to the MM and MF models of the BAUMANNFLEX.
- Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular hub.
- Set screw positions are not on the same plane.
- The set screws are included with the product.
- Refer to the technical documents at the end of this volume for standard dimensions for bore drilling other than those given here.





Unit [mm]

Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]
Tolerance	H7,H8	E9	$^{+0.3}_{0}$	—	Tolerance	H7	H9	$^{+0.3}_{0}$	—	Tolerance	G7	H9	$^{+0.3}_{0}$	—
4	4 $^{+0.018}_{0}$	—	—	2-M3	—	—	—	—	—	—	—	—	—	—
5	5 $^{+0.018}_{0}$	—	—	2-M3	—	—	—	—	—	—	—	—	—	—
6	6 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
7	7 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
8	8 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
9	9 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
10	10 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
11	11 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
12	12 $^{+0.018}_{0}$	4 $^{+0.050}_{+0.020}$	13.5	2-M4	12H	12 $^{+0.018}_{0}$	4 $^{+0.030}_{0}$	13.8	2-M4	—	—	—	—	—
14	14 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	16.0	2-M4	14H	14 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	16.3	2-M4	14N	14 $^{+0.024}_{+0.006}$	5 $^{+0.030}_{0}$	16.3	2-M4
15	15 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	17.0	2-M4	15H	15 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	17.3	2-M4	—	—	—	—	—
16	16 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	18.0	2-M4	16H	16 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	18.3	2-M4	—	—	—	—	—
17	17 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	19.0	2-M4	17H	17 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	19.3	2-M4	—	—	—	—	—
18	18 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	20.0	2-M4	18H	18 $^{+0.018}_{0}$	6 $^{+0.030}_{0}$	20.8	2-M5	—	—	—	—	—
19	19 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	21.0	2-M4	19H	19 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	21.8	2-M5	19N	19 $^{+0.028}_{+0.007}$	6 $^{+0.030}_{0}$	21.8	2-M5
20	20 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	22.0	2-M4	20H	20 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	22.8	2-M5	—	—	—	—	—
22	22 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	25.0	2-M6	22H	22 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	24.8	2-M5	—	—	—	—	—
24	24 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	27.0	2-M6	24H	24 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	27.3	2-M6	24N	24 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	27.3	2-M6
25	25 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	28.0	2-M6	25H	25 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	28.3	2-M6	—	—	—	—	—
28	28 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	31.0	2-M6	28H	28 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	31.3	2-M6	28N	28 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	31.3	2-M6
30	30 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	33.0	2-M6	30H	30 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	33.3	2-M6	—	—	—	—	—
32	32 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	35.5	2-M8	32H	32 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	35.3	2-M8	—	—	—	—	—
35	35 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	38.5	2-M8	35H	35 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	38.3	2-M8	—	—	—	—	—

* The ø11 or below requirement under the new JIS standards and ø11 requirement for the new motor standards are the same as the old JIS standards (class 2)

Distance from Set Screw Edge

Coupling size	6	8	12	14	16	19	20	24	25	28	30	35
Distance from set screw edge C [mm]	3	5	7	7	10	10	10	10	15	15	15	15

ZG/LM/MM/MF Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

(1) The operating temperature range is -40℃ to 120℃ for ZG and LM models and -30℃ to 100℃ for MM and MF models. Note that the MM-K and MF-K types are not waterproof and cannot be used outdoors.

(2) To prevent friction during operation, the MM and MF models are lightly lubricated with oil on their coil spring components. Do not clean them with degreasers.
Note that when processing the inner diameter of pilot-bore products, cutting oil (particularly if water soluble) should be kept away from the coil spring component.

(3) To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table.
The coupling should be mounted, however, so that the difference between centers is 50% or less of that misalignment value if rotation speed exceeds 2000 min^{-1}.

(4) Remove any rust, dust, oil or the like from the inner diameter surfaces of the shaft and coupling.

(5) Be careful not to place more bending, tensile, or compressive load on the coupling than necessary when inserting a shaft into a coupling.

(6) Tighten set screws with hex socket heads to the tightening torques shown below using a calibrated torque screwdriver or torque wrench.

Size of hex-socket-head set screw	M3	M4	M5	M6	M8
Tightening torque [N·m]	0.7	1.7	3.6	6.0	14.2

Selection Procedures

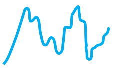
(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$\mathrm{Ta\ [N{\cdot}m]} = 9550 \times \frac{\mathrm{P\ [kW]}}{\mathrm{n[min^{-1}]}}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$\mathrm{Td\ [N{\cdot}m]} = \mathrm{Ta} \times \mathrm{K1} \times \mathrm{K2} \times \mathrm{K3}$$

■ Service factor based on load property: K1

	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
Load properties				
K1	1.0	1.25	1.75	2.25

■ Service factor based on operating time: K2

Hrs./day	～8	～16	～24
K2	1.0	1.12	1.25

■ Service factor based on starting/braking frequency: K3

Times/hr.	～10	～30	～60	～120	～240	Over 240
K3	1.0	1.1	1.3	1.5	2.0	*

* Items marked with asterisks require consultations.

(3) Set the size so that the nominal coupling torque Tn is at least equal to the corrected torque Td.

$$\mathrm{Tn} \geqq \mathrm{Td}$$

(4) Select a size that results in a maximum torque, Tm, for the coupling that is at least equal to the peak torque, Ts generated by the driver, follower or both. Maximum torque refers to the maximum amount of torque that can be applied for a set amount of time considering eight hours of operation per day and up to around ten instances.

$$\mathrm{Tm} \geqq \mathrm{Ts}$$

(5) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling.

Pin Bushing Couplings

PARAFLEX

High stiffness
High flexibility
High damping
Easy to mount and remove

Max. nominal torque [N·m]	25
Bore ranges [mm]	ϕ3～22
Operating temperature [℃]	－30～100
Backlash	Extremely small size
Driver	Servo motor, stepper motor, induction motor
Application	Chip mounters, electric discharge machines, automated teller machines, winders

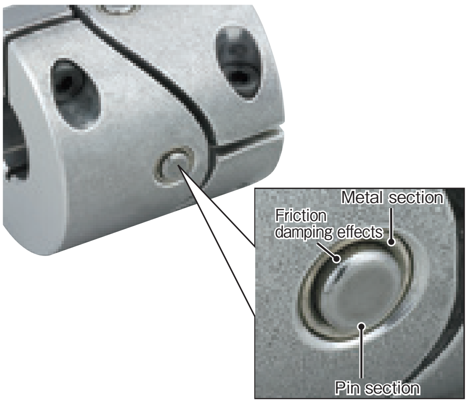
Pin bushing Couplings That Keep Shaft Reaction Force from Mounting Misalignment Extremely Low

Pin/bushing style couplings that use aluminum alloy as their primary material. This system makes shaft reaction force due to mounting misalignment extremely small. There is also a damping effect from sliding at the friction surface between the pin and dry metal.

RoHS

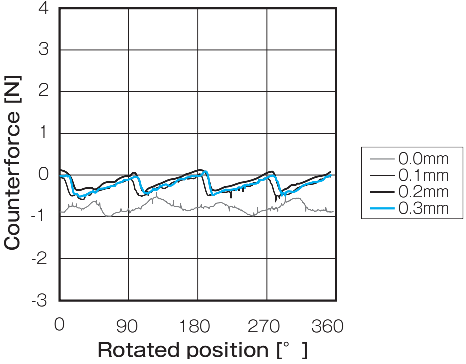
Main Features

Friction Damping Effect of Pin and Metal Bushing



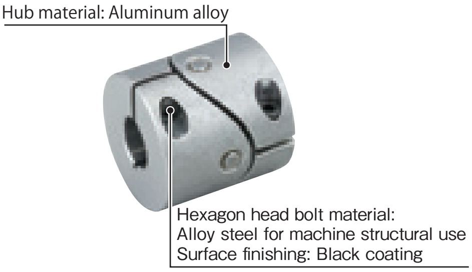
Counterforce from Parallel Misalignment and Angular Deflection is Extremely Small

CPU-36-A: Counterforce due to parallel misalignment

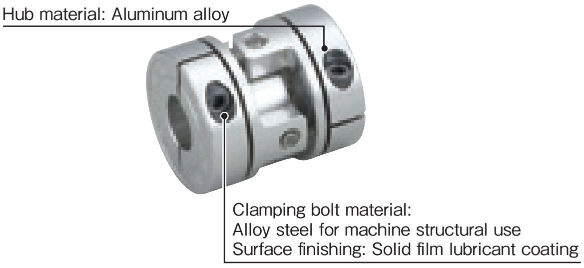


Structure and Materials

CPE



CPU



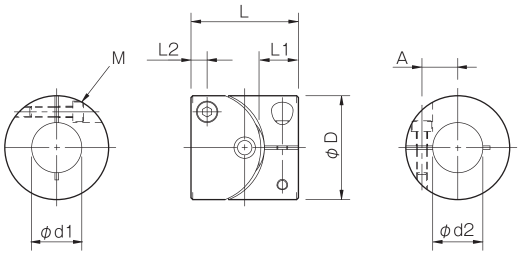
CPE Models

Specifications

Model	Torque		Misalignment		Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m²]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]				
CPE-19	0.7	1.4	0.2	1	6000	500	0.69×10^{-6}	0.015
CPE-29	2	4	0.2	1	6000	700	5.80×10^{-6}	0.050
CPE-39	5	10	0.2	1	6000	1900	18.50×10^{-6}	0.080

* Torques for CPE-19 are values when the bore diameter is at least equal to 4 mm.
* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Unit [mm]

Model	d1・d2		D	L	L1	L2	M	A
	Min.	Max.						
CPE-19	3	8	19	19.4	6	3	M2.5	6
CPE-29	6	14	29	30	9.5	4.5	M3	10
CPE-39	8	20	39	40	12.5	6	M4	14

* Insert the shaft to at least the dimension L1. (Note that the shaft cannot go all the way through.)
* The recommended processing tolerance for paired mounting shafts is the h7 class.

Standard Bore Diameter

Model	Standard bore diameter d1, d2 [mm]																
	3	4	5	6	6.35	7	8	9.525	10	11	12	14	15	16	18	19	20
CPE-19	○	●	●	●	●	●	●										
CPE-29				●	●	●	●	●	●	●	●	●					
CPE-39							●	●	●	●	●	●	●	●	●	●	●

* Torque on the CPE-19 with a bore diameter of 3 mm is limited by holding force in the shaft coupling component, so nominal torque is 0.4 N·m and maximum torque is 0.8 N·m.
* Bore diameters between the minimum and maximums shown in the dimensions table are compatible, but bore diameters other than those shown in the above table require a separate bore drilling charge.

How to Place an Order

CPE-19-6B-6B

Size

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
B: Clamping hub

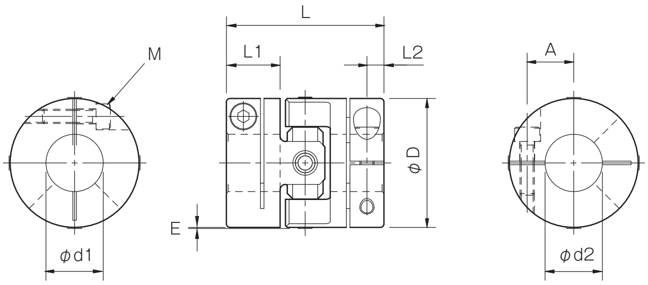
CPU Models

Specifications

Model	Rated torque [N·m]	Misalignment		Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
		Parallel [mm]	Angular [°]				
CPU-26-A	2.2	0.3	4	4000	600	3.57×10^{-6}	0.04
CPU-36-A	10	0.4	4	3500	1350	1.64×10^{-5}	0.09
CPU-46-A	25	0.5	4	3000	1650	5.33×10^{-5}	0.19

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Unit [mm]

Model	d1・d2		D	E	L	L1	L2	M	A
	Min.	Max.							
CPU-26-A	6	12	26	0.3	36	12	4	M3	9
CPU-36-A	8	18	36	0.3	44	15	4.75	M4	13
CPU-46-A	10	22	46	0.3	54	18	6.5	M5	16

* Insert the shaft to at least the dimension L1. (Note that the shaft cannot go all the way through.)
* The recommended processing tolerance for paired mounting shafts is the h7 class.

Standard Bore Diameter

Model	Standard bore diameter d1, d2 [mm]															
	6	6.35	7	8	9	9.525	10	11	12	14	15	16	18	19	20	22
CPU-26-A	●	●	●	●	●	●	●	●	●							
CPU-36-A				●	●	●	●	●	●	●	●	●	●			
CPU-46-A							●	●	●	●	●	●	●	●	●	●

* Bore diameters between the minimum and maximums shown in the dimensions table are compatible, but bore diameters other than those shown in the above table require a separate bore drilling charge.

How to Place an Order

CPU-36-A-12B-12B

Size

Type A: Aluminum type

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
B: Clamping hub

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

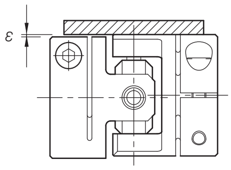
(1) Couplings are designed for use within an operating temperature range of -30℃ to 100℃ . PARAFLEX couplings are water and oil resistant, but should not be used in extreme atmospheres.

(2) Never tighten the clamping bolt (hex-socket-head bolt) prior to inserting the shaft into the coupling.

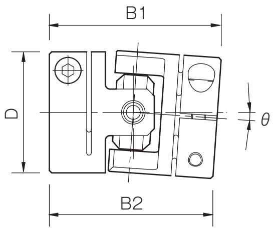
(3) Remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(4) Mount couplings after checking, by the following sort of method, that differences between coupling centers during operation are within the misalignment shown in the specifications table. CPU models allow angular deflection of up to 4° at this time, but it should be kept within 1.5° if it is important that the coupling be isokinetic. The angular velocity ratio at an angular deflection of 1.5° is 1.0007.

■ Parallel misalignment



■ Angular deflection



$$\tan\theta = \frac{|B1\text{-}B2|}{D}$$

(5) PARAFLEX couplings are not structurally able to absorb axial displacement, so do not place tensile or compressive loads on them during use.

(6) The length of insertion of the shaft into the coupling should be the dimension L1 on the dimensions table. The shaft cannot go all the way through.

(7) Tighten clamping bolts (hex-socket-head bolt) to the tightening torques shown below using a calibrated torque wrench.

Model	CPE-19	CPE-29	CPE-39
Bolt with hex socket head for clamping	M2.5	M3	M4
Tightening torque [N·m]	1.0	1.5	3.4

Model	CPU-26-A	CPU-36-A	CPU-46-A
Clamping bolts	M3	M4	M5
Tightening torque [N·m]	1.5	3.4	7.0

(8) Do not use any clamping bolt (hex-socket-head bolt) other than those specified by Miki Pulley. Do not apply oil, grease, fixatives (adhesives) or the like to the clamping bolt (hex-socket-head bolt).

Selection Procedures

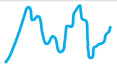
(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$\text{Ta [N·m]} = 9550 \times \frac{\text{P [kW]}}{\text{n[min}^{-1}\text{]}}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$\text{Td [N·m]} = \text{Ta} \times \text{K1} \times \text{K2} \times \text{K3} \times \text{K4} \times \text{K5}$$

■ Service factor based on load property: K1

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K1	1.0	1.25	1.75	2.25

■ Service factor based on amount of parallel misalignment: K2

Parallel misalignment [mm]	0	0.1	0.2
K2	1.0	1.1	1.2

■ Service factor based on amount of angular deflection: K3

Amount of angular deflection [°]	0	0.5	1.0
K3	1.0	1.06	1.12

■ Service factor based on operating temperature: K4

Atmospheric temperature [℃]	60 or below	80 or below	100 or below
K4	1.0	1.4	1.8

■ Service factor based on rotation speed: K5

Max. rotation speed [min^{-1}]	1500 or below	2500 or below	2500 or below	3000 or below	3500 or below	4000 or below	5000 or below	6000 or below
K5	1.0	1.3	1.7	2.0	2.4	2.7	3.3	4.0

(3) Select the size so that the nominal torque (CPE models) or rated torque (CPU models) Tn is at least equal to the corrected torque, Td.

$$\text{Tn} \geqq \text{Td}$$

(4) Select a size that results in a maximum torque (CPE models) or rated torque (CPU models) Tm that is at least equal to the peak torque, Ts, generated by the driver, follower or both. Maximum torque (CPE models) refers to the maximum amount of torque that can be applied for a set amount of time, considering eight hours of operation per day and up to around ten instances.

$$\text{Tm} \geqq \text{Ts} \times \text{K4}$$

(5) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling.

Link Couplings

SCHMIDT

High parallel misalignment

For high output

Model	NSS	DL
Max. nominal torque [N·m]	7850	2310
Operating temperature [℃]	－10 ～ 60	－10 ～ 60
Backlash	Extremely small size	Extremely small size
Max. displacement (parallel) [mm]	183 (linear)	4
Driver	Induction motor	
Application	Roll formers, production equipment for sanitary goods	

Compact Couplings That Transmit Power with Different Shaft Centers

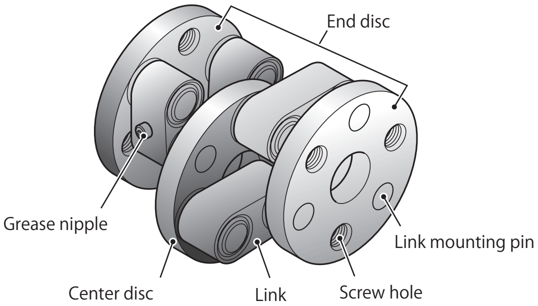
Power transmission with different shaft centers, constructed with spline shafts or the like, efficiently transmit power in a compact form factor. The NSS models not only transmit power with different shaft centers, they can also translate shafts over a wide range while rotating.

Some exceptions apply

Operating Principles

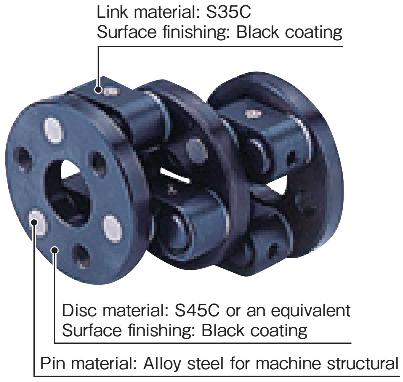
SCHMIDT couplings employ different shaft centers and the crank motion of a link.

Power input at one end disc is transmitted to the other end disc via links and center disc. This eliminates the slight frictional loss of bearings and reliably transmits the drive-side energy to the driven side together with rotation speed and torque.

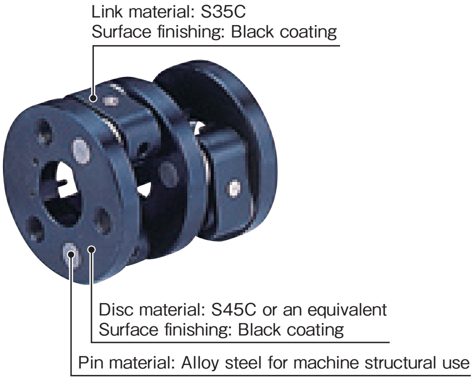


Structure and Materials

■ NSS



■ DL



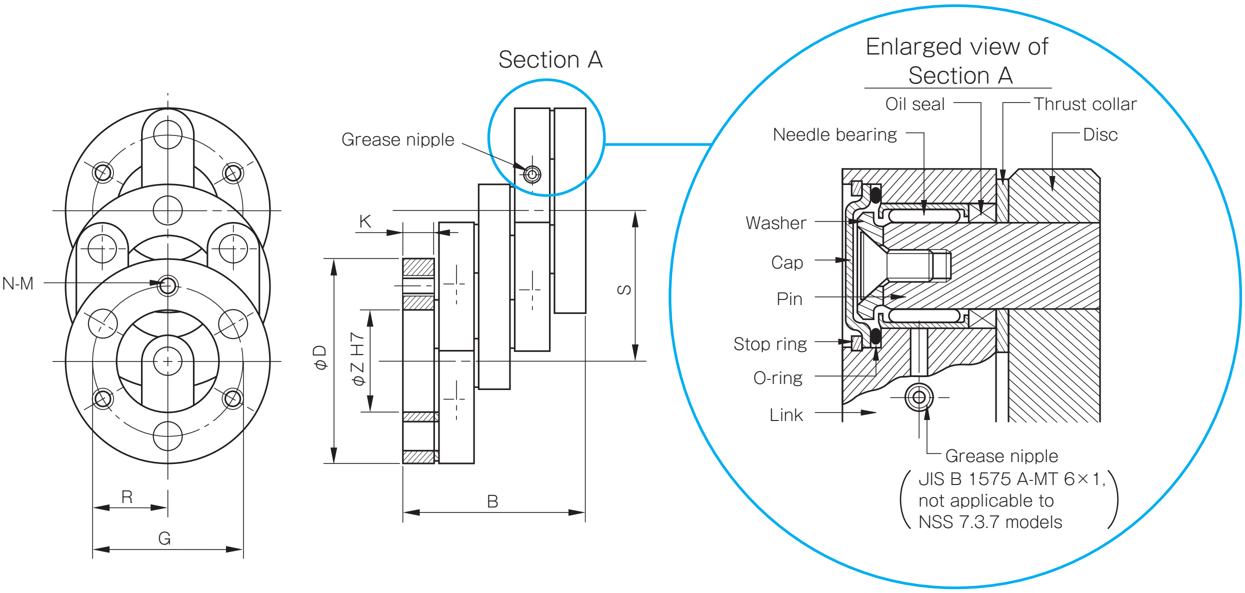
NSS Models

Specifications

Model	No. of links	Parallel misalignment			Torque		Max. rotation speed [min⁻¹]	Bearing basic load [N]	Pin pitch = Radius of the circle [m]	Moment of inertia [kg·m²]	Mass [kg]
		Min. [mm] S × 0.25	Max. [mm] S × 0.95	Linear Max. [mm]	Nominal [N·m]	Max. [N·m]		C	R		
NSS 7.3.7	3 × 2	9	34	65	49	137	3000	3870	0.024	9.03×10^{-4}	1.3
NSS 7.7.9	3 × 2	18	66	128	68	196	2500	3870	0.035	2.69×10^{-3}	1.9
NSS 10.9.12	3 × 2	23	85	165	196	600	2000	8920	0.045	1.15×10^{-2}	4.9
NSS 13.9.14	3 × 2	23	85	165	350	1060	1800	14120	0.050	2.80×10^{-2}	10.4
NSS 16.10.16	3 × 2	25	95	183	640	1850	1500	21570	0.057	5.80×10^{-2}	15.7
NSS 20.9.20	3 × 2	23	85	165	1180	3470	1000	30890	0.075	1.61×10^{-1}	27
NSS 20.9.20/4	4 × 2	23	85	165	1370	4170	600	30890	0.075	1.80×10^{-1}	30
NSS 20.9.23/5	5 × 2	23	85	165	2060	6280	500	30890	0.090	3.08×10^{-1}	35
NSS 20.9.25/6	6 × 2	23	85	165	2750	8340	460	30890	0.100	4.48×10^{-1}	43
NSS 20.9.33/8	8 × 2	23	85	165	5200	15700	300	30890	0.140	1.19	59
NSS 20.9.39/10	10 × 2	23	85	165	7850	23500	250	30890	0.170	2.25	79

* If the number of links is not 3 × 2, the part must be made to order.
* Max. rotation speed does not take into account dynamic balance.
* Select NSS model SCHMIDT couplings as guided by the design checklist on P.116-119, with due consideration to service life.

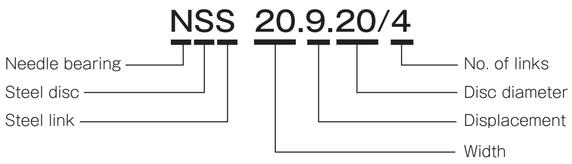
Dimensions



Unit [mm]

Model	D	B	S	Z	G	N	M	K
NSS 7.3.7	70	74	36	25	48	3	M10	10
NSS 7.7.9	92	74	70	45	70	3	M10	10
NSS 10.9.12	120	101	90	50	90	3	M12	15
NSS 13.9.14	140	134	90	55	100	3	M16	22
NSS 16.10.16	160	155	100	60	115	3	M16	25
NSS 20.9.20	200	196	90	80	150	3	M20	30
NSS 20.9.20/4	200	196	90	80	150	4	M20	30
NSS 20.9.23/5	230	196	90	120	180	5	M20	30
NSS 20.9.25/6	250	196	90	120	200	6	M20	30
NSS 20.9.33/8	330	196	90	210	280	8	M20	30
NSS 20.9.39/10	390	196	90	250	340	10	M20	30

How to Place an Order



NSS Models

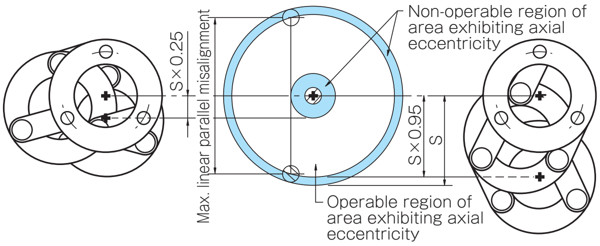
Items Checked for Design Purposes

Precautions for Handling

(1) Couplings are designed for use within an operating temperature range of -10℃ to 60℃ . NSS model SCHMIDT couplings are not waterproof. Do not use them outdoors.

(2) The discs are all connected by bearings and can move freely, so be alert to injury during transport and handle so that undue force is not applied to the product.

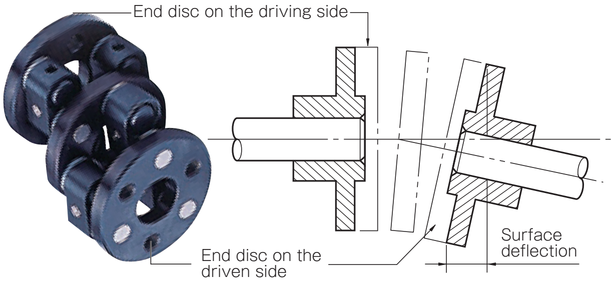
(3) Use in a manner that results in the parallel misalignment of both shafts being in the range S × 0.25 to S × 0.95.



Amount of parallel misalignment of both shafts

Model	Parallel misalignment [mm]		
	S × 0.25	S × 0.95	Max. linear
NSS 7.3.7	9	34	65
NSS 7.7.9	18	66	128
NSS 10.9.12	23	85	165
NSS 13.9.14	23	85	165
NSS 16.10.16	25	95	183
NSS 20.9.20	23	85	165
NSS 20.9.20/4	23	85	165
NSS 20.9.23/5	23	85	165
NSS 20.9.25/6	23	85	165
NSS 20.9.33/8	23	85	165
NSS 20.9.39/10	23	85	165

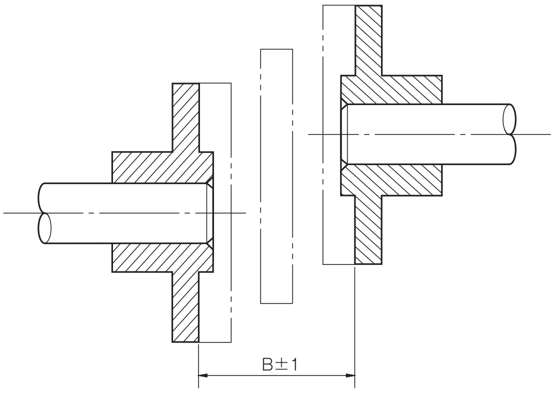
(4) Make the driving shaft and driven shaft parallel. Adjust the mounting angle misalignment of the two coupling shafts so that the coupling surface deflection is at or below the values of the table below after mounting and during operation. If surface deflection exceeds the allowable value, the product will break down in a very short period of time.



Allowable surface deflection

Model	Allowable surface deflection [mm]
NSS 7.3.7	0.15
NSS 7.7.9	0.15
NSS 10.9.12	0.2
NSS 13.9.14	0.2
NSS 16.10.16	0.2
NSS 20.9.20	0.2
NSS 20.9.20/4	0.2
NSS 20.9.23/5	0.3
NSS 20.9.25/6	0.4
NSS 20.9.33/8	0.5
NSS 20.9.39/10	0.6

(5) When mounting a coupling, design and mount it so that the axial length during use is standard dimension B ± 1 mm.



(6) Design the device so that no bending or thrust loads act on the coupling. Avoid using these couplings in applications that install them vertically or obliquely.

(7) The grease for lubricating the bearings should be type 1-1 or 1-2 JIS K2220 cup grease or the equivalent.

(8) Mount a protective cover on the rotating part. Be careful not to pinch your hand between the discs and links when mounting.

(9) When mounting heavy items, be sure to use an eye bolt. Eye bolts can be used by securing them to both end discs, but when they are wider than the end disc, the link components and eye bolt can come into contact and suffer damage when hanging, so consider the mounting position when choosing an eye bolt size.

Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$\text{Ta [N·m]} = 9550 \times \frac{\text{P [kW]}}{\text{n[min}^{-1}\text{]}}$$

(2) When a service factor based on load property, K, shown on the table below is 1.5, select the model from the quick reference table.

Service factor based on load property: K

When mounted between shafts with virtually no shock	1.0 ~ 1.5
When mounted between shafts with severe shock (including when shaft displacement speed is fast)	1.5 ~ 2.0
When mounted in unbalanced machinery that shakes the entire coupling	2.0 ~ 2.5

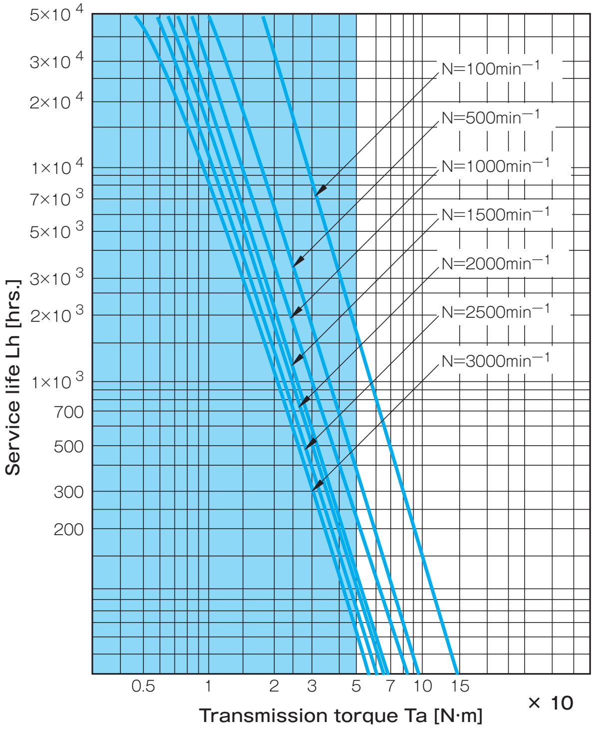
If selecting a model using conditions other than those of the quick reference table, calculate the service life using the equation below.

$$p = \frac{4 \times \text{Ta}}{\text{N} \times \text{R}}$$

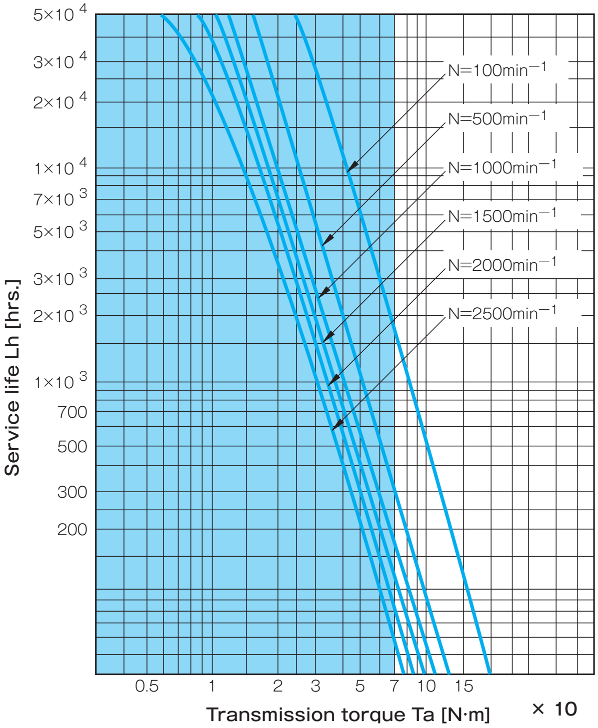
$$\text{Lh} = \frac{16666}{n} \left(\frac{C}{p \cdot K} \right)^{\frac{10}{3}}$$

P: Output capacity of driver [kW]
p: Bearing load [N]
R: Radius of pitch circle of pin [m]
Ta: Transmission torque [N·m]
N: Total number of links (on a standard product, 3x2=6)
Lh: Service life [h]
n: Usage rotation speed [min^{-1}]
C: Basic load capacity of bearing [N]
K: Load coefficient

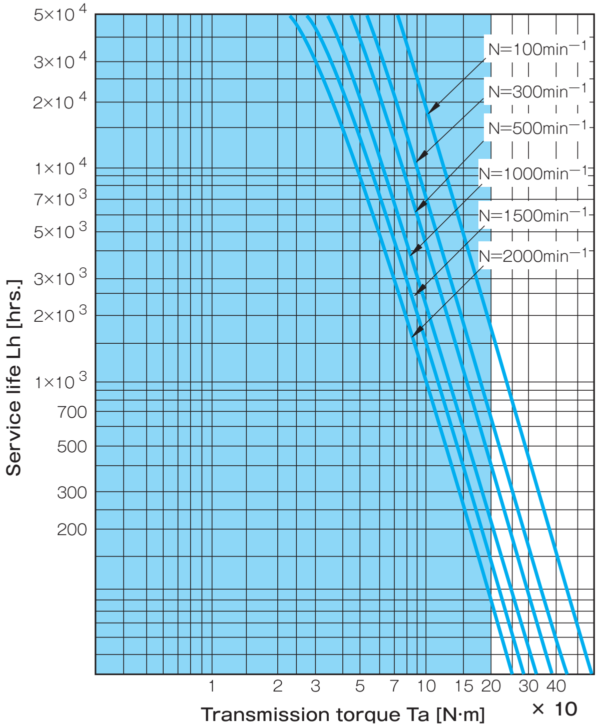
■ Model NSS 7.3.7



■ Model NSS 7.7.9



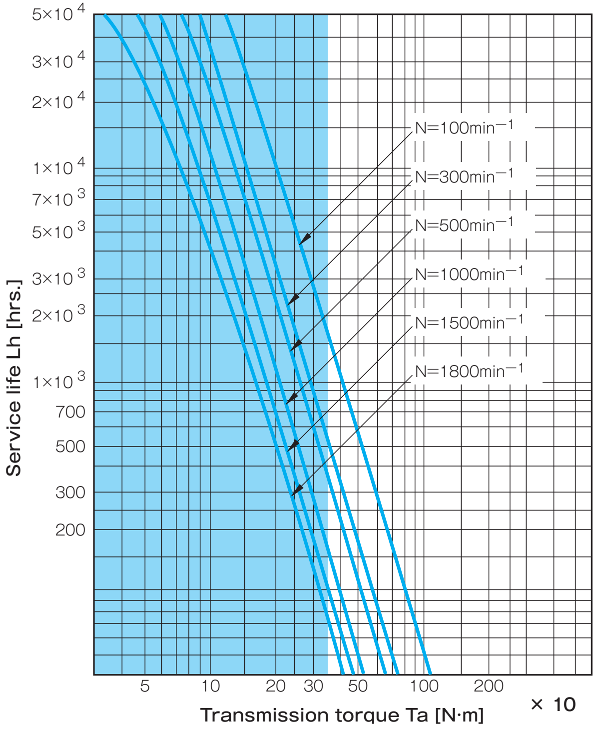
■ Model NSS 10.9.12



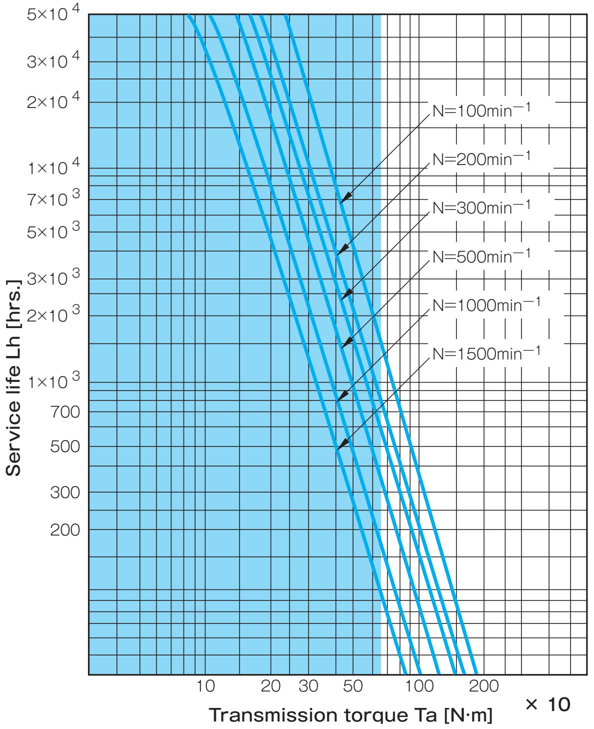
* The table considers safety factors (service factor based on load property: K = 1.5). Use in the range of the 🟦 part in the graph.

NSS Models

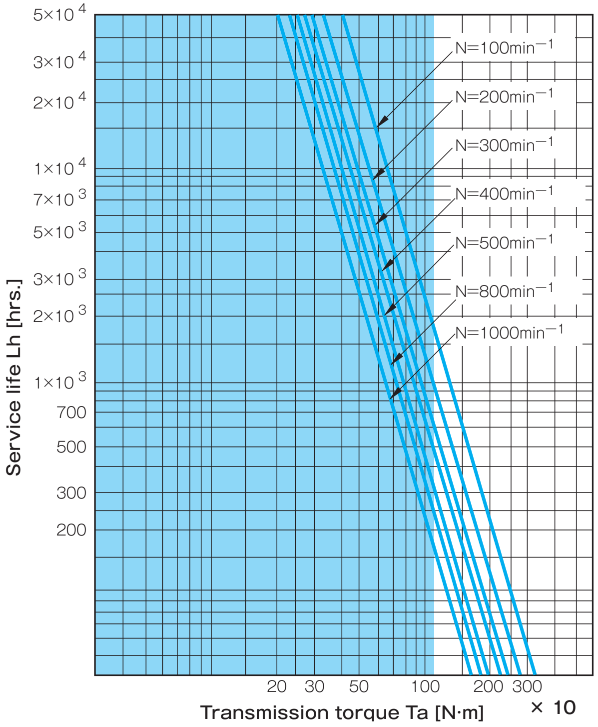
■ Model NSS 13.9.14



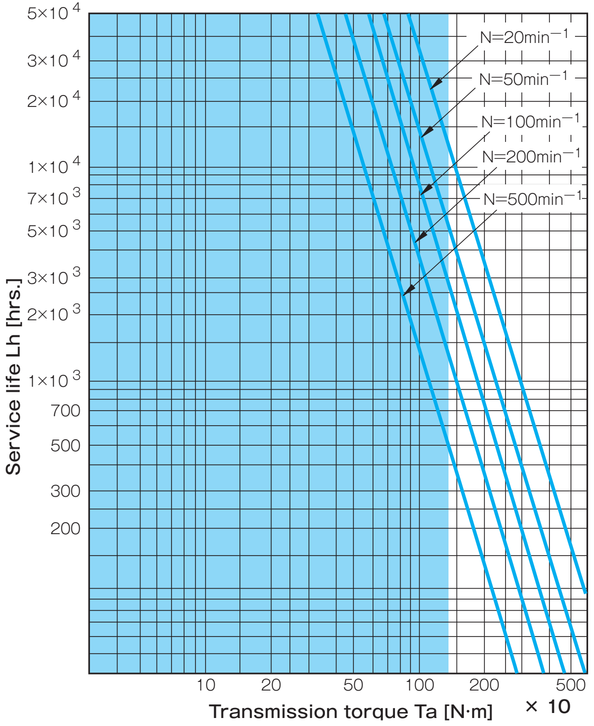
■ Model NSS 16.10.16



■ Model NSS 20.9.20

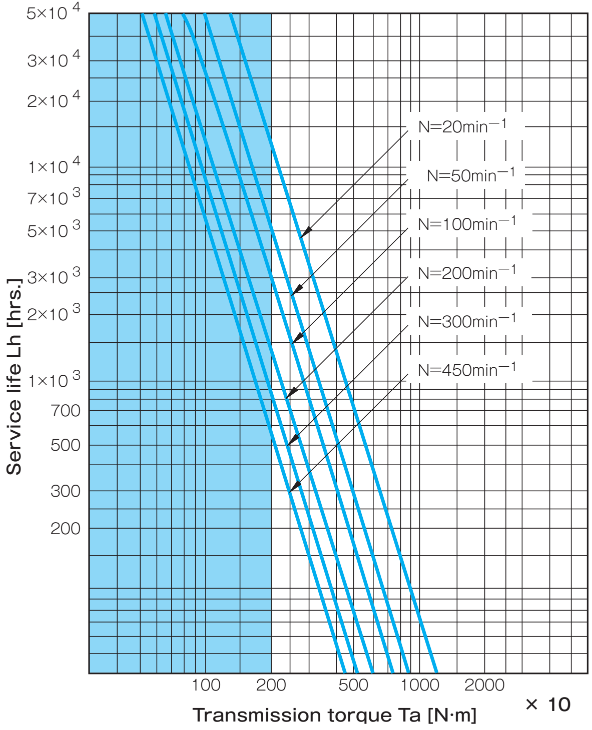


■ Model NSS 20.9.20/4

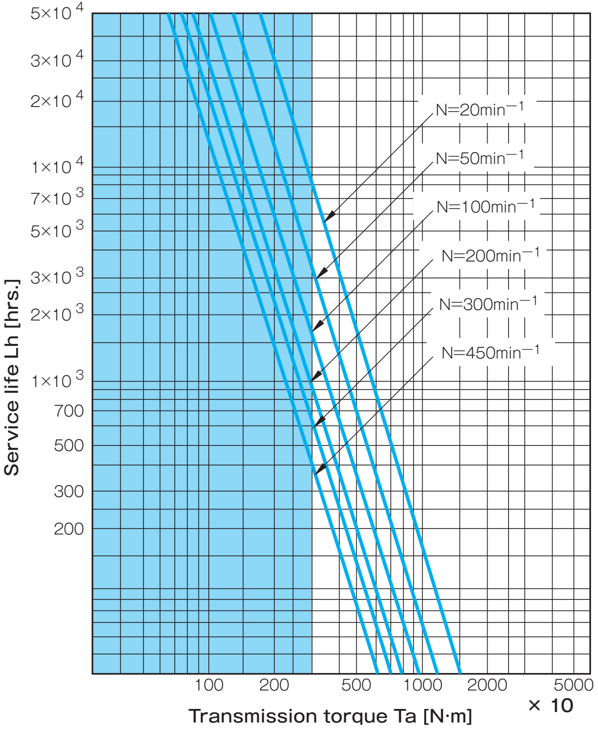


* The table considers safety factors (service factor based on load property: K = 1.5). Use in the range of the 🟦 part in the graph.

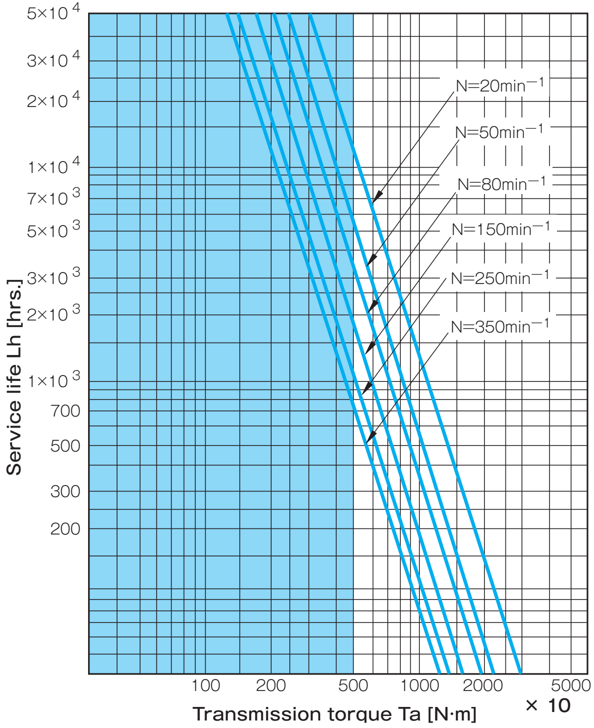
■ Model NSS 20.9.23/5



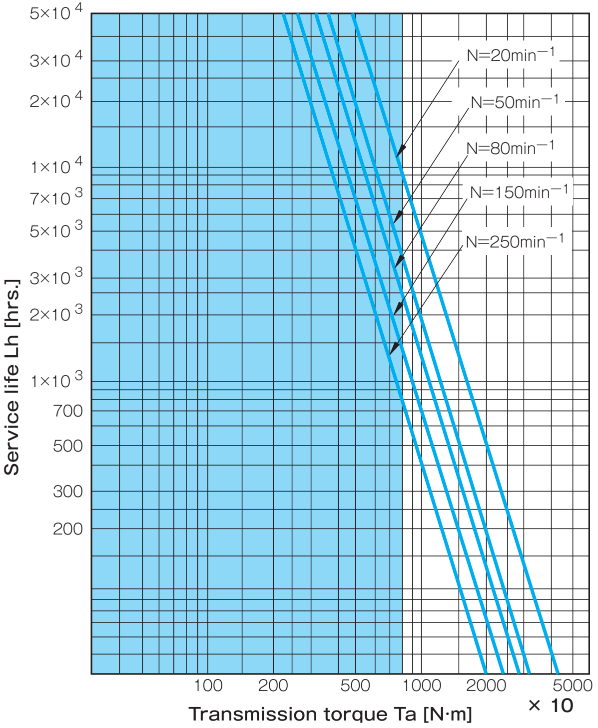
■ Model NSS 20.9.25/6



■ Model NSS 20.9.33/8



■ Model NSS 20.9.39/10



* The table considers safety factors (Service factor based on load property: K = 1.5). Use in the range of the 🟦 part in the graph.

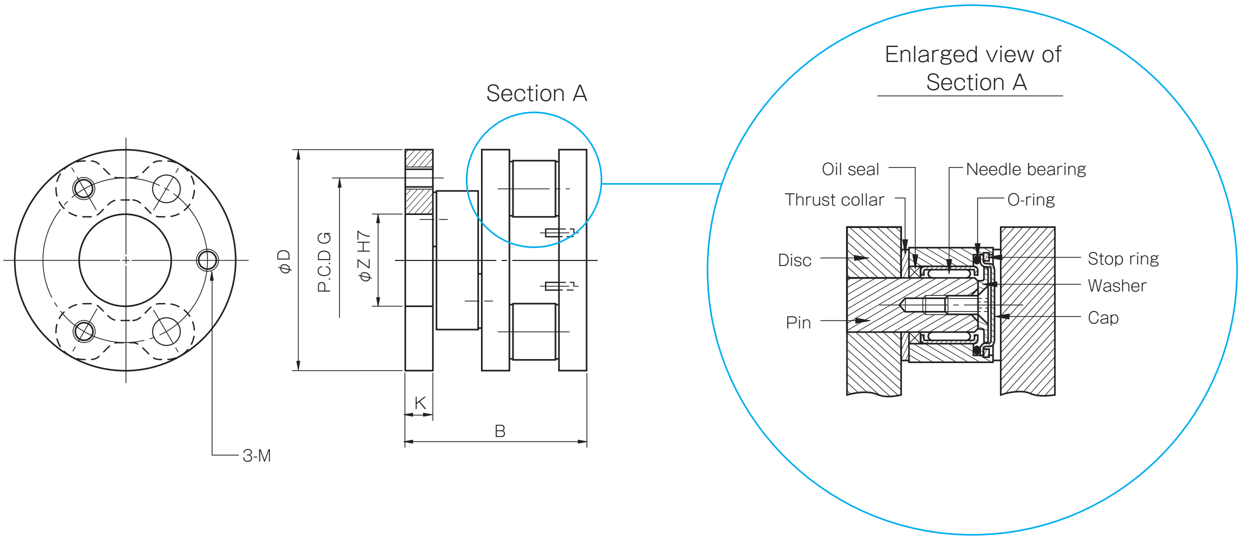
DL Models

Specifications

Model	No. of links	Parallel [mm]	Rated torque [N·m]	Max. rotation speed [min^{-1}]	Moment of inertia [kg·m^2]	Mass [kg]
DL 7.7-02	2 × 2	± 2	93	2000	7.75×10^{-4}	1.1
DL 7.9-03	2 × 2	± 3	135	1800	2.30×10^{-3}	1.7
DL 10.12-04	2 × 2	± 4	402	1600	9.98×10^{-3}	4.4
DL 13.14-04	2 × 2	± 4	706	1400	2.60×10^{-2}	9.1
DL 16.16-04	2 × 2	± 4	1230	1200	5.10×10^{-2}	13.9
DL 20.20-04	2 × 2	± 4	2310	1000	1.44×10^{-1}	24.1

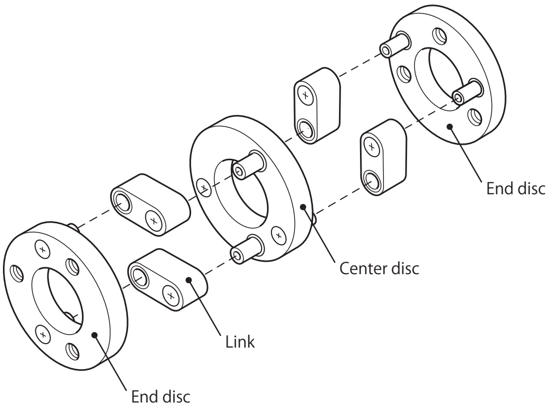
* Max. rotation speed does not take into account dynamic balance.

Dimensions

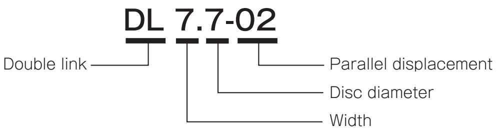


Unit [mm]

Model	D	B	Z	G	M	K
DL 7.7-02	70	74	25	48	M10	10
DL 7.9-03	92	74	45	70	M10	10
DL 10.12-04	120	101	50	90	M12	15
DL 13.14-04	140	134	55	100	M16	22
DL 16.16-04	160	155	60	115	M16	25
DL 20.20-04	200	196	80	150	M20	30



How to Place an Order



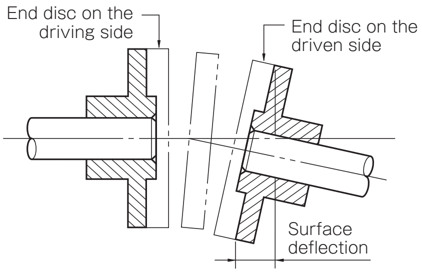
Items Checked for Design Purposes

Precautions for Handling

(1) Couplings are designed for use within an operating temperature range of -10 ℃ to 60 ℃ . DL model SCHMIDT couplings are not waterproof. Do not use them outdoors.

(2) The discs are all connected by bearings and can move freely, so be alert to injury during transport and handle so that undue force is not applied to the product.

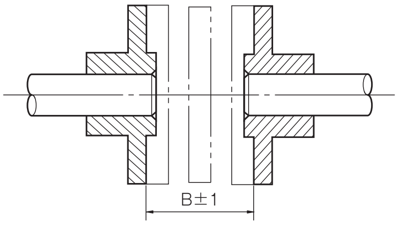
(3) Make the driving shaft and driven shaft parallel. Adjust the mounting angle misalignment of the two coupling shafts so that the coupling surface deflection is at or below the values of the table below after mounting and during operation.



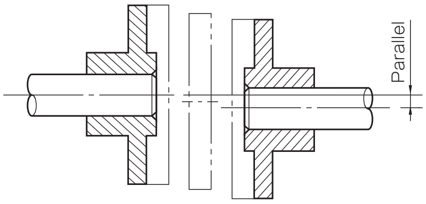
■ Allowable surface deflection

Model	Allowable surface deflection [mm]
DL 7.7-02	0.15
DL 7.9-03	0.15
DL 10.12-04	0.2
DL 13.14-04	0.2
DL 16.16-04	0.2
DL 20.20-04	0.2

(4) When mounting a coupling, design and mount it so that the axial length during use is standard dimension B ± 1 mm.



(5) Adjust so that driving shaft and driven shaft parallel misalignment is within the following allowable values after mounting and during operation.



■ Allowable parallel misalignment

Model	Allowable parallel misalignment [mm]
DL 7.7-02	±2
DL 7.9-03	±3
DL 10.12-04	±4
DL 13.14-04	±4
DL 16.16-04	±4
DL 20.20-04	±4

(6) Mount the couplings so they are not subject to axial loads. Avoid using these couplings in applications that install them vertically or obliquely.

Selection Procedures

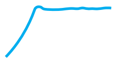
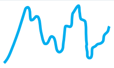
(1) Find the torque, Ta, applied to the coupling using the output capacity P of the motor and the usage rotation speed n.

$$Ta\,[N\cdot m] = 9550\times\frac{P\,[kW]}{n\,[min^{-1}]}$$

(2) Determine the service factor K from the operating conditions and find the corrected torque, Td, applied to the coupling.

$$Td = Ta\times K1\times K2\times K3$$

■ Service factor based on load property: K1

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K1	1.0	1.0 ～ 1.5	1.5 ～ 2.0	2.0 ～ 2.5

■ Service factor based on service life: K2

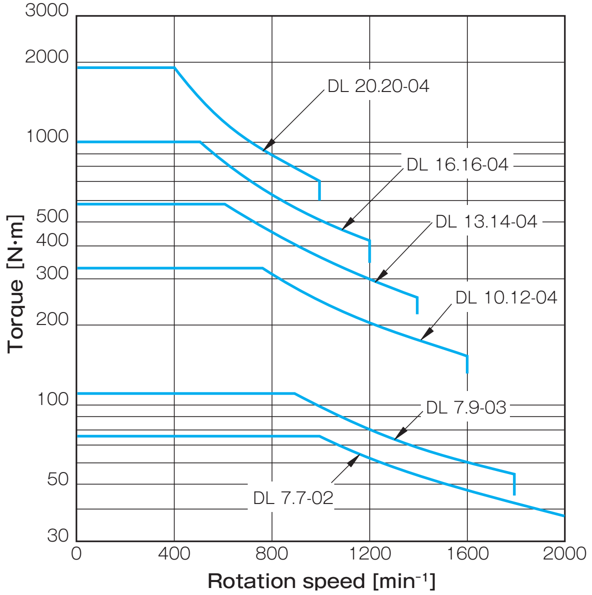
Required service life [h]	1,000	5,000	10,000	15,000	20,000	25,000	30,000	40,000	50,000
K2	1.0	1.0	1.05	1.1	1.2	1.3	1.4	1.5	1.6

■ Service factor based on amount of parallel misalignment: K3

Parallel misalignment [mm]	0	0.5	1	1.5	2	2.5	3	3.5	4
K3	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8

(3) Find Td, and then select the DL model that can be used in the zone under the rated torque diagram shown for each type.

■ Diagram for rated torque and rotation speed



COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
Metal Couplings
Metal Disc Couplings SERVOFLEX
High-rigidity Couplings SERVORIGID
Metal Slit Couplings HELI-CAL
Metal Coil Spring Couplings BAUMANNFLEX
Pin Bushing Couplings PARAFLEX
Link Couplings SCHMIDT
Rubber and Plastic Couplings
Dual Rubber Couplings STEPFLEX
Jaw Couplings MIKI PULLEY STARFLEX
Jaw Couplings SPRFLEX
Plastic Bellows Couplings BELLOWFLEX
Rubber and Plastic Couplings CENTAFLEX
MODELS
NSS
DL

Dual Rubber Couplings

STEPFLEX

No-backlash
High response
High flexibility
Easy to mount and remove
High damping

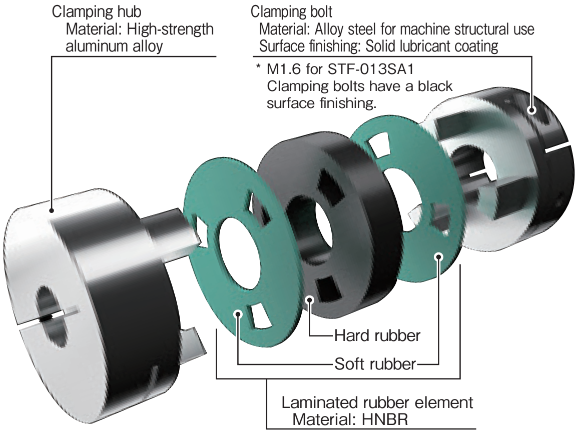
Max. nominal torque (N·m)	30
Bore ranges (mm)	ϕ3～30
Operating temperature (℃)	−20～80
Driver	Servo motor, stepper motor
Application	Encoder, Semi conductor manufacturing equipment, Actuator

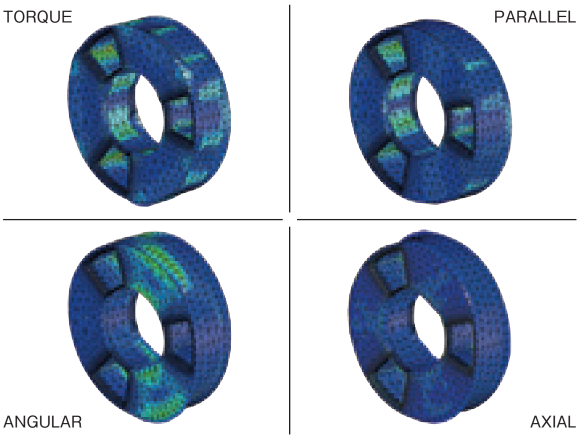
Couplings with High Damping Performance

Our newly developed laminated rubber element achieves high damping and low reaction force. These couplings for servo and stepper motors boast high damping performance. Their unitized construction with HNBR in the power-transmitting elements provides a backlash-free design. They dampen vibration faster than flexible couplings that use metal in their elastic components. This suppresses the resonance phenomenon that can occur with stepper motors, enabling resonance to be avoided over a wide range of operating speeds. It also provides stable high-speed control.

RoHS

Structure and Materials



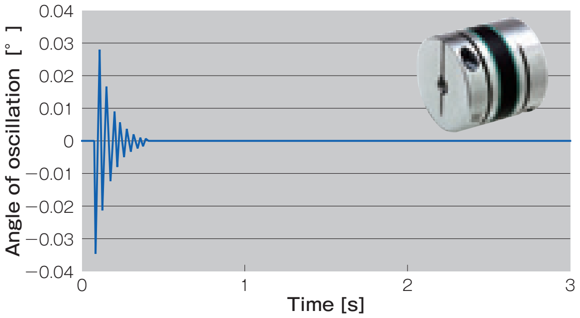


Main Features

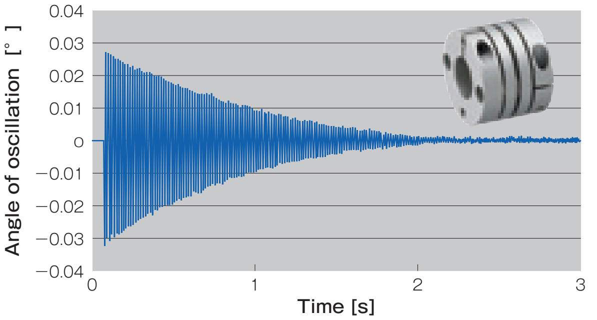
Excellent Damping Performance

The STEPFLEX laminated rubber element couplings provide better damping performance than standard metal disc couplings.

STEPFLEX



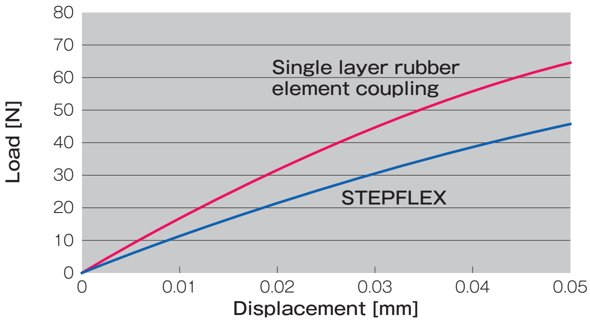
Metal Disc Couplings



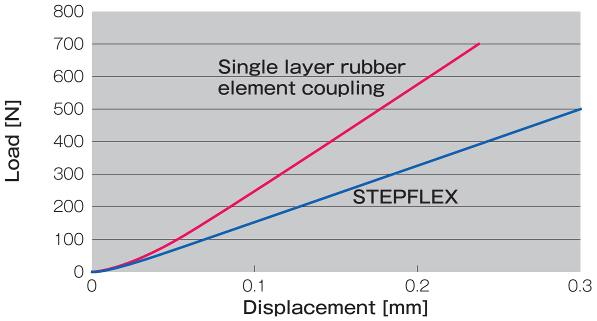
Shaft Counterforce Is Also Reduced

Use of a laminated rubber element with layers of varying hardnesses of rubber works to dramatically cut down on counterforces generated along the parallel and axial directions.

Comparison of counterforces for parallel misalignment



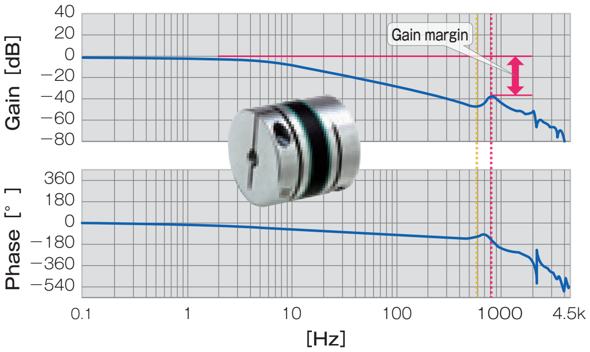
Comparison of counterforces along the axial direction



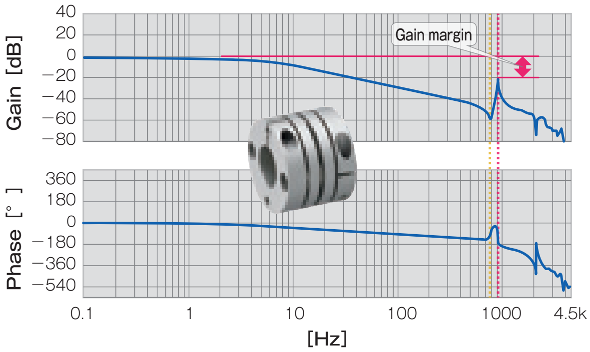
Enables Higher Gain

The damping effect can be seen clearly in the board chart, providing a bigger gain margin than metal plate-spring type couplings and helping to boost gain in the device.

STEPFLEX



Metal Disc Couplings



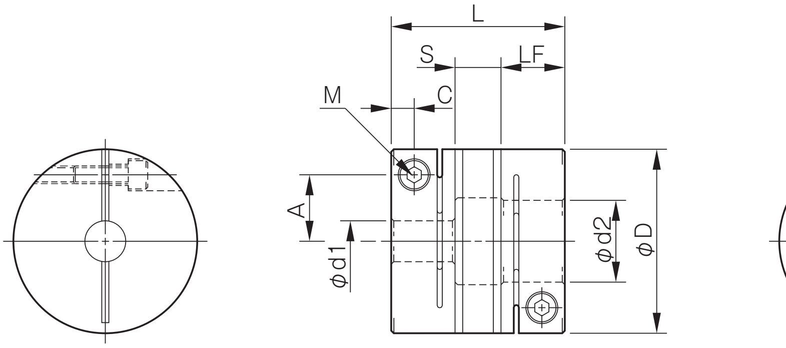
STF Models

Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
STF-013SA1	0.5	1	0.15	1.5	± 0.2	10000	15	0.11×10^{-6}	0.004
STF-016SA1	1	2	0.15	1.5	± 0.2	10000	27	0.31×10^{-6}	0.009
STF-019SA1	1.5	3	0.15	1.5	± 0.2	10000	38	0.70×10^{-6}	0.013
STF-024SA1	2.5	5	0.15	1.5	± 0.2	10000	127	1.89×10^{-6}	0.023
STF-029SA1	4	8	0.2	1.5	± 0.3	10000	201	4.40×10^{-6}	0.034
STF-034SA1	6	12	0.2	1.5	± 0.3	10000	371	9.77×10^{-6}	0.056
STF-039SA1	8.5	17	0.2	1.5	± 0.3	10000	485	21.13×10^{-6}	0.091
STF-044SA1	15	30	0.2	1.5	± 0.3	10000	996	37.30×10^{-6}	0.120
STF-056SA1	30	60	0.2	1.5	± 0.3	10000	2075	125.5×10^{-6}	0.251

* Check the Max. Torque for the Shaft Diameter list as there may be limitations on the standard and maximum torque caused by the holding power of the coupling shaft section.
* The max. rotation speed values do not take into account dynamic balance.
* The static torsional stiffness values are analysis values for the element taken at a temperature of 20° C at maximum bore diameter.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Model	d1・d2 [mm]		D [mm]	L [mm]	LF [mm]	S [mm]	A [mm]	C [mm]	M Qty·Nominal diameter	Tightening torque [N·m]
	Min.	Max.								
STF-013SA1	3	5	13	18	6	6	3.9	2	1-M1.6	0.23 ~ 0.28
STF-016SA1	3	6	16	22	7.5	7	4.8	2.5	1-M2	0.4 ~ 0.5
STF-019SA1	3	8	19	25	9	7	5.8 (6)	3.15	1-M2.5 (M2)	1.0 ~ 1.1 (0.4 ~ 0.5)
STF-024SA1	5	10	24	27	9	9	8.7	3.15	1-M2.5	1.0 ~ 1.1
STF-029SA1	5	14	29	30	10	10	11	3.3	1-M2.5	1.0 ~ 1.1
STF-034SA1	5	16	34	34	12	10	12.5	3.75	1-M3	1.5 ~ 1.9
STF-039SA1	6	19	39	41	15.5	10	14	4.5	1-M4	3.4 ~ 4.1
STF-044SA1	8	24	44	48	15.5	17	17	4.5	1-M4	3.4 ~ 4.1
STF-056SA1	8	30	56	60	20.5	19	22	6	1-M5	7.0 ~ 8.5

* The nominal diameter for the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for a hub on one side.
* The figures in parentheses ( ) for the STF-019 are the values when d1 or d2 is ø8 mm.
* The escape in the internal diameter of the element is equal to dimension d2 (large diameter) plus ø0.9 mm.
* The rated dimension tolerance for countershafts is h7 class.

Standard Bore Diameter

Model	Standard bore diameter d1·d2 [mm]																								
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	13	14	15	16	17	18	19	20	22	24	25	28	30
STF-013SA1	●	●	●																						
STF-016SA1	●	●	●	●																					
STF-019SA1	●	●	●	●	●	●	●																		
STF-024SA1			●	●	●	●	●	●	●	●															
STF-029SA1			●	●	●	●	●	●	●	●	●	●	●	●											
STF-034SA1			●	●	●	●	●	●	●	●	●	●	●	●	●	●									
STF-039SA1				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
STF-044SA1							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
STF-056SA1							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

* The bore diameters marked with ● are supported as standard bore diameter.
* Depending on the bore diameter used, restrictions may apply to the standard and maximum torque as determined by the holding force in the shaft coupling. Check "Max. Torque for the Shaft Diameter".

Max. Torque for the Shaft Diameter

Model	Standard bore diameter [mm] and max. torque for the shaft diameter [N • m]																						
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	13	14	15	16	17	18	19	20	22	24	25	28	30
STF-013SA1	0.10	0.25	0.40																						
STF-016SA1	0.5	0.6	0.7	0.8																					
STF-019SA1	0.8	1.2	1.6	1.9	1.9	2.3	0.8																		
STF-024SA1			1.6	2.1	2.1	2.6	3.3	4.0	4.0	4.7															
STF-029SA1			1.8	2.2	2.2	2.7	3.4	4.1	4.1	4.8	5.5	6.3	7.8	8.0											
STF-034SA1			2.7	3.0	3.0	3.3	4.0	4.8	4.8	5.6	6.5	7.8	9.0	10.7	12.0	12.0									
STF-039SA1				3.4	3.4	4.0	5.0	6.1	6.1	7.1	8.2	9.3	10.4	11.5	12.8	14.0	15.3	16.6	17.0						
STF-044SA1							6.0	8.3	8.3	9.8	11.3	12.8	14.3	16.0	17.3	18.8	20.3	21.8	23.5	24.8	27.8	30.0			
STF-056SA1							10.7	11.9	11.9	13.4	14.9	16.3	17.8	18.7	20.8	22.2	23.7	25.2	27.0	32.0	41.9	52.0	56.3	60.0	60.0

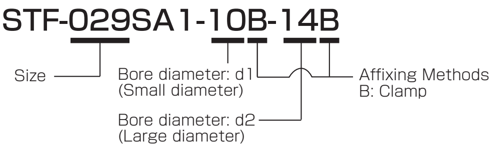
* Check the above list as there may be limitations on the standard and maximum torque caused by the holding power of the coupling shaft section.

* Maximum torque with a limitation becomes the small diameter (d1) torque value. However, note that only in the instance that d1 or d2 for STF-019SA1 is ø8 mm, there is a decrease in the size of the clamping bolt, and the limit is 0.8 N·m.

STF-019SA1 standard bore diameter and max. torque

d1-d2	Max. torque [N • m]	d1-d2	Max. torque [N • m]	d1-d2	Max. torque [N • m]	d1-d2	Max. torque [N • m]	d1-d2	Max. torque [N • m]	d1-d2	Max. torque [N • m]	d1-d2	Max. torque [N • m]
3B-3B	0.8	3B-4B	0.8	3B-5B	0.8	3B-6B	0.8	3B-6.35B	0.8	3B-7B	0.8	3B-8B	0.8
		4B-4B	1.2	4B-5B	1.2	4B-6B	1.2	4B-6.35B	1.2	4B-7B	1.2	4B-8B	0.8
				5B-5B	1.6	5B-6B	1.6	5B-6.35B	1.6	5B-7B	1.6	5B-8B	0.8
						6B-6B	1.9	6B-6.35B	1.9	6B-7B	1.9	6B-8B	0.8
								6.35B-6.35B	1.9	6.35B-7B	1.9	6.35B-8B	0.8
										7B-7B	2.3	7B-8B	0.8
												8B-8B	0.8

How to Place an Order



STF Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

(1) Couplings are designed for use within an operating temperature from -20℃ to 80℃ . Avoid using it under the environment where water, oil, acid, alkali, ozone, chemical agent, etc. are used. Use and storage in direct sunlight may shorten element service life, so cover elements appropriately.

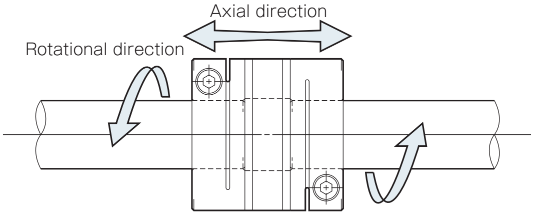
(2) Do not tighten up clamping bolts until after inserting the mounting shaft.

Mounting

(1) Check that coupling clamping bolts have been loosened and remove any rust, dust, oil residue, etc. from inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

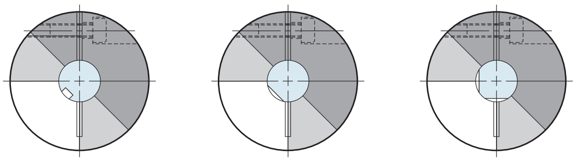
(2) Be careful when inserting the couplings into the shaft so as not to apply excessive force of compression or tensile force to the element. Be particularly careful not to apply excessive compressing force needlessly when inserting couplings into the paired shaft after attaching the couplings to the motor.

(3) With two of the clamping bolts loosened, make sure that couplings move gently along the axial and rotational directions. Readjust the centering of the two shafts if the couplings fail to move smoothly enough. This method is recommended as a way to easily check the concentricity of the left and right sides. If unable to use the same method, check the mounting accuracy using machine parts quality control procedures or an alternative method.

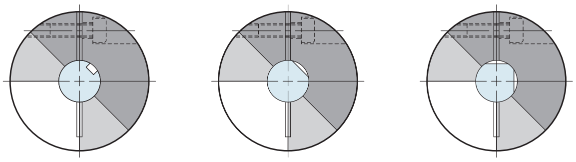


(4) As a general rule, round shafts are to be used for the paired mounting shaft. If needing to use a shaft with a different shape, be careful not to insert it into any of the locations indicated in the diagrams below. (Do not attempt to face keyed grooves, D-shaped cuts, or other insertions to the grayed areas (▭).) Placing the shaft in an undesirable location may cause the couplings to break or lead to a loss in shaft holding power. It is recommended that you use only round shafts to ensure full utilization of the entire range of coupling performance.

■ Proper mounting examples

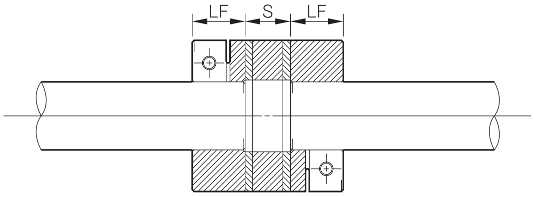


■ Poor mounting examples



*▭: Size: 013, 016 or 019 (ϕ 8) or 056 (ϕ 19 or less); ▨: Other

(5) Insert and mount each shaft far enough in that the paired mounting shaft touches the shaft along the entire length of the clamping hub of the coupling (LF dimension), as shown in the diagram below, and does not interfere with the elements or the other shaft. In addition, restrict the dimension between clamping hub faces (S dimension) within the allowable error range for axial displacement with respect to a reference value. Note that the tolerance values were calculated based on the assumption that both the level of parallel misalignment and angular deflection are zero. Adjust to keep this value as low as possible.



Model	LF [mm]	S [mm]
STF-013SA1	6	6
STF-016SA1	7.5	7
STF-019SA1	9	7
STF-024SA1	9	9
STF-029SA1	10	10
STF-034SA1	12	10
STF-039SA1	15.5	10
STF-044SA1	15.5	17
STF-056SA1	20.5	19

(6) Check to make sure that no compression or tensile force is being applied along the axial direction before tightening up the two clamping bolts. Use a calibrated torque wrench to tighten the clamping bolts to within the tightening torque range listed below.

Model	Clamping bolts	Tightening torque [N·m]
STF-013SA1	M1.6	0.23 ～ 0.28
STF-016SA1	M2	0.4 ～ 0.5
STF-019SA1	M2	0.4 ～ 0.5
STF-019SA1	M2.5	1.0 ～ 1.1
STF-024SA1	M2.5	1.0 ～ 1.1
STF-029SA1	M2.5	1.0 ～ 1.1
STF-034SA1	M3	1.5 ～ 1.9
STF-039SA1	M4	3.4 ～ 4.1
STF-044SA1	M4	3.4 ～ 4.1
STF-056SA1	M5	7.0 ～ 8.5

* Use M2 bolts on STF-019SA models with holes with a diameter of ø8 mm.

* The start and end numbers for the tightening torque ranges are between the minimum and maximum values. Tighten bolts to a tightening torque within the specified range for the model used.

Suitable Torque Screwdriver

Nominal bolt diameter	Tightening torque [N·m]	Torque screwdriver	Hexagon bit	Coupling size
M1.6	0.23 ～ 0.28	CN30LTDK	CB1.5mm	013
M2	0.4 ～ 0.5	CN60LTDK	SB1.5mm	016,019
M2.5	1.0 ～ 1.1	CN120LTDK	SB2mm	019,024,029
M3	1.5 ～ 1.9	CN200LTDK	SB2.5mm	034
M4	3.4 ～ 4.1	CN500LTDK	SB3mm	039,044
M5	7.0 ～ 8.5	N10LTDK	SB4mm	056

Clamping Bolts

Use Miki Pulley-specified clamping bolts because they are processed with solid lubrication films (except for STF-013SA1 M1.6). Applying adhesives to prevent loosening, oil, or the like to a clamping bolt will alter torque coefficients due to those lubricating components, creating excessive axial forces and potentially damaging the clamping bolt or coupling. Be particularly careful to never use liquid anaerobic screw fixatives, as they have adverse effects on the rubber body.

Points to Consider Regarding the Feed Screw System

STEPFLEX coupling STF model is the coupling greatly controls and prevents the resonance of stepper motor and oscillation of servo motor by utilizing the damping of laminated rubber element. If more detailed review is required, make a review by paying attention to the following points.

Please contact Miki Pulley with any questions regarding servo motor oscillation or stepper motor resonance.

■ Stepper motor resonance

Stepper motors resonate at certain rotation speeds due to the pulsation frequency of the stepper motor and the torsional natural frequency of the system as a whole. To avoid resonance, either the resonant rotation speed must be simply skipped or the torsional natural frequency considered at the design stage.

■ Servo motor oscillation

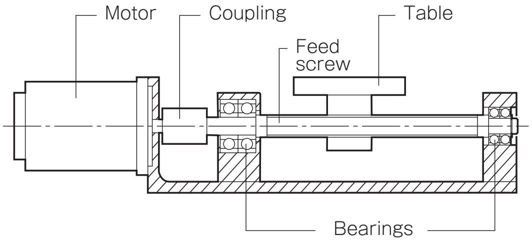
Gain adjustment on the servo motor may cause the servo motor to oscillate. Oscillation in the servo motor during operation can cause problems particularly with the overall natural frequency and electrical control systems of the feed screw system.

In order for these issues to be resolved, the torsional stiffness for the coupling and feed screw section and the moment of inertia and other characteristics for the system overall will need to be adjusted and the torsional natural frequency for the mechanical system raised or the tuning function (filter function) for the electrical control system in the servo motor adjusted during the design stage.

■ How to find the natural frequency of a feed screw system

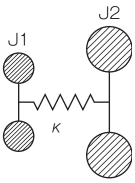
(1) Select a coupling based on the nominal and maximum torque of the servo motor or stepper motor.

(2) Find the overall natural frequency, Nf, from the torsional stiffness of the coupling and feed screw, κ, the moment of inertia of the driving side, J1, and the moment of inertia of driven side, J2, for the feed screw system shown below.



$$Nf = \frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{J1}+\frac{1}{J2}\right)}$$

Nf: Overall natural frequency of a feed screw system [Hz]
κ : Torsional stiffness of the coupling and feed screw [N·m/rad]
J1: Moment of inertia of driving side [$kg·m^2$]
J2: Moment of inertia of driven side [$kg·m^2$]



Selection Procedures

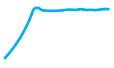
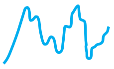
(1) Find the torque , Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\,[N·m] = 9550 \times \frac{P\,[kW]}{n[min^{-1}]}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$Td\,[N·m] = Ta \times K1 \times K2 \times K3 \times K4$$

■ Service factor based on load property: K1

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K1	1.0	1.25	1.75	2.25

■ Service factor based on operating time: K2

Hrs./day	～8	～16	～24
K2	1.0	1.12	1.25

■ Service factor based on starting/braking frequency: K3

Times/min.	～60	～120	～360	Over 360
K3	1.0	1.3	1.5	＊

* Items marked with asterisks require consultations.

■ Service factor based on operating temperature: K4

Temperature [℃]	−20～30	30～40	40～50	50～60	60～70	70～80
K4	1.0	1.1	1.2	1.4	1.6	1.8

(3) Set the size so that the standard coupling torque Tn is at least equal to the corrected torque, Td.

$$Tn \geqq Td$$

(4) Select a size that results in a maximum torque, Tm, for the coupling that is at least equal to the peak torque, Ts, generated by the driver, follower or both. Maximum torque refers to the maximum amount of torque that can be applied for a set amount of time considering eight hours of operation per day and up to around ten instances.

$$Tm \geqq Ts$$

(5) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling. When using a clamping hub, the bore diameter may restrict the transmission torque. For that reason, check that the clamping-hub shaft holding force of the selected coupling size is at least equal to the peak torque, Ts, applied to the coupling.

(6) Contact Miki Pulley for assistance with any device experiencing extreme periodic vibrations.

Guide for Selecting Size

Displays under the guide of suitable size for STEPFLEX coupling measured from the result of rated output of general stepper motor and servo motor. The torque characteristics of servo motors vary between manufacturers, so check the specifications in the manufacturer catalog before finalizing a coupling size selection.

Stepper motor	Rated output of servo motor	Model
□20～	5W・10 W	STF-013SA1
□30～	20W・30W	STF-016SA1
□40～	50W・100W	STF-019SA1
□40～	100W	STF-024SA1
□50～	200W	STF-029SA1
□60～	400W	STF-034SA1
□85～	750W	STF-039SA1
□85～	1kW	STF-044SA1
□85～	1.5kW	STF-056SA1

Jaw Couplings

MIKI PULLEY STARFLEX

High damping

High flexibility

High torque

Easy to mount and remove

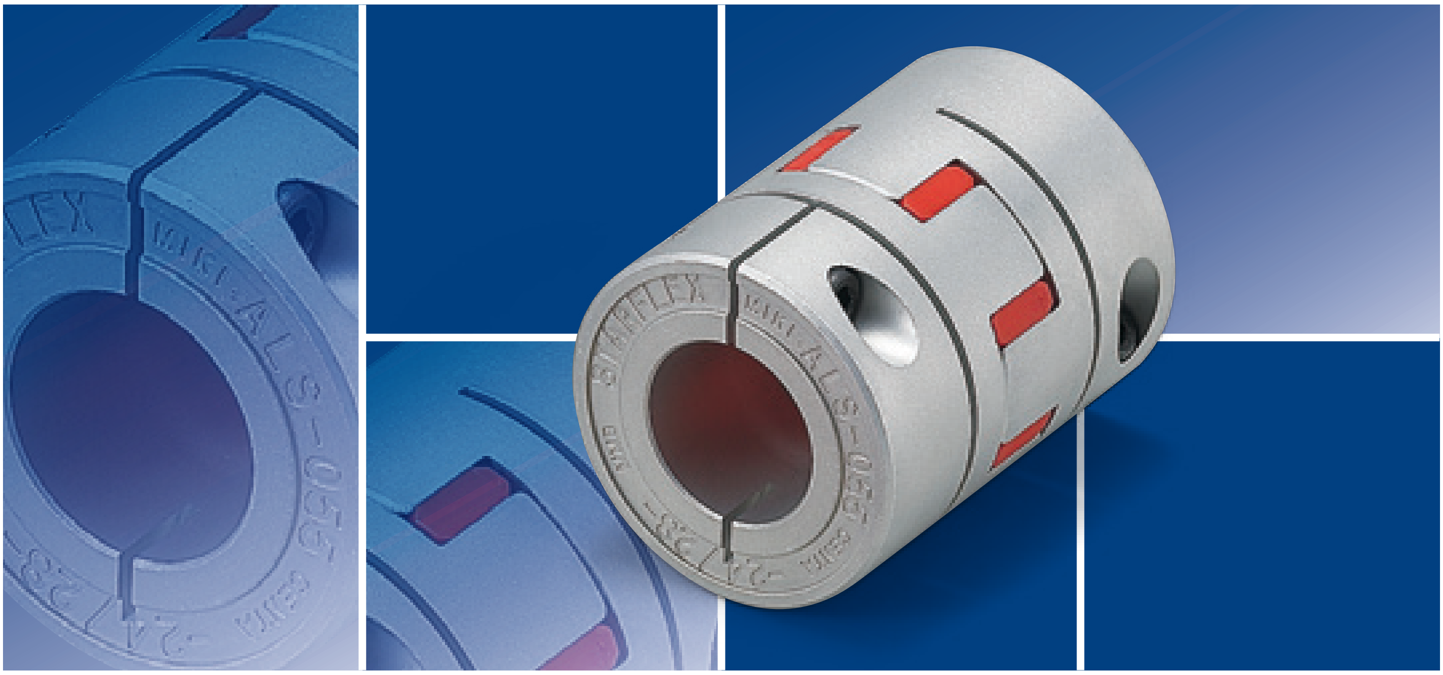
Wide range of variations

Application	Machine tools, hydraulic equipment, pumps, fans, conveyors, textile machinery
Driver	Servo motor, stepper motor, induction motor

General-purpose Coupling of Simple Construction

Motive power is transmitted by a polyurethane elastomer that has the elasticity of rubber. As well as providing excellent absorption of vibrations and shock, these couplings transmit more than double the torque of older jaw couplings. The product range includes three types of hubs, two element hardnesses and two types of fit. This ensures the optimum combination for your transmission torque, response and misalignment. And the ability to combine different hubs means they can be used in a wide range of applications.

RoHS



Various Types of Combinations

The line-up includes three types of hubs: pilot-bore products that allow free bore drilling, key/set screw types that enable high transmission torque, and clamp types that are easy to mount and remove.

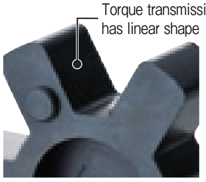
No backlash

The R and Y types have no backlash and yet can absorb shock and vibration.

Reduced Counterforfce

Optimal design of the element shape reduces mounting error counterforfce to not damage the shaft.

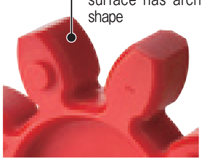
■ Shaped like older models



Torque transmission surface has linear shape

The shape of the torque transmission surface is linear.

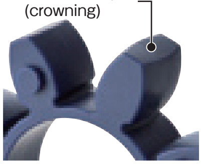
■ ALS Y/R types



Torque transmission surface has arched shape

The shape of the torque transmission surface is arced. Combined with an undercut to reduce mounting error reaction force.

■ ALS B types



Convex shape (crowning)

It is also made more flexible by its crowning shape and by removing material from the inner diameter.

Available Models

There are three MIKI PULLEY STARFLEX models. Each has a different type of element.

ALS R

These are JIS A tight-fit, high-torque, high-response models that have a shore hardness of 97.

ALS Y

These are JIS A tight-fit models that have a shore hardness of 90 and are equipped with a good balance of torque transmission performance, flexibility, and responsiveness.

ALS B

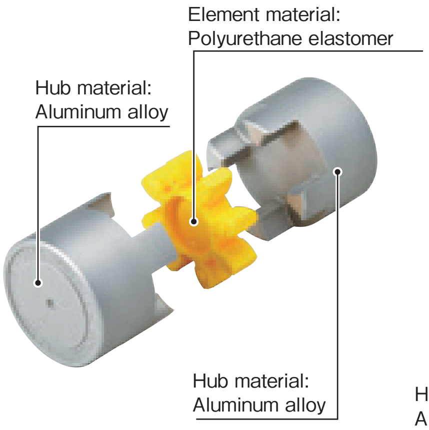
These are JIS A loose-fit, high-torque, flexible models that have a shore hardness of 97.

Model Selection

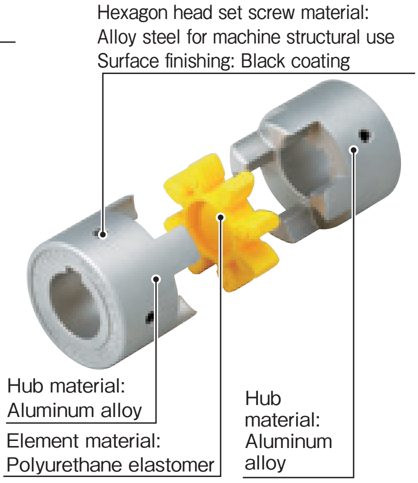
Model/Type	Nominal torque [N·m] (0 – 310 – 525)	Hub material	Shore hardness (Element) JIS A	Element fit	Transmission torque	Flexibility	No-backlash	Operating temperature [℃]
ALS R	2 ～ 525	Aluminum alloy	97	Tight fit (pre-compressed construction)	◎	○	○	−30 ～ 80
ALS Y	1.2 ～ 310	Aluminum alloy	90	Tight fit (pre-compressed construction)	○	○	○	−30 ～ 80
ALS B	12.5 ～ 525	Aluminum alloy	97	Loose fit	◎	◎	–	−30 ～ 80

Structure and Materials

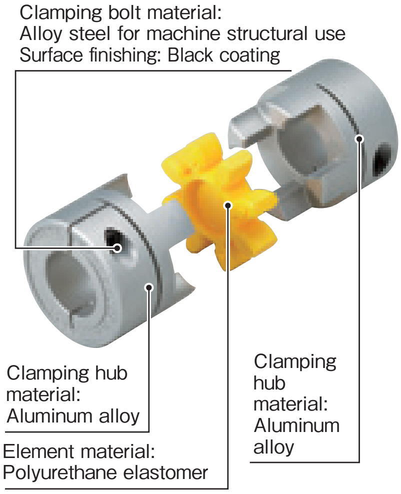
■ Pilot Bore



■ Key/Set Screw Type



■ Clamp Type

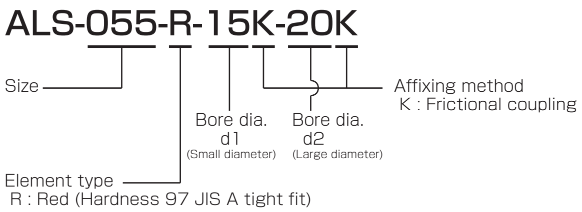


Customization Examples

Tapered coupling type

How to Place an Order

The amount of thrust applied to the axis can be increased with the tapered shaft installation method.



Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N・m/rad]	Moment of inertia [kg・m^2]	Mass [kg]
	Nominal [N・m]	Max. [N・m]	Parallel [mm]	Angular [°]	Axial [mm]				
ALS-055-R	30 (60)	60 (120)	0.1	1	0 to +1.4	8700	2000	1.63×10^{-4}	0.34
ALS-065-R	80 (160)	160 (320)	0.1	1	0 to +1.5	7400	3100	3.73×10^{-4}	0.53

* The specified torque in the above table shows the rate concerned the feeding screw application only and calculated with safety factor. Figures in ( ) is the rate of MP standard STARFLEX Coupling.
* Dynamic balance is not considered for the maximum rotation speed.
* The torsional stiffness values are measured at 20℃ .
* Moment of Inertia and mass are measured with the maximum bore diameters.

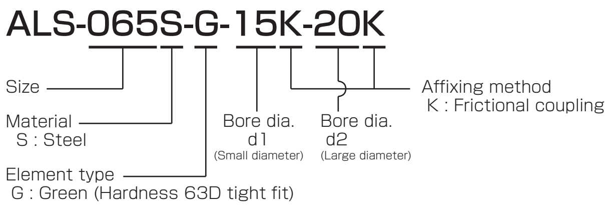
Model	Standard bore diameter d1・d2 [mm] and rated torque [N-m]													D [mm]	L [mm]	L1・L2 [mm]	E [mm]	S [mm]	R [mm]	M	M1
	14	15	16	19	20	22	24	25	28	30	32	35	38								
ALS-055-R	50	●	●	●	●	●	●	●	●					55	79	30.5	18	2	24	4-M5	4-M5
ALS-065-R				125	135	147	●	●	●	●	●	●	●	65	94	37	20	2.5	30	8-M5	4-M5

* The bore diameters marked with ● or numbers are supported as standard bore diameter.
* The rated torque of small bore diameter indicated in the column with value is limited by the shaft locking mechanism. The value indicates its operating torque [N·m].
* M: Name of Bolt specified the amount of bolts on one hub and bolt size. M1: Name of Tap specified the amount of taps for release on one hub and tap size.
* To tighten the pressure bolts M1, please use a torque wrench. Tightening torque is M5 : 6N-m.
* The dimensional tolerance of the target shaft is h7.

High-speed rotation specifications

How to Place an Order

These are high-speed rotation specifications for main spindles of machine tools. These hubs are processed with high precision to ensure high concentricity; they reduce imbalances and suppress vibration.



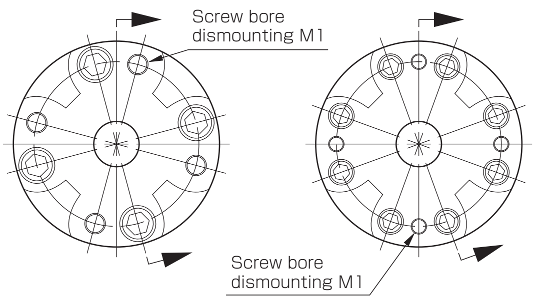
Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N・m/rad]	Moment of inertia [kg・m^2]	Mass [kg]
	Nominal [N・m]	Max. [N・m]	Parallel [mm]	Angular [°]	Axial [mm]				
ALS-065S-G	200	400	0.08	0.8	0 to +1.5	22000	16000	0.95×10^{-3}	1.34
ALS-080S-G	405	810	0.09	0.8	0 to +1.8	17900	22100	2.79×10^{-3}	2.64

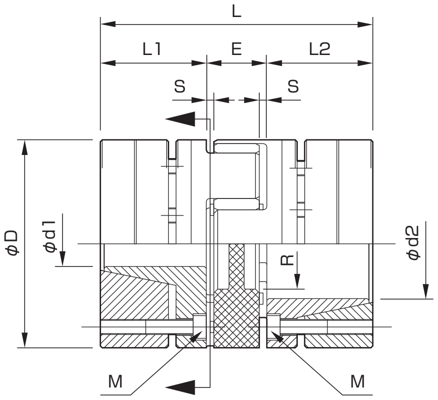
* Dynamic balance is not considered for the maximum rotation speed.
* The torsional stiffness values are measured at 20℃ .
* Moment of Inertia and mass are measured with the maximum bore diameters.

Model	Standard bore diameter d1・d2 [mm]															D [mm]	L [mm]	L1・L2 [mm]	E [mm]	S [mm]	R [mm]	M	M1
	15	16	19	20	22	24	25	28	30	32	35	38	40	42	45								
ALS-065S-G	●	●	●	●	●	●	●	●	●	●	●	●				65	94	37	20	2.5	25	8-M5	4-M5
ALS-080S-G				●	●	●	●	●	●	●	●	●	●	●	●	80	118	47	24	3	32	8-M6	4-M6

* The bore diameters marked with ● or numbers are supported as standard bore diameter.
* M: Name of Bolt specified the amount of bolts on one hub and bolt size. M1: Name of Tap specified the amount of taps for release on one hub and tap size.
* To tighten the pressure bolts M1, please use a torque wrench. Tightening torque is M5 : 6N-m , M6 : 14N-m.
* The dimensional tolerance of the target shaft is h7.

■ ALS-055 ■ ALS-065・080





FAQ

Q1 How long is the MIKI PULLEY STARFLEX service life?

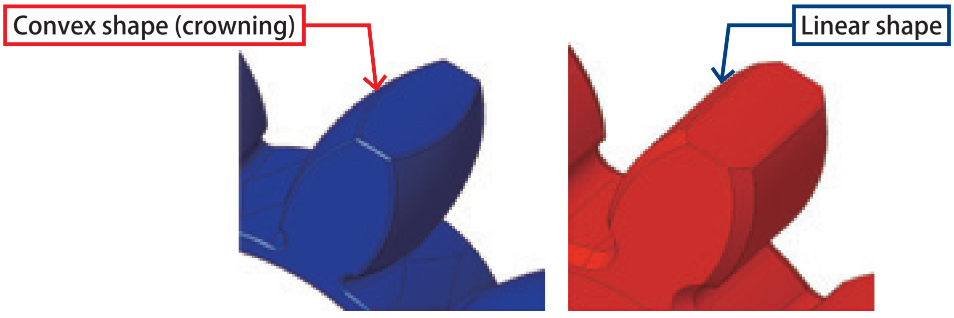
A If power transmission is your primary goal, select an appropriate coupling using the selection procedures of the catalog, then you can expect long-term use. Service life will vary with usage environment and conditions and is heavily affected by usage temperature and mounting misalignment. Contact Miki Pulley for details.

Q2 Can they be used in excess of the nominal torque?

A They can, up to ten times daily when operating 8 hours per day, but not in excess of the maximum torque.
This assumes startup torque of a motor with a low frequency of starting and stopping.

Q3 What exactly is a loose fit element?

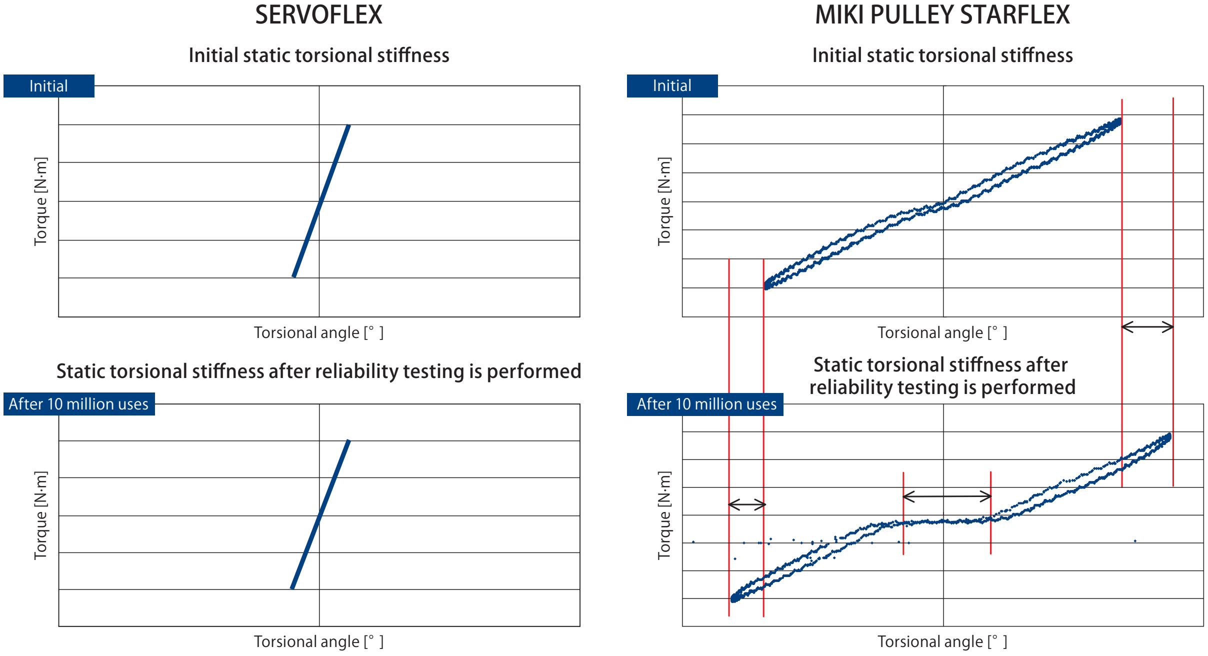
A These elements have a convex (crowning) shape to the torque transmission surface. They greatly increase the permissible mounting misalignment. They are also easy to assemble, since they set a loose fit with the hub. This can reduce the number of work steps.



Loose fit　　Tight fit

Q4 Does MIKI PULLEY STARFLEX develop no-backlash as it ages?

A MIKI PULLEY STARFLEX achieves no-backlash by preliminary compression of the element, so it may not be able to maintain no-backlash as the plastic ages. If you are considering using one in no-backlash mode over a long period of time, we recommend setting the service factor based on load property to a high value. If you require high precision control for a longer period, we recommend the SERVOFLEX series of metal disc couplings.



ALS R Types　Key/Set Screw Type

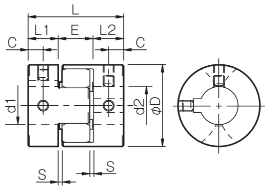
Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Static torsional stiffness [N·m/rad]	Radial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]					
ALS-014-R	2	4	0.10	1	0～+0.6	34100	21	380	1.91×10^{-7}	0.007
ALS-020-R	5	10	0.10	1	0～+0.8	23800	43	400	1.08×10^{-6}	0.018
ALS-030-R	12.5	25	0.10	1	0～+1.0	15900	136	650	6.25×10^{-6}	0.047
ALS-040-R	17	34	0.10	1	0～+1.2	11900	1550	1700	3.87×10^{-5}	0.15
ALS-055-R	60	120	0.10	1	0～+1.4	8700	2000	1350	1.66×10^{-4}	0.35
ALS-065-R	160	320	0.10	1	0～+1.5	7400	3100	1400	3.57×10^{-4}	0.51
ALS-080-R	325	650	0.10	1	0～+1.8	6000	6000	1710	1.06×10^{-3}	1.01
ALS-095-R	450	900	0.10	1	−0.5～+2.0	5000	10000	4200	2.24×10^{-3}	1.50
ALS-105-R	525	1050	0.15	1	−0.9～+2.0	4500	12000	5000	3.72×10^{-3}	2.05

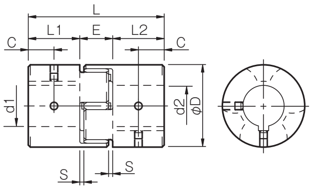
* Axial displacement of the ALS-014-R to ALS-080-R is not allowed in the negative direction.
* Max. rotation speed does not take into account dynamic balance.
* Stiffness values given are from measurements taken at 20℃
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

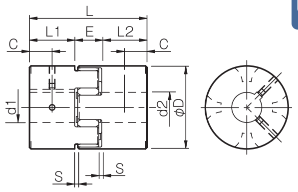
■ALS-014 to 030



■ALS-040



■ALS-055 to 105



Unit [mm]

Model	d1・d2			D	L	L1・L2	E	S	C
	Pilot bore	Min.	Max.						
ALS-014-R	3	3	6.5	14	22	7	8	1	3.5
ALS-020-R	4	4	9.6	20	30	10	10	1	5
ALS-030-R	5	6	14	30	35	11	13	1.5	5.5
ALS-040-R	5	8	22	40	66	25	16	2	12.5
ALS-055-R	5	10	28	55	78	30	18	2	15
ALS-065-R	5	14	38	65	90	35	20	2.5	17.5
ALS-080-R	10	19	45	80	114	45	24	3	22.5
ALS-095-R	8	19	55	95	126	50	26	3	25
ALS-105-R	10	19	60	105	140	56	28	3.5	28

* "Pilot bore" refers to center processing.

Standard Bore Diameter

Model	Standard bore diameter d1, d2 [mm]																																		
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	56	60
ALS-014-R	●	●	●	●	●																														
ALS-020-R		●	●	●	●	●	●	●	●																										
ALS-030-R				●	●	●	●	●	●	●	●	●	●																						
ALS-040-R							●	●	●	●	●	●	●	●	●	●	●	●	●	●															
ALS-055-R										●	●	●	●	●	●	●	●	●	●	●	●	●	●												
ALS-065-R													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●								
ALS-080-R																		●	●	●	●	●	●	●	●	●	●	●	●	●					
ALS-095-R																		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
ALS-105-R																		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

* The bore diameters marked with ● are supported as standard bore diameter.
* ⌀ 11 and below have no keyway; ø12 and above can be processed for old JIS standards, new JIS standards, and new standard motors.

How to Place an Order

ALS-055-R-24N-28H

Size

Element type
R: Hardness, 97; JIS A; Tight-fit type

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore
Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
J: Compliant with the new JIS standards Js9
N: Compliant with the new motor standards

ALS R Types Clamp Type

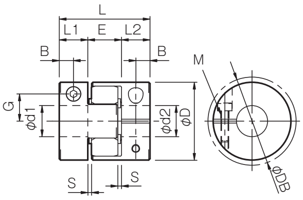
Specifications

Model	Misalignment			Max. rotation speed [$\mathrm{min^{-1}}$]	Static torsional stiffness [N·m/rad]	Radial stiffness [N/mm]	Moment of inertia [$\mathrm{kg \cdot m^2}$]	Mass [kg]
	Parallel [mm]	Angular [°]	Axial [mm]					
ALS-014-R	0.10	1	0～+0.6	10000	21	380	1.98×10^{-7}	0.007
ALS-020-R	0.10	1	0～+0.8	10000	43	400	1.09×10^{-6}	0.019
ALS-030-R	0.10	1	0～+1.0	10000	136	650	6.19×10^{-6}	0.045
ALS-040-R	0.10	1	0～+1.2	10000	1550	1700	4.01×10^{-5}	0.16
ALS-055-R	0.10	1	0～+1.4	7000	2000	1350	1.63×10^{-4}	0.34
ALS-065-R	0.10	1	0～+1.5	5900	3100	1400	3.69×10^{-4}	0.54
ALS-080-R	0.10	1	0～+1.8	4800	6000	1710	1.04×10^{-3}	1.00

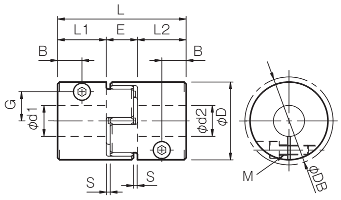
* Axial displacement is not allowed in the negative direction.
* Max. rotation speed does not take into account dynamic balance.
* Stiffness values given are from measurements taken at 20℃
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

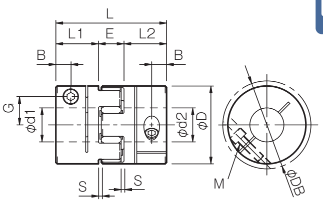
■ALS-014 to 030



■ALS-040



■ALS-055 to 080



Unit [mm]

Model	d1・d2		D	DB	L	L1・L2	E	S	B	G	M	Tightening torque [N·m]
	Min.	Max.										
ALS-014-R	3	6	14	16.1	22	7	8	1	3.5	4.8	1-M2	0.4
ALS-020-R	4	8	20	20	30	10	10	1	5	6.5	1-M2.5	1
ALS-030-R	6	14	30	30	35	11	13	1.5	5.5	10.5	1-M3	1.5
ALS-040-R	8	20	40	43.2	66	25	16	2	12.5	15	1-M5	7
ALS-055-R	10	28	55	55	78	30	18	2	10.5	20	1-M6	14
ALS-065-R	14	35	65	69.8	90	35	20	2.5	11.5	24.5	1-M8	30
ALS-080-R	19	45	80	80	114	45	24	3	11.5	30	1-M8	30

* The øDB value is measured assuming that the head of the clamping bolt is larger than the external diameter of the hub.
* The nominal diameter for the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for a hub on one side.

Standard Bore Diameter and Rated Transmission Torque

Model	Standard bore diameter d1, d2 [mm] and rated transmission torque [N·m]																												
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45
ALS-014-R	0.31	0.42	0.54	0.65																									
ALS-020-R		1.2	1.6	2.1	2.2	2.6	3.0																						
ALS-030-R				2.0	2.2	2.7	3.4	4	4.4	4.7	5.4	6.0	7.4																
ALS-040-R							8	12	14	16	19	23	31	34	34	34	34	34											
ALS-055-R										21	25	28	35	38	41	48	51	54	61	67	71	80							
ALS-065-R													40	44	47	54	58	61	68	75	79	89	96	103	114				
ALS-080-R																	53	59	72	84	90	108	121	133	151	170	182	194	212

* Bore diameters whose fields contain numbers are supported as the standard bore diameters.
* Bore diameters whose fields contain numbers are restricted in their rated transmission torque by the holding power of the shaft connection component. The numbers indicate the rated transmission torque value [N·m].
* The recommended processing tolerance for paired mounting shafts is the h7 class. However, for a shaft diameter of ø35, the tolerance is $^{+0.010}_{-0.025}$.
* Bore diameters between the minimum and maximums shown in the dimensions table are compatible, but bore diameters other than those shown in the above table require other arrangements. Contact Miki Pulley for details.

How to Place an Order

ALS-055-R-24B-28B

Size

Element type
R: Hardness, 97; JIS A; Tight-fit type

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Bore specifications
B: Clamp type

ALS Y Types Key/Set Screw Type

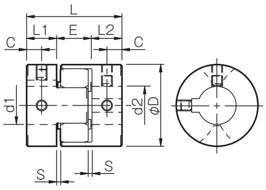
Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Static torsional stiffness [N·m/rad]	Radial stiffness [N/mm]	Moment of inertia [$\mathrm{kg \cdot m^2}$]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]					
ALS-014-Y	1.2	2.4	0.10	1	0～+0.6	34100	12	200	1.91×10^{-7}	0.007
ALS-020-Y	3	6	0.15	1	0～+0.8	23800	24	210	1.08×10^{-6}	0.018
ALS-030-Y	7.5	15	0.15	1	0～+1.0	15900	73	330	6.25×10^{-6}	0.047
ALS-040-Y	10	20	0.10	1	0～+1.2	11900	760	940	3.87×10^{-5}	0.15
ALS-055-Y	35	70	0.15	1	0～+1.4	8700	1400	1160	1.66×10^{-4}	0.35
ALS-065-Y	95	190	0.15	1	0～+1.5	7400	2100	1200	3.57×10^{-4}	0.51
ALS-080-Y	190	380	0.15	1	0～+1.8	6000	4000	1430	1.06×10^{-3}	1.01
ALS-095-Y	265	530	0.15	1	−0.5～+2.0	5000	6000	2400	2.24×10^{-3}	1.50
ALS-105-Y	310	620	0.20	1	−0.9～+2.0	4500	7000	4000	3.72×10^{-3}	2.05

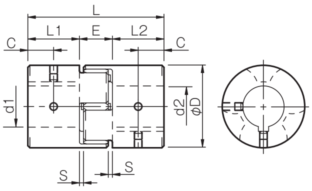
* Axial displacement of the ALS-014-Y to ALS-080-Y is not allowed in the negative direction.
* Max. rotation speed does not take into account dynamic balance.
* Stiffness values given are from measurements taken at 20℃
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

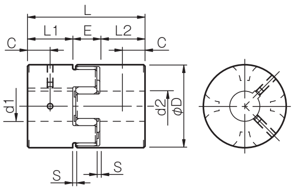
■ALS-014 to 030



■ALS-040



■ALS-055 to 105



Unit [mm]

Model	d1・d2			D	L	L1・L2	E	S	C
	Pilot bore	Min.	Max.						
ALS-014-Y	3	3	6.5	14	22	7	8	1	3.5
ALS-020-Y	4	4	9.6	20	30	10	10	1	5
ALS-030-Y	5	6	14	30	35	11	13	1.5	5.5
ALS-040-Y	5	8	22	40	66	25	16	2	12.5
ALS-055-Y	5	10	28	55	78	30	18	2	15
ALS-065-Y	5	14	38	65	90	35	20	2.5	17.5
ALS-080-Y	10	19	45	80	114	45	24	3	22.5
ALS-095-Y	8	19	55	95	126	50	26	3	25
ALS-105-Y	10	19	60	105	140	56	28	3.5	28

* "Pilot bore" refers to center processing.

Standard Bore Diameter

Model	Standard bore diameter d1, d2 [mm]																																		
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	56	60
ALS-014-Y	●	●	●	●	●																														
ALS-020-Y		●	●	●	●	●	●	●	●																										
ALS-030-Y				●	●	●	●	●	●	●	●	●	●																						
ALS-040-Y							●	●	●	●	●	●	●	●	●	●	●	●	●	●															
ALS-055-Y										●	●	●	●	●	●	●	●	●	●	●	●	●	●												
ALS-065-Y													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●								
ALS-080-Y																		●	●	●	●	●	●	●	●	●	●	●	●	●					
ALS-095-Y																		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
ALS-105-Y																		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

* The bore diameters marked with ● are supported as standard bore diameter.
* ø11 and below have no keyway; ø12 and above can be processed for old JIS standards, new JIS standards, and new standard motors.

How to Place an Order

ALS-055-Y-24N-28H

Size

Element type
Y: Hardness, 90; JIS A; Tight-fit type

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore

Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
J: Compliant with the new JIS standards Js9
N: Compliant with the new motor standards

ALS Y Types Clamp Type

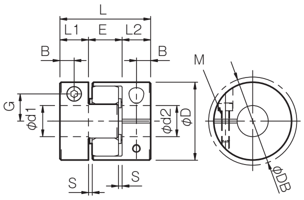
Specifications

Model	Misalignment			Max. rotation speed [min^{-1}]	Static torsional stiffness [N·m/rad]	Radial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
	Parallel [mm]	Angular [°]	Axial [mm]					
ALS-014-Y	0.10	1	0～+0.6	10000	12	200	1.98×10^{-7}	0.007
ALS-020-Y	0.15	1	0～+0.8	10000	24	210	1.09×10^{-6}	0.019
ALS-030-Y	0.15	1	0～+1.0	10000	73	330	6.19×10^{-6}	0.045
ALS-040-Y	0.10	1	0～+1.2	10000	760	940	4.01×10^{-5}	0.16
ALS-055-Y	0.15	1	0～+1.4	7000	1400	1160	1.63×10^{-4}	0.34
ALS-065-Y	0.15	1	0～+1.5	5900	2100	1200	3.69×10^{-4}	0.54
ALS-080-Y	0.15	1	0～+1.8	4800	4000	1430	1.04×10^{-3}	1.00

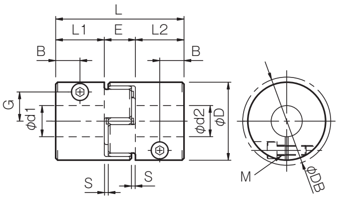
* Axial displacement is not allowed in the negative direction.
* Max. rotation speed does not take into account dynamic balance.
* Stiffness values given are from measurements taken at 20℃
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

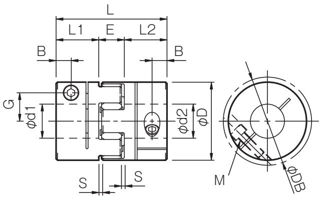
■ALS-014 to 030



■ALS-040



■ALS-055 to 080



Unit [mm]

Model	d1・d2		D	DB	L	L1・L2	E	S	B	G	M	Tightening torque [N·m]
	Min.	Max.										
ALS-014-Y	3	6	14	16.1	22	7	8	1	3.5	4.8	1-M2	0.4
ALS-020-Y	4	8	20	20	30	10	10	1	5	6.5	1-M2.5	1
ALS-030-Y	6	14	30	30	35	11	13	1.5	5.5	10.5	1-M3	1.5
ALS-040-Y	8	20	40	43.2	66	25	16	2	12.5	15	1-M5	7
ALS-055-Y	10	28	55	55	78	30	18	2	10.5	20	1-M6	14
ALS-065-Y	14	35	65	69.8	90	35	20	2.5	11.5	24.5	1-M8	30
ALS-080-Y	19	45	80	80	114	45	24	3	11.5	30	1-M8	30

* The øDB value is measured assuming that the head of the clamping bolt is larger than the external diameter of the hub.
* The nominal diameter for the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for a hub on one side.

Standard Bore Diameter and Rated Transmission Torque

型式	標準穴径 d1・d2 [mm] と許容伝達トルク [N・m]																												
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45
ALS-014-Y	0.31	0.42	0.54	0.65																									
ALS-020-Y		1.2	1.6	2.1	2.2	2.6	3.0																						
ALS-030-Y				2.0	2.2	2.7	3.4	4	4.4	4.7	5.4	6.0	7.4																
ALS-040-Y							8	12	14	16	19	20	20	20	20	20	20	20											
ALS-055-Y										21	25	28	35	38	41	48	51	54	61	67	70	70							
ALS-065-Y													40	44	47	54	58	61	68	75	79	89	96	103	114				
ALS-080-Y																	53	59	72	84	90	108	121	133	151	170	182	194	212

* Bore diameters whose fields contain numbers are supported as the standard bore diameters.
* Bore diameters whose fields contain numbers are restricted in their rated transmission torque by the holding power of the shaft connection component. The numbers indicate the rated transmission torque value [N·m].
* The recommended processing tolerance for paired mounting shafts is the h7 class. However, for a shaft diameter of ø35, the tolerance is $^{+0.010}_{-0.025}$.
* Bore diameters between the minimum and maximums shown in the dimensions table are compatible, but bore diameters other than those shown in the above table require other arrangements. Contact Miki Pulley for details.

How to Place an Order

ALS-055-Y-24B-28B

Size
Element type
Y: Hardness, 90; JIS A; Tight-fit type
Bore specifications
B: Clamp type
Bore diameter: d1 (Small diameter) - d2 (Large diameter)

ALS B Types Key/Set Screw Type

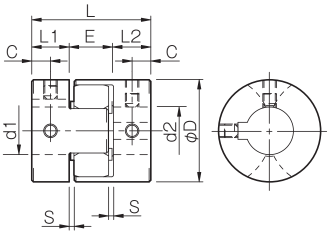
Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Static torsional stiffness [N·m/rad]	Radial stiffness [N/mm]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]					
ALS-030-B	12.5	25	0.17	1	−0.2～+1.0	15900	90	460	6.13×10^{-6}	0.045
ALS-040-B	17	34	0.20	1	−0.5～+1.2	11900	400	640	3.86×10^{-5}	0.15
ALS-055-B	60	120	0.22	1	−0.2～+1.4	8700	1150	400	1.66×10^{-4}	0.35
ALS-065-B	160	320	0.25	1	−0.6～+1.5	7400	2000	800	3.57×10^{-4}	0.51
ALS-080-B	325	650	0.28	1	−0.9～+1.8	6000	4550	600	1.06×10^{-3}	1.01
ALS-095-B	450	900	0.32	1	−0.5～+2.0	5000	12000	800	2.22×10^{-3}	1.48
ALS-105-B	525	1050	0.36	1	−0.9～+2.0	4500	15000	2000	3.70×10^{-3}	2.02

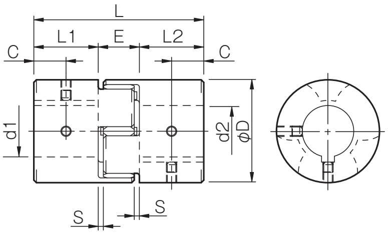
* Max. rotation speed does not take into account dynamic balance.
* Stiffness values given are from measurements taken at 20℃
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

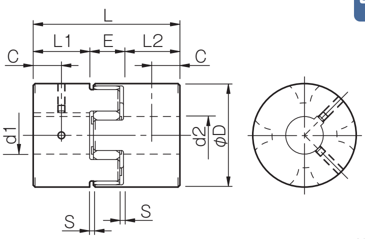
■ALS-030



■ALS-040



■ALS-055 to 105



Unit [mm]

Model	d1・d2			D	L	L1・L2	E	S	C
	Pilot bore	Min.	Max.						
ALS-030-B	5	6	14	30	35	11	13	1.5	5.5
ALS-040-B	5	8	22	40	66	25	16	2	12.5
ALS-055-B	5	10	28	55	78	30	18	2	15
ALS-065-B	5	14	38	65	90	35	20	2.5	17.5
ALS-080-B	10	19	45	80	114	45	24	3	22.5
ALS-095-B	8	19	55	95	126	50	26	3	25
ALS-105-B	10	19	60	105	140	56	28	3.5	28

* "Pilot bore" refers to center processing.

Standard Bore Diameter

Model	Standard bore diameter d1, d2 [mm]																															
	6	6.35	7	8	9	9.525	10	11	12	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	56	60
ALS-030-B	●	●	●	●	●	●	●	●	●	●																						
ALS-040-B				●	●	●	●	●	●	●	●	●	●	●	●	●	●															
ALS-055-B							●	●	●	●	●	●	●	●	●	●	●	●	●	●												
ALS-065-B										●	●	●	●	●	●	●	●	●	●	●	●	●	●	●								
ALS-080-B															●	●	●	●	●	●	●	●	●	●	●	●	●					
ALS-095-B															●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
ALS-105-B															●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

* The bore diameters marked with ● are supported as standard bore diameter.
* ø11 and below have no keyway; ø12 and above can be processed for old JIS standards, new JIS standards, and new standard motors.

How to Place an Order

ALS-055-B-24N-28H

Size

Element type
B: Hardness, 97; JIS A; Loose-fit type

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore

Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
J: Compliant with the new JIS standards Js9
N: Compliant with the new motor standards

ALS B Types Clamp Type

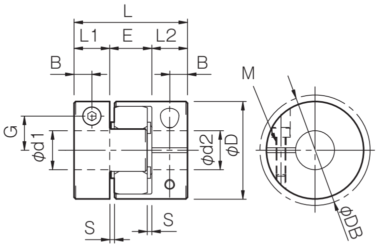
Specifications

Model	Misalignment			Max. rotation speed $[min^{-1}]$	Static torsional stiffness [N·m/rad]	Radial stiffness [N/mm]	Moment of inertia $[kg·m^2]$	Mass [kg]
	Parallel [mm]	Angular [°]	Axial [mm]					
ALS-030-B	0.17	1	− 0.2 ～+ 1.0	10000	90	460	6.07×10^{-6}	0.043
ALS-040-B	0.20	1	− 0.5 ～+ 1.2	10000	400	640	4.00×10^{-5}	0.16
ALS-055-B	0.22	1	− 0.2 ～+ 1.4	7000	1150	400	1.63×10^{-4}	0.34
ALS-065-B	0.25	1	− 0.6 ～+ 1.5	5900	2000	800	3.69×10^{-4}	0.54
ALS-080-B	0.28	1	− 0.9 ～+ 1.8	4800	4550	600	1.04×10^{-3}	1.00

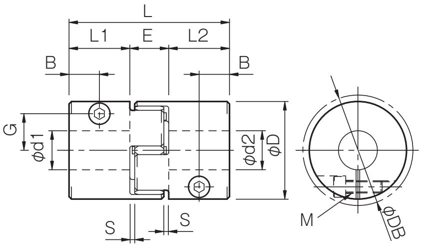
* Max. rotation speed does not take into account dynamic balance.
* Stiffness values given are from measurements taken at 20℃
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions

■ALS-030

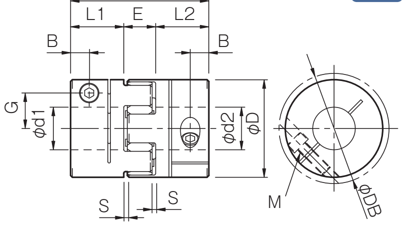


■ALS-040



■ALS-055 to 080

CAD



Unit [mm]

Model	d1 • d2		D	DB	L	L1 • L2	E	S	B	G	M	Tightening torque [N·m]
	Min.	Max.										
ALS-030-B	6	14	30	30	35	11	13	1.5	5.5	10.5	1-M3	1.5
ALS-040-B	8	20	40	43.2	66	25	16	2	12.5	15	1-M5	7
ALS-055-B	10	28	55	55	78	30	18	2	10.5	20	1-M6	14
ALS-065-B	14	35	65	69.8	90	35	20	2.5	11.5	24.5	1-M8	30
ALS-080-B	19	45	80	80	114	45	24	3	11.5	30	1-M8	30

* The øDB value is measured assuming that the head of the clamping bolt is larger than the external diameter of the hub.
* The nominal diameter for the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for a hub on one side.

Standard Bore Diameter and Rated Transmission Torque

Model	Standard bore diameter d1, d2 [mm] and rated transmission torque [N·m]																								
	6	6.35	7	8	9	9.525	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45
ALS-030-B	2.0	2.2	2.7	3.4	4	4.4	4.7	5.4	6.0	7.4																
ALS-040-B				8	12	14	16	19	23	31	34	34	34	34	34											
ALS-055-B							21	25	28	35	38	41	48	51	54	61	67	71	80							
ALS-065-B										40	44	47	54	58	61	68	75	79	89	96	103	114				
ALS-080-B														53	59	72	84	90	108	121	133	151	170	182	194	212

* Bore diameters whose fields contain numbers are supported as the standard bore diameters.
* Bore diameters whose fields contain numbers are restricted in their rated transmission torque by the holding power of the shaft connection component. The numbers indicate the rated transmission torque value [N·m].
* The recommended processing tolerance for paired mounting shafts is the h7 class. However, for a shaft diameter of ø35, the tolerance is $^{+0.010}_{-0.025}$.
* Bore diameters between the minimum and maximums shown in the dimensions table are compatible, but bore diameters other than those shown in the above table require other arrangements. Contact Miki Pulley for details.

How to Place an Order

ALS-055-B-24B-28B

Size

Element type
B: Hardness, 97; JIS A; Loose-fit type

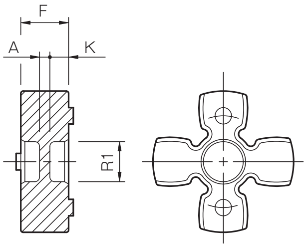
Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Bore specifications
B: Clamp type

ALS Elements

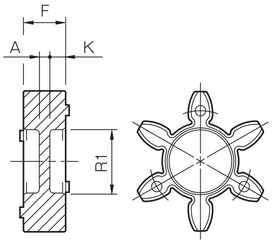
Dimensions

ALS R/Y

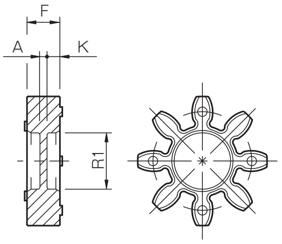
■ALS-014 to 030-R·Y



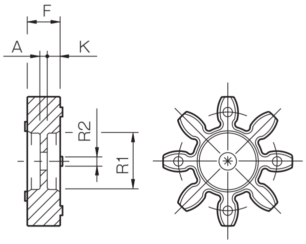
■ALS-040-R·Y



■ALS-055 to 065-R·Y



■ALS-080 to105-R·Y



Unit [mm]

Model	F	R1	R2	K	A
ALS-014-□-EL	6.2	3.5	–	2.5	1.2
ALS-020-□-EL	8.2	6.2	–	3.4	1.4
ALS-030-□-EL	10.2	8.5	–	4	2.2
ALS-040-□-EL	12	18	–	4.5	3
ALS-055-□-EL	14	24	–	5.5	3
ALS-065-□-EL	15	30	–	5.5	4
ALS-080-□-EL	18	37	15	7	4
ALS-095-□-EL	20	43	20	8	4
ALS-105-□-EL	21	50	20	8.5	4

How to Place an Order

ALS-055-R-EL

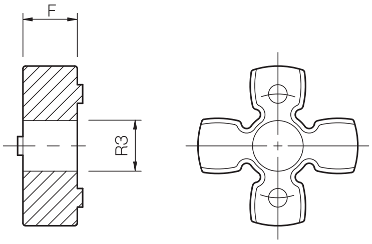
Element only

Size

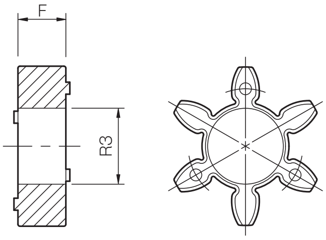
Element type
R: Hardness, 97; JIS A; Tight-fit type
Y: Hardness, 90; JIS A; Tight-fit type

ALS B

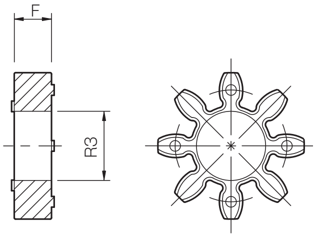
■ALS-030-B



■ALS-040-B



■ALS-055 to 105-B



Unit [mm]

Model	F	R3
ALS-030-B-EL	10.2	10.5
ALS-040-B-EL	12	18.5
ALS-055-B-EL	14	27.5
ALS-065-B-EL	15	32
ALS-080-B-EL	18	41
ALS-095-B-EL	20	47
ALS-105-B-EL	21	50

How to Place an Order

ALS-055-B-EL

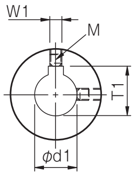
Element only

Size

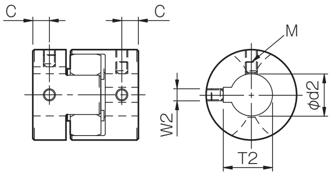
Element type
B: Hardness, 97; JIS A; Loose-fit type

Standard Hole-Drilling Standards

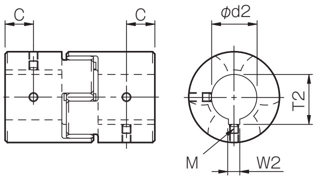
- Set screw and keyway positions are not on the same plane. Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular hub.
- The set screws are included with the product.
- We also process non-standard bore diameters to the standards of the table below.
- Contact Miki Pulley if you require standards other than those shown below.



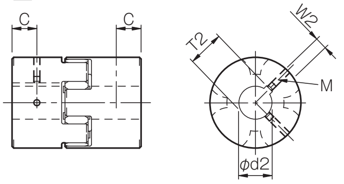
■ALS-014 to 030



■ALS-040



■ALS-055 to105



Unit [mm]

Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards (H9)					Models compliant with the new JIS standards (Js9)					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]
Tolerance	H7,H8	E9	$^{+0.3}_{0}$	—	Tolerance	H7	H9	$^{+0.3}_{0}$	—	Tolerance	H7, H8	Js9	$^{+0.3}_{0}$	—	Tolerance	G7,F7	H9	$^{+0.3}_{0}$	—
3	3 $^{+0.018}_{0}$	—	—	1-M3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	4 $^{+0.018}_{0}$	—	—	2-M3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	5 $^{+0.018}_{0}$	—	—	2-M3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6	6 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6.35	6.35 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7	7 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8	8 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9	9 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9.525	9.525 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10	10 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11	11 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12	12 $^{+0.018}_{0}$	4 $^{+0.050}_{+0.020}$	13.5	2-M4	12H	12 $^{+0.018}_{0}$	4 $^{+0.030}_{0}$	13.8	2-M4	12J	12 $^{+0.018}_{0}$	4 ±0.0150	13.8	2-M4	—	—	—	—	—
14	14 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	16.0	2-M4	14H	14 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	16.3	2-M4	14J	14 $^{+0.018}_{0}$	5 ±0.0150	16.3	2-M4	14N	14 $^{+0.024}_{+0.006}$	5 $^{+0.030}_{0}$	16.3	2-M4
15	15 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	17.0	2-M4	15H	15 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	17.3	2-M4	15J	15 $^{+0.018}_{0}$	5 ±0.0150	17.3	2-M4	—	—	—	—	—
16	16 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	18.0	2-M4	16H	16 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	18.3	2-M4	16J	16 $^{+0.018}_{0}$	5 ±0.0150	18.3	2-M4	—	—	—	—	—
17	17 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	19.0	2-M4	17H	17 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	19.3	2-M4	17J	17 $^{+0.018}_{0}$	5 ±0.0150	19.3	2-M4	—	—	—	—	—
18	18 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	20.0	2-M4	18H	18 $^{+0.018}_{0}$	6 $^{+0.030}_{0}$	20.8	2-M5	18J	18 $^{+0.018}_{0}$	6 ±0.0150	20.8	2-M5	—	—	—	—	—
19	19 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	21.0	2-M4	19H	19 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	21.8	2-M5	19J	19 $^{+0.021}_{0}$	6 ±0.0150	21.8	2-M5	19N	19 $^{+0.028}_{+0.007}$	6 $^{+0.030}_{0}$	21.8	2-M5
20	20 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	22.0	2-M4	20H	20 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	22.8	2-M5	20J	20 $^{+0.021}_{0}$	6 ±0.0150	22.8	2-M5	—	—	—	—	—
22	22 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	25.0	2-M6	22H	22 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	24.8	2-M5	22J	22 $^{+0.021}_{0}$	6 ±0.0150	24.8	2-M5	—	—	—	—	—
24	24 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	27.0	2-M6	24H	24 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	27.3	2-M6	24J	24 $^{+0.021}_{0}$	8 ±0.0180	27.3	2-M6	24N	24 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	27.3	2-M6
25	25 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	28.0	2-M6	25H	25 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	28.3	2-M6	25J	25 $^{+0.021}_{0}$	8 ±0.0180	28.3	2-M6	—	—	—	—	—
28	28 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	31.0	2-M6	28H	28 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	31.3	2-M6	28J	28 $^{+0.021}_{0}$	8 ±0.0180	31.3	2-M6	28N	28 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	31.3	2-M6
30	30 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	33.0	2-M6	30H	30 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	33.3	2-M6	30J	30 $^{+0.021}_{0}$	8 ±0.0180	33.3	2-M6	—	—	—	—	—
32	32 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	35.5	2-M8	32H	32 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	35.3	2-M8	32J	32 $^{+0.025}_{0}$	10 ±0.0180	35.3	2-M8	—	—	—	—	—
35	35 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	38.5	2-M8	35H	35 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	38.3	2-M8	35J	35 $^{+0.025}_{0}$	10 ±0.0180	38.3	2-M8	—	—	—	—	—
38	38 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	41.5	2-M8	38H	38 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	41.3	2-M8	38J	38 $^{+0.025}_{0}$	10 ±0.0180	41.3	2-M8	38N	38 $^{+0.050}_{+0.025}$	10 $^{+0.036}_{0}$	41.3	2-M8
40	40 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	43.5	2-M8	40H	40 $^{+0.025}_{0}$	12 $^{+0.043}_{0}$	43.3	2-M8	40J	40 $^{+0.025}_{0}$	12 ±0.0215	43.3	2-M8	—	—	—	—	—
42	42 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	45.5	2-M8	42H	42 $^{+0.025}_{0}$	12 $^{+0.043}_{0}$	45.3	2-M8	42J	42 $^{+0.025}_{0}$	12 ±0.0215	45.3	2-M8	42N	42 $^{+0.050}_{+0.025}$	12 $^{+0.043}_{0}$	45.3	2-M8
45	45 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	48.5	2-M8	45H	45 $^{+0.025}_{0}$	14 $^{+0.043}_{0}$	48.8	2-M10	45J	45 $^{+0.025}_{0}$	14 ±0.0215	48.8	2-M10	—	—	—	—	—
48	48 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	51.5	2-M8	48H	48 $^{+0.025}_{0}$	14 $^{+0.043}_{0}$	51.8	2-M10	48J	48 $^{+0.025}_{0}$	14 ±0.0215	51.8	2-M10	48N	48 $^{+0.050}_{+0.025}$	14 $^{+0.043}_{0}$	51.8	2-M10
50	50 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	53.5	2-M8	50H	50 $^{+0.025}_{0}$	14 $^{+0.043}_{0}$	53.8	2-M10	50J	50 $^{+0.025}_{0}$	14 ±0.0215	53.8	2-M10	—	—	—	—	—
55	55 $^{+0.030}_{0}$	15 $^{+0.075}_{+0.032}$	60.0	2-M10	55H	55 $^{+0.030}_{0}$	16 $^{+0.043}_{0}$	59.3	2-M10	55J	55 $^{+0.030}_{0}$	16 ±0.0215	59.3	2-M10	55N	55 $^{+0.060}_{+0.030}$	16 $^{+0.043}_{0}$	59.3	2-M10
56	56 $^{+0.030}_{0}$	15 $^{+0.075}_{+0.032}$	61.0	2-M10	56H	56 $^{+0.030}_{0}$	16 $^{+0.043}_{0}$	60.3	2-M10	56J	56 $^{+0.030}_{0}$	16 ±0.0215	60.3	2-M10	—	—	—	—	—
60	60 $^{+0.030}_{0}$	15 $^{+0.075}_{+0.032}$	65.0	2-M10	60H	60 $^{+0.030}_{0}$	18 $^{+0.043}_{0}$	64.4	2-M10	60J	60 $^{+0.030}_{0}$	18 ±0.0215	64.4	2-M10	60N	60 $^{+0.060}_{+0.030}$	18 $^{+0.043}_{0}$	64.4	2-M10

* Tolerance will be h8 class for hole diameter equal to or less than ø10 mm.
* The set screw size is M3 for ALS-014.

Distance from Set Screw Edge

Model	ALS-014	ALS-020	ALS-030	ALS-040	ALS-055	ALS-065	ALS-080	ALS-095	ALS-105
Distance from set screw edge C [mm]	3.5	5	5.5	12.5	15	17.5	22.5	25	28

ALS Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.
(1) Always be careful of parallel, angular, and axial misalignment.
(2) Always tighten bolts with the specified torque.

Precautions for Handling

ALS models come with three different types of elements and two different types of mounting hubs. Be aware in their handling that their allowable values and points of caution are not the same.

(1) Couplings are designed for use within an operating temperature range of -30℃ to 80℃ .

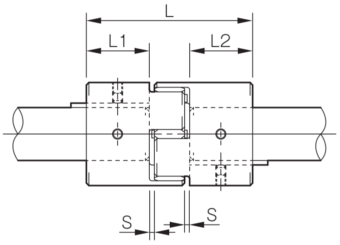
(2) Although elements are designed to be oilproof, do not subject them to excessive amounts of oil as it may cause deterioration. Use and storage in direct sunlight may shorten element service life, so cover elements appropriately.

(3) Do not tighten up clamping bolts on clamp-type ALS models until after inserting the mounting shaft.

Mounting

(1) Remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Insert and mount the shaft far enough so that the paired mounting shafts touch the entire length of the clamping hub of the coupling (dimensions chart L1, L2), and does not interfere with the elements or the other shaft.
After mounting the left and right hubs, check also that the total coupling length (L in the dimensions chart) does not exceed the permitted axial tolerance. If the total coupling length cannot be checked, use a feeler gauge or similar tool to check that the gap between the left and right hubs (S in the dimensions chart) does not exceed the permitted axial tolerance.

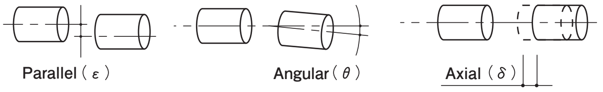


Model	L [mm]	L1・L2 [mm]	S [mm]
ALS-014	22	7	1
ALS-020	30	10	1
ALS-030	35	11	1.5
ALS-040	66	25	2
ALS-055	78	30	2
ALS-065	90	35	2.5
ALS-080	114	45	3
ALS-095	126	50	3
ALS-105	140	56	3.5

(3) To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table. However, this misalignment is the maximum value when each occurs independently, so make the allowable value when they combine 50% or less of this value.

(4) Check centering by holding a straight-edge to the outer circumference of the main body, using two points about 90° apart. The centering precision has a major impact on the service life of the element. We recommend aligning the centering locations as the method for centering the two shafts.

Misalignment



Model	Parallel ε [mm]	Angular θ [°]	Axial δ [mm]	Axial total length L [mm]
ALS-014-R	0.10	1	0～+ 0.6	22～22.6
ALS-020-R	0.10	1	0～+ 0.8	30～30.8
ALS-030-R	0.10	1	0～+ 1.0	35～36.0
ALS-040-R	0.10	1	0～+ 1.2	66～67.2
ALS-055-R	0.10	1	0～+ 1.4	78～79.4
ALS-065-R	0.10	1	0～+ 1.5	90～91.5
ALS-080-R	0.10	1	0～+ 1.8	114～115.8
ALS-095-R	0.10	1	− 0.5～+ 2.0	125.5～128.0
ALS-105-R	0.15	1	− 0.9～+ 2.0	139.1～142.0

Model	Parallel ε [mm]	Angular θ [°]	Axial δ [mm]	Axial total length L [mm]
ALS-014-Y	0.10	1	0～+ 0.6	22～22.6
ALS-020-Y	0.15	1	0～+ 0.8	30～30.8
ALS-030-Y	0.15	1	0～+ 1.0	35～36.0
ALS-040-Y	0.10	1	0～+ 1.2	66～67.2
ALS-055-Y	0.15	1	0～+ 1.4	78～79.4
ALS-065-Y	0.15	1	0～+ 1.5	90～91.5
ALS-080-Y	0.15	1	0～+ 1.8	114～115.8
ALS-095-Y	0.15	1	− 0.5～+ 2.0	125.5～128.0
ALS-105-Y	0.20	1	− 0.9～+ 2.0	139.1～142.0

Model	Parallel ε [mm]	Angular θ [°]	Axial δ [mm]	Axial total length L [mm]
ALS-030-B	0.17	1	− 0.2～+ 1.0	34.8～36.0
ALS-040-B	0.20	1	− 0.5～+ 1.2	65.5～67.2
ALS-055-B	0.22	1	− 0.2～+ 1.4	77.8～79.4
ALS-065-B	0.25	1	− 0.6～+ 1.5	89.4～91.5
ALS-080-B	0.28	1	− 0.9～+ 1.8	113.1～115.8
ALS-095-B	0.32	1	− 0.5～+ 2.0	125.5～128.0
ALS-105-B	0.36	1	− 0.9～+ 2.0	139.1～142.0

(5) Tighten set screws with hex socket heads and clamping bolts to the tightening torques shown below using a calibrated torque screwdriver or torque wrench.

Size of hex-socket-head set screw	M3	M4	M5	M6	M8	M10
Tightening torque [N·m]	0.7	1.7	3.6	6.0	14.5	28.0

Clamping bolt size	M2	M2.5	M3	M5	M6	M8
Tightening torque [N·m]	0.4	1.0	1.5	7.0	14.0	30.0

(6) Do not use any hex-socket-head set screw or clamping bolt other than those specified by Miki Pulley. Do not apply oil, grease, or screw fixatives.

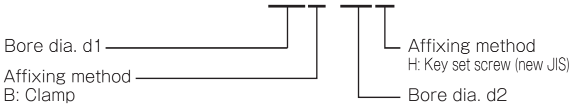
Selection Order of Nominal Bore Diameters when Ordering

When specifying bore diameters for key/set screw systems, you should basically specify d1 (small diameter)-d2 (large diameter). However, where d1=d2 (same diameters), please order using the selection order below.

Selection order	1	2	3	4
Nominal bore diameter	Blank	H	J	N
Standards	Old JIS/no keyway	New JIS H9	New JIS Js9	New motor standards

Key/set screw type hubs and clamp type hubs can be used in combination. When specifying bore diameters in this instance, specify d1: clamp type, d2: key/set screw type in that order, regardless of larger and smaller bore diameters.

Example) ALS-055-R-28B-19H



Selection Procedures

ALS models can be selected in one of two ways depending on their mode of use: ordinary use or no-backlash use (exploiting their pre-compressed construction). When considering use of couplings in no-backlash mode, however, be sure that use will be at a torque that is low enough for the nominal torque of the coupling. Note that selection criteria are different for ordinary use and use in no-backlash mode. When considering use of couplings in no-backlash mode, select from among the ALS-R and ALS-Y types. ALS-B types cannot be used in no-backlash mode.

■ Ordinary use

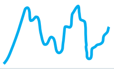
(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\ [N{\cdot}m] = 9550 \times \frac{P\ [kW]}{n[min^{-1}]}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$Td\ [N{\cdot}m] = Ta \times K1 \times K2 \times K3 \times K4$$

■ Service factor based on load property: K1

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K1	1.0	1.25	1.75	2.25

■ Service factor based on operating time: K2

Hrs./day	～8	～16	～24
K2	1.0	1.12	1.25

■ Service factor based on starting/braking frequency: K3

Times/hr.	～10	～30	～60	～120	～240	Over 240
K3	1.0	1.1	1.3	1.5	2.0	2.5≦

■ Service factor based on operating temperature: K4

Temperature [℃]	−30～30	30～40	40～60	60～80
K4	1.0	1.2	1.4	1.8

(3) Set the size so that the nominal torque of the coupling Tn is at least equal to the corrected torque, Td.

$$Tn \geqq Td$$

(4) Select a size that results in a maximum torque, Tm, for the coupling that is at least equal to the peak torque, Ts, generated by the driver, follower or both. Maximum torque refers to the maximum amount of torque that can be applied for a set amount of time considering eight hours of operation per day and up to around ten instances.

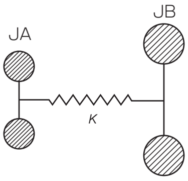
$$Tm \geqq Ts \times K4$$

(5) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling.

(6) When the coupling is used in machinery prone to periodic violent load-torque fluctuations, torsional vibration must also be considered in addition to the above selection criteria. In other words, check that the vibration frequency of the torque fluctuation does not match the natural frequency of the shafting. The natural frequency is generally calculated by finding the natural frequency, fe, of one section, approximating the shafting as shown in the diagram below.

$$fe = \frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{JA}+\frac{1}{JB}\right)}\ [Hz]$$

κ : Static torsional stiffness of coupling [N·m/rad]
JA: Moment of inertia of driving side [kg·m^2]
JB: Moment of inertia of driven side [kg·m^2]



■ No-backlash use

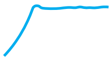
(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\ [N{\cdot}m] = 9550 \times \frac{P\ [kW]}{n[min^{-1}]}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$Td\ [N{\cdot}m] = Ta \times K1 \times K2 \times K3 \times K4$$

■ Service factor based on load property: K1

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K1	1.0	1.25	1.75	2.25

* When using in no-backlash mode, be sure that K1 ≧ 4.

■ Service factor based on operating time: K2

Hrs./day	～8	～16	～24
K2	1.0	1.12	1.25

■ Service factor based on starting/braking frequency: K3

Times/hr.	～10	～30	～60	～120	～240	Over 240
K3	1.0	1.1	1.3	1.5	2.0	2.5≦

■ Service factor based on operating temperature: K4

Temperature [℃]	−30～30	30～40	40～60	60～80
K4	1.0	1.2	1.4	1.8

(3) Select a size that results in a peak torque Ts generated by the driver, follower or both that is no greater than the nominal torque Tn for the coupling.

$$Tn \geqq Ts \times K4$$

(4) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling. When using a clamping hub, the bore diameter may restrict the transmission torque. For that reason, check that the clamping-hub shaft holding force of the selected coupling size is at least equal to the peak torque, Ts, applied to the coupling.

Couplings can structurally be used in no-backlash mode while the element is pre-compressed, but backlash may start to occur with use. If you are considering using the coupling in no-backlash mode over a long period of time, we recommend setting the service factor K1 to a high value.
If you require higher precision control/positioning for a long period of time, we recommend our SERVOFLEX series of metal disc couplings.

ALS Models

Items Checked for Design Purposes

Induction Motor Specifications and Easy Selection Table

Motor		50 Hz: 3000 min^{-1}, 60 Hz: 3600 min^{-1}				50 Hz: 1500min^{-1}, 60 Hz: 1800min^{-1}				50 Hz: 1000min^{-1}, 60 Hz: 1200min^{-1}			
		Two-pole motor		MIKI PULLEY STARFLEX		Four-pole motor		MIKI PULLEY STARFLEX		Six-pole motor		MIKI PULLEY STARFLEX	
Output [kW]	Frequency [Hz]	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter
0.1	50	–	–	–	–	11	0.7	ALS-030	11	–	–	–	–
	60	–	–	–	–	11	0.5	ALS-030	11	–	–	–	–
0.2	50	11	0.7	ALS-030	11	11	1.3	ALS-030	11	–	–	–	–
	60	11	0.5	ALS-030	11	11	1.1	ALS-030	11	–	–	–	–
0.4	50	14	1.3	ALS-030	14N	14	2.6	ALS-030	14N	19	3.9	ALS-040	19N
	60	14	1.1	ALS-030	14N	14	2.2	ALS-030	14N	19	3.2	ALS-040	19N
0.75	50	19	2.4	ALS-040	19N	19	4.9	ALS-040	19N	24	7.3	ALS-055	24N
	60	19	2	ALS-040	19N	19	4.1	ALS-040	19N	24	6.1	ALS-055	24N
1.5	50	24	4.9	ALS-055	24N	24	9.7	ALS-055	24N	28	15	ALS-055	28N
	60	24	4.1	ALS-055	24N	24	8.1	ALS-055	24N	28	12	ALS-055	28N
2.2	50	24	7.1	ALS-055	24N	28	14	ALS-055	28N	28	21	ALS-065	28N
	60	24	6	ALS-055	24N	28	12	ALS-055	28N	28	18	ALS-065	28N
3.7	50	28	12	ALS-055	28N	28	24	ALS-065	28N	38	36	ALS-065	38N
	60	28	10	ALS-055	28N	28	20	ALS-065	28N	38	30	ALS-065	38N
5.5	50	38	18	ALS-065	38N	38	36	ALS-065	38N	38	54	ALS-080	38N
	60	38	15	ALS-065	38N	38	30	ALS-065	38N	38	45	ALS-065	38N
7.5	50	38	24	ALS-065	38N	38	49	ALS-065	38N	42	72	ALS-080	42N
	60	38	20	ALS-065	38N	38	41	ALS-065	38N	42	60	ALS-080	42N
11	50	42	36	ALS-080	42N	42	71	ALS-080	42N	42	108	ALS-080-R	42N
	60	42	30	ALS-080	42N	42	59	ALS-080	42N	42	90	ALS-080	42N
15	50	42	49	ALS-080	42N	42	97	ALS-080	42N	48	149	ALS-095-R	48N
	60	42	41	ALS-080	42N	42	81	ALS-080	42N	48	124	ALS-095	48N
18.5	50	42	65	ALS-080	42N	48	120	ALS-095	48N	55	183	ALS-095-R	55N
	60	42	50	ALS-080	42N	48	100	ALS-095	48N	55	152	ALS-095-R	55N
22	50	48	71	ALS-095	48N	48	143	ALS-095-R	48N	55	218	ALS-095-R	55N
	60	48	59	ALS-095	48N	48	119	ALS-095	48N	55	182	ALS-095-R	55N
30	50	55	97	ALS-095	55N	55	195	ALS-095-R	55N	60	296	–	60N
	60	55	81	ALS-095	55N	55	162	ALS-095-R	55N	60	247	ALS-105-R	60N
37	50	55	120	ALS-095	55N	60	240	ALS-105-R	60N	–	–	–	–
	60	55	100	ALS-095	55N	60	200	ALS-105-R	60N	–	–	–	–
45	50	55	146	ALS-105	55N	60	292	–	60N	–	–	–	–
	60	55	122	ALS-095	55N	60	243	ALS-105-R	60N	–	–	–	–

* The above table shows appropriate sizes for key types in ordinary use in an induction motor driver. It is not for making selections for use with no-backlash specifications.

* Motor rotation speed and output torque are calculated (reference) values.

Servo Motor Specifications and Easy Selection Table

Servo motor specifications					Corresponding coupling specifications	
Rated output [kW]	**Rated rotation speed [min^{-1}]**	**Rated torque [N·m]**	**Max. torque [N·m]**	**Shaft diameter [mm]**	**Model ALS-□-R**	**Max. bore diameter [mm]**
0.05	3000	0.16	0.48	8	ALS-020-R	8
0.1	3000	0.32	0.95	8	ALS-020-R	8
0.2	3000	0.64	1.9	14	ALS-030-R	14
0.4	3000	1.30	3.8	14	ALS-030-R	14
0.5	2000	2.39	7.16	24	ALS-055-R	28
0.5	3000	1.59	4.77	24	ALS-055-R	28
0.75	2000	3.58	10.7	22	ALS-055-R	28
0.75	3000	2.40	7.2	19	ALS-040-R	20
0.85	1000	8.12	24.4	24	ALS-055-R	28
1	2000	4.78	14.4	24	ALS-055-R	28
1	3000	3.18	9.55	24	ALS-055-R	28
1.2	1000	11.50	34.4	35	ALS-065-R	35
1.5	2000	7.16	21.6	28	ALS-055-R	28
1.5	3000	4.78	14.3	24	ALS-055-R	28
2	2000	9.55	28.5	35	ALS-065-R	35
2	3000	6.37	15.9	24	ALS-055-R	28
3	1000	28.60	85.9	35	ALS-065-R	35
3.5	2000	16.70	50.1	35	ALS-065-R	35
3.5	3000	11.10	27.9	28	ALS-055-R	28
5	2000	23.90	71.6	35	ALS-065-R	35
5	3000	15.90	39.7	28	ALS-055-R	28
7	2000	33.40	100	35	ALS-065-R	35

* The above table was set up in simple terms for clamp types based on the shaft diameters of compatible servo motors and the rated transmission torque of the coupling. It is not guaranteed when using the couplings in the no-backlash mode.

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
Metal Couplings
Metal Disc Couplings SERVOFLEX
High-rigidity Couplings SERVORIGID
Metal Slit Couplings HELI-CAL
Metal Coil Spring Couplings BAUMANNFLEX
Pin Bushing Couplings PARAFLEX
Link Couplings SCHMIDT
Rubber and Plastic Couplings
Dual Rubber Couplings STEPFLEX
Jaw Couplings MIKI PULLEY STARFLEX
Jaw Couplings SPRFLEX
Plastic Bellows Couplings BELLOWFLEX
Rubber and Plastic Couplings CENTAFLEX
MODELS
ALS

Jaw Couplings

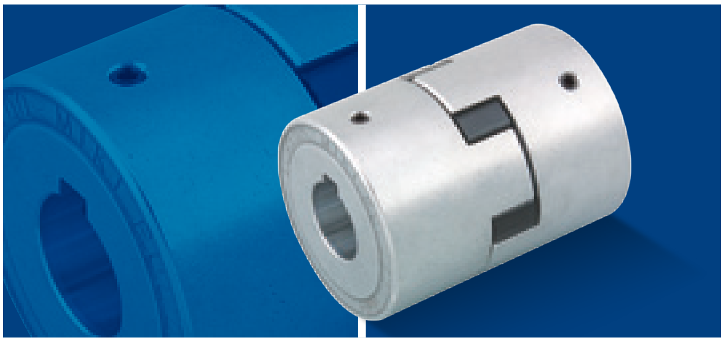
SPRFLEX

High flexibility

High damping

Max. nominal torque [N·m]	50
Pilot bore/added work ranges [mm]	φ 4～48
Operating temperature [℃]	−20～80
Backlash	Yes
Driver	Induction motor
Application	Pumps, fans, textile machinery

Jaw Couplings that Use Rubber as Buffer Material

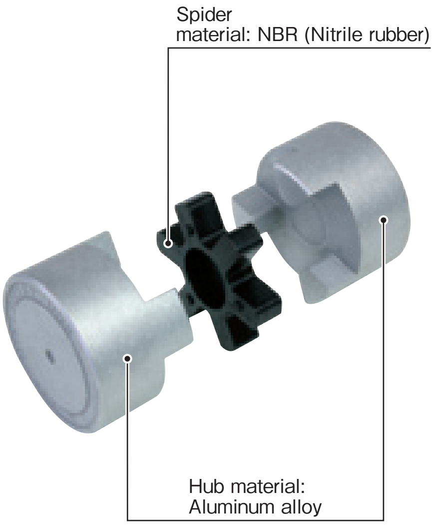


These jaw couplings have simpler designs that sandwich a buffer material (spider) between two hubs. The hub is lightweight, being made of aluminum alloy. Input and output can be coupled or separated easily by simply moving the coupling in the axial.

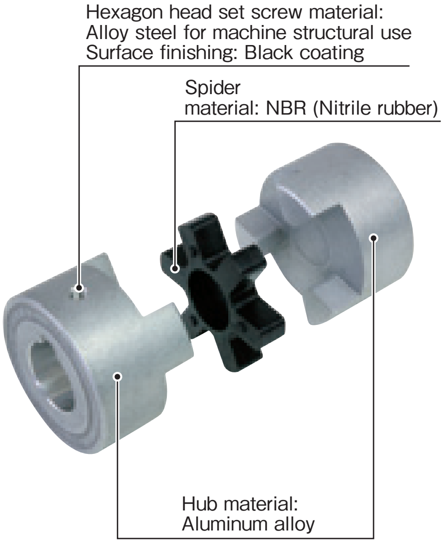
RoHS

Structure and Materials

■ Pilot bore



■ Key/set screw types



■ Spider
(rubber buffer)

AL Models

Specifications

Model	Torque		Misalignment			Max. rotation speed [min⁻¹]	Moment of inertia [kg·m²]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]			
AL-035	0.5	1.5	0.1	0.5	+ 0.3	18000	0.38×10^{-6}	0.01
AL-050	1.5	4.5	0.2	1.0	± 0.5	12000	5.10×10^{-6}	0.06
AL-070	3	9	0.2	1.0	± 0.5	9000	1.79×10^{-5}	0.12
AL-075	5	15	0.2	1.0	± 0.5	7000	5.36×10^{-5}	0.21
AL-090	8	24	0.3	1.0	± 0.5	6000	1.15×10^{-4}	0.31
AL-095	10	30	0.3	1.0	± 0.5	6000	1.40×10^{-4}	0.36
AL-100	25	75	0.3	1.0	± 0.7	5000	4.34×10^{-4}	0.78
AL-110	50	150	0.3	1.0	± 0.7	4000	1.43×10^{-3}	1.56

* Max. rotation speed does not take into account dynamic balance or mounting misalignment.
* The moment of inertia and mass are measured for the pilot bore.

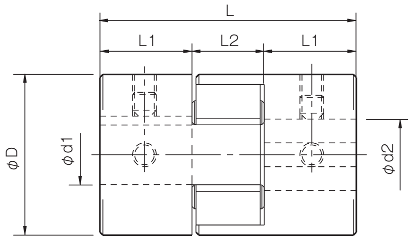
Dimensions (Couplings)

Unit [mm]

Model	d1・d2			D	L	L1	L2
	Pilot bore	Min.	Max.				
AL-035	4	4	8	16.1	20.5	6.5	7.5*1
AL-050	5	6	16	27	43.2	15.5	12.2
AL-070	5	6	20	35	49.2	18.5	12.2
AL-075	5	7	26	45	54.4	21.0	12.4
AL-090	5	9	28	54	55.0	21.0	13.0
AL-095	5	9	28	55	61.0	24.0	13.0
AL-100	5	11	36	66	88.0	35.0	18.0
AL-110	5	11	48	85	110.0	44.0	22.0

* "Pilot bore" refers to center processing. Minimums and maximums for d1 and d2 are values at the MIKI PULLEY standard hole-drilling standards.
* The value marked *1 leaves a 1 mm space for the thickness of the spider body.

CAD



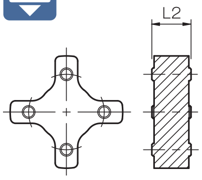
Dimensions (Spider)

Unit [mm]

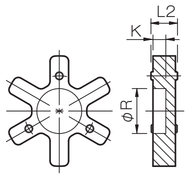
Couplings model	Spider model	L2	R	K
AL-035	L-035	6.5	—	—
AL-050	L-050	12.2	—	—
AL-070	L-070	12.2	—	—
AL-075	L-075	12.4	20	6.0
AL-090	L-090/095	13.0	22	6.3
AL-095	L-090/095	13.0	22	6.3
AL-100	L-100	18.0	26	6.0
AL-110	L-110	22.0	30	6.0

■ L-035 - 070

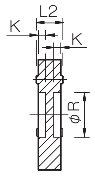
CAD



■ L-075 - 095



■ L-100 - 110



How to Place an Order

Pilot Bore

AL-050

Size

Key/Set Screw Types

AL-050 12H-14N

Size

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Bore specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards

Spiders

Spider L-075

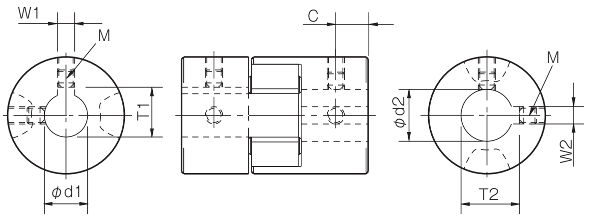
Size

AL Models

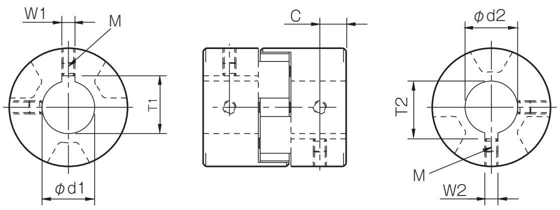
Standard Hole-Drilling Standards

- Set screw and keyway positions are not on the same plane. Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular hub.
- The set screws are included with the product.

■ AL-035 to 070



■ AL-075 to 110



Unit [mm]

Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]
Toler-ance	H7, H8	E9	$^{+0.3}_{0}$	—	Toler-ance	H7	H9	$^{+0.3}_{0}$	—	Toler-ance	G7, F7	H9	$^{+0.3}_{0}$	—
6	6 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
7	7 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
8	8 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
9	9 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
10	10 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
11	11 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
12	12 $^{+0.018}_{0}$	4 $^{+0.050}_{+0.020}$	13.5	2-M4	12H	12 $^{+0.018}_{0}$	4 $^{+0.030}_{0}$	13.8	2-M4	—	—	—	—	—
14	14 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	16.0	2-M4	14H	14 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	16.3	2-M4	14N	14 $^{+0.024}_{+0.006}$	5 $^{+0.030}_{0}$	16.3	2-M4
15	15 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	17.0	2-M4	15H	15 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	17.3	2-M4	—	—	—	—	—
16	16 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	18.0	2-M4	16H	16 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	18.3	2-M4	—	—	—	—	—
17	17 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	19.0	2-M4	17H	17 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	19.3	2-M4	—	—	—	—	—
18	18 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	20.0	2-M4	18H	18 $^{+0.018}_{0}$	6 $^{+0.030}_{0}$	20.8	2-M5	—	—	—	—	—
19	19 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	21.0	2-M4	19H	19 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	21.8	2-M5	19N	19 $^{+0.028}_{+0.007}$	6 $^{+0.030}_{0}$	21.8	2-M5
20	20 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	22.0	2-M4	20H	20 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	22.8	2-M5	—	—	—	—	—
22	22 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	25.0	2-M6	22H	22 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	24.8	2-M5	—	—	—	—	—
24	24 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	27.0	2-M6	24H	24 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	27.3	2-M6	24N	24 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	27.3	2-M6
25	25 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	28.0	2-M6	25H	25 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	28.3	2-M6	—	—	—	—	—
28	28 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	31.0	2-M6	28H	28 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	31.3	2-M6	28N	28 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	31.3	2-M6
30	30 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	33.0	2-M6	30H	30 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	33.3	2-M6	—	—	—	—	—
32	32 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	35.5	2-M8	32H	32 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	35.3	2-M8	—	—	—	—	—
35	35 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	38.5	2-M8	35H	35 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	38.3	2-M8	—	—	—	—	—
38	38 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	41.5	2-M8	38H	38 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	41.3	2-M8	38N	38 $^{+0.050}_{+0.025}$	10 $^{+0.036}_{0}$	41.3	2-M8
40	40 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	43.5	2-M8	40H	40 $^{+0.025}_{0}$	12 $^{+0.043}_{0}$	43.3	2-M8	—	—	—	—	—
42	42 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	45.5	2-M8	42H	42 $^{+0.025}_{0}$	12 $^{+0.043}_{0}$	45.3	2-M8	42N	42 $^{+0.050}_{+0.025}$	12 $^{+0.043}_{0}$	45.3	2-M8
45	45 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	48.5	2-M8	45H	45 $^{+0.025}_{0}$	14 $^{+0.043}_{0}$	48.8	2-M10	—	—	—	—	—
48	48 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	51.5	2-M8	48H	48 $^{+0.025}_{0}$	14 $^{+0.043}_{0}$	51.8	2-M10	48N	48 $^{+0.050}_{+0.025}$	14 $^{+0.043}_{0}$	51.8	2-M10

* The ø11 or below requirement under the new JIS standards and ø11 requirement for the new motor standards are the same as the old JIS standards (class 2).

* For AL-035, the tolerance is $^{+0.05}_{0}$ regardless of bore diameter. The set screw size is M3.

Distance from Set Screw Edge

Model	AL-035	AL-050	AL-070	AL-075	AL-090	AL-095	AL-100	AL-110
Distance from set screw edge C [mm]	3.5	7.5	9	10	12	12	12	15

Items Checked for Design Purposes

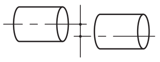
Special Items to Take Note of

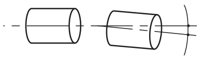
You should note the following to prevent any problems.
(1) Always be careful of parallel, angular, and axial misalignment.
(2) Always tighten bolts with the specified torque.

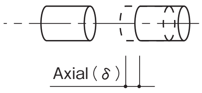
Precautions for Handling

(1) Couplings are designed for use within an operating temperature from -20℃ to 80℃ . Although SPRFLEX couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water or oil as these may cause deterioration. Use and storage in direct sunlight may shorten coupling service life, so cover couplings appropriately.

(2) To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table. However, this misalignment is the maximum value when each occurs independently, so make the allowable value when they combine 50% or less of this value. Also, the maximum rotation speed does not take into account dynamic balance or mounting misalignment, so factor in the dynamic balance and mounting misalignment when using the couplings at or above 3600 min^{-1}. Be particularly careful to mount the couplings so that the mounting misalignment at rotation speeds of 2000 min^{-1} or more is no greater than 50% or the allowable value.


Parallel (ε)


Angular (θ)


Axial (δ)

(3) Check centering by holding a straight-edge to the outer circumference of the main body, using two points about 90° apart. Spider service life is greatly affected by the precision of centering. We recommend matching of centering locations as the method for centering two shafts.

(4) Remove any rust, dust, oil or the like from the inner diameter surfaces of the shaft and coupling.

(5) The length of insertion of the shaft into the coupling should be the dimension L1 on the dimensions table.

(6) Tighten set screws with hex socket heads to the tightening torques shown below using a calibrated torque screwdriver.

Size of hex-socket-head set screw	M3	M4	M5	M6	M8	M10
Tightening torque [N·m]	0.7	1.7	3.6	6.0	14.2	28.0

Selection Procedures

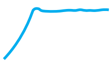
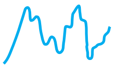
(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$\text{Ta [N·m]} = 9550 \times \frac{\text{P [kW]}}{\text{n [min}^{-1}\text{]}}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$\text{Td [N·m]} = \text{Ta} \times \text{K1} \times \text{K2} \times \text{K3} \times \text{K4}$$

■ Service factor based on load property: K1

	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
Load properties				
K1	1.0	1.25	1.75	2.25

■ Service factor based on operating time: K2

Hrs./day	～8	～16	～24
K2	1.0	1.12	1.25

■ Service factor based on starting/braking frequency: K3

Times/hr.	～10	～30	～60	～120	～240	Over 240
K3	1.0	1.1	1.3	1.5	2.0	＊

* Items marked with asterisks require consultations.

■ Service factor based on operating temperature: K4

Temperature [℃]	－20	0	＋20	＋40	＋60	＋80
K4	1.3	1.1	1.0		1.1	1.3

(3) Set the size so that the nominal torque of the coupling, Tn, is at least equal to the corrected torque, Td.

$$\text{Tn} \geqq \text{Td}$$

(4) Select a size that results in a maximum torque, Tm, for the coupling that is at least equal to the peak torque, Ts, generated by the motor, driven machine or both. Maximum torque refers to the maximum amount of torque that can be applied for a set amount of time considering eight hours of operation per day and up to around ten instances.

$$\text{Tm} \geqq \text{Ts}\cdot\text{K4}$$

(5) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling.

Induction Motor Specifications and Easy Selection Table

Motor		50 Hz: 3000 min^{-1}, 60 Hz: 3600 min^{-1}				50 Hz: 1500min^{-1}, 60 Hz: 1800min^{-1}				50 Hz: 1000min^{-1}, 60 Hz: 1200min^{-1}			
		Two-pole motor		SPRFLEX		Four-pole motor		SPRFLEX		Six-pole motor		SPRFLEX	
Output [kW]	Frequency [Hz]	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter
0.1	50	—	—	—	—	11	0.7	AL-050	11	—	—	—	—
	60	—	—	—	—	11	0.5	AL-050	11	—	—	—	—
0.2	50	11	0.7	AL-050	11	11	1.3	AL-070	11	—	—	—	—
	60	11	0.5	AL-050	11	11	1.1	AL-070	11	—	—	—	—
0.4	50	14	1.3	AL-070	14N	14	2.6	AL-075	14N	19	3.9	AL-090	19N
	60	14	1.1	AL-070	14N	14	2.2	AL-075	14N	19	3.2	AL-090	19N
0.75	50	19	2.4	AL-075	19N	19	4.9	AL-095	19N	24	7.3	AL-100	24N
	60	19	2.0	AL-075	19N	19	4.1	AL-090	19N	24	6.1	AL-095	24N
1.5	50	24	4.9	AL-095	24N	24	9.7	AL-100	24N	28	15	AL-110	28N
	60	24	4.1	AL-095	24N	24	8.1	AL-100	24N	28	12	AL-100	28N
2.2	50	24	7.1	AL-100	24N	28	14	AL-110	28N	28	21	AL-110	28N
	60	24	6.0	AL-095	24N	28	12	AL-100	28N	28	18	AL-110	28N
3.7	50	28	12	AL-100	28N	28	24	AL-110	28N	38	36	—	38N
	60	28	10	AL-100	28N	28	20	AL-110	28N	38	30	AL-110	38N

* The above table shows suitable sizes for ordinary use on an induction motor drive unit.
* Motor rotation speed and output torque are calculated (reference) values.

Plastic Bellows Couplings

BELLOWFLEX

High flexibility High damping No backlash

Max. nominal torque [N·m]	1.5
Bore ranges [mm]	ϕ3～12
Operating temperature [℃]	−20～60
Driver	Induction motor, stepper motor, encoder
Application	Automated teller machines, inspection equipment, printing machinery

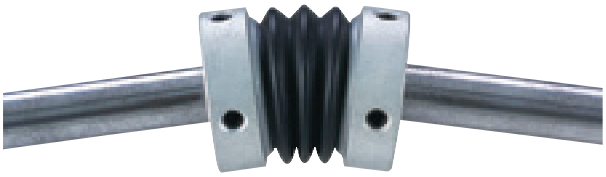
Plastic Bellows Coupling Ideal for Stepper Motors and Encoders

Bellows couplings that use a plastic (polyester resin) boot with plenty of elasticity in order to achieve high damping performance and extremely small counterforce from mounting misalignment. A compact design that unitizes an aluminum alloy hub and plastic boot means there is no backlash.

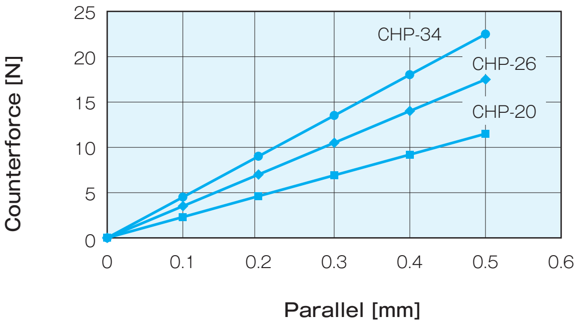
RoHS

Main Features

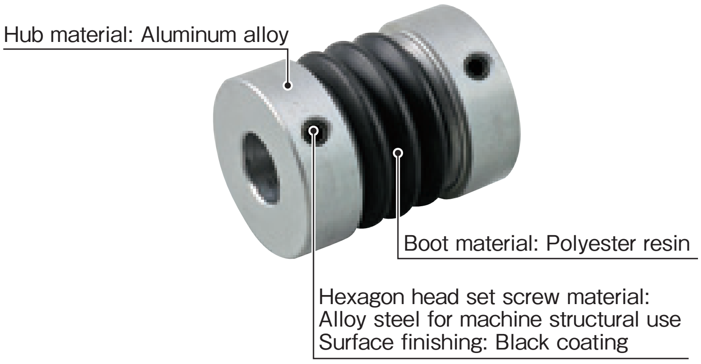
Allows Angular Deflection up to 10°



Extremely Small Counterforce due to Misalignment



Structure and Materials



CHP Models

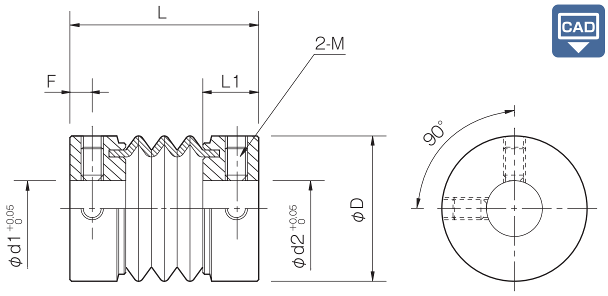
Specifications

Model	Torque		Misalignment			Max. rotation speed [min⁻¹]	Static torsional stiffness [N·m/rad]	Moment of inertia [kg·m²]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
CHP-20	0.4	0.8	0.5	10	± 0.5	9000	5.9	6.30×10^{-7}	0.012
CHP-26	0.7	1.4	0.5	10	± 0.5	7000	12.5	2.40×10^{-6}	0.026
CHP-34	1.5	3.0	0.5	10	± 0.5	5500	32.8	7.90×10^{-6}	0.051

* Static torsional stiffness values given are from measurements taken at 20℃

* The moment of inertia and mass are measured for the minimum bore diameter.

Dimensions



CAD

Unit [mm]

Model	d1 • d2		D	L	L1	F	M
	Min.	Max.					
CHP-20	3	8	20	28	8	3	M3
CHP-26	6	13	26	34	10	4	M4
CHP-34	8	18	34	40	12	5	M5

* For combination with a CHP-20 that has a bore diameter of ø3, open the set screw to an angle of 120°.

Model	Standard bore diameter d1-d2 [mm]					
	3-3	5-5	6-6	8-8	10-10	12-12
CHP-20	●	●	●			
CHP-26			●	●	●	
CHP-34				●	●	●

* The recommended processing tolerance for paired mounting shafts is the h8 class.

* Non-standard bore diameters require additional processing.

How to Place an Order

CHP-26 8-8

Size

Bore diameter d1 - d2

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

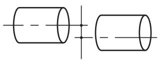
(2) Always tighten bolts with the specified torque.

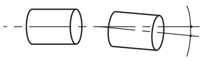
Precautions for Handling

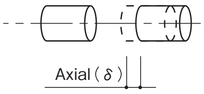
(1) Couplings can be used within a temperature range of −20℃ to 60℃. Although BELLOWFLEX couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water or oil as these may cause deterioration. Use and storage in direct sunlight may shorten coupling service life, so cover couplings appropriately.

(2) Be careful, when working on the bore, to not change the shape of the hub or get cutting residue inside the boot.

(3) To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table.
However, this misalignment is the maximum value when each occurs independently, so make the allowable value when they combine 50% or less of this value.


Parallel (ε)


Angular (θ)


Axial (δ)

(4) Remove any rust, dust, oil or the like from the inner diameter surfaces of the shaft and coupling.

(5) Be careful not to place more bending, tensile, or compressive load on the coupling than necessary when inserting a shaft into a coupling. Also, the length of insertion of the shaft into the coupling should be the dimension L1 on the dimensions table.

(6) Tighten set screws with hex socket heads to the tightening torques shown below using a calibrated torque screwdriver.

Size of hex-socket-head set screw	M3	M4	M5
Tightening torque [N·m]	0.7	1.7	3.6

Selection Procedures

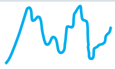
(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\ [\mathrm{N\cdot m}] = 9550 \times \frac{P\ [\mathrm{kW}]}{n[\mathrm{min}^{-1}]}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$Td\ [\mathrm{N\cdot m}] = Ta \times K1 \times K2$$

■ Service factor based on load property: K1

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K1	1.0	1.25	1.75	2.25

■ Service factor based on operating temperature: K2

Temperature [℃]	− 20	0	+ 20	+ 40	+ 60
K2		1.0		1.2	1.3

(3) Set the size so that the nominal torque of the coupling Tn is at least equal to the corrected torque Td.

$$Tn \geqq Td$$

(4) Select a size that results in a maximum torque, Tm, for the coupling that is at least equal to the peak torque, Ts, generated by the driver, follower or both. Maximum torque refers to the maximum amount of torque that can be applied for a set amount of time considering eight hours of operation per day and up to around ten instances.

$$Tm \geqq Ts$$

(5) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling.

Rubber and Plastic Couplings

CENTAFLEX

High flexibility
High damping
For high output
For special-order specific length couplings
Long service life
Wide range of variations

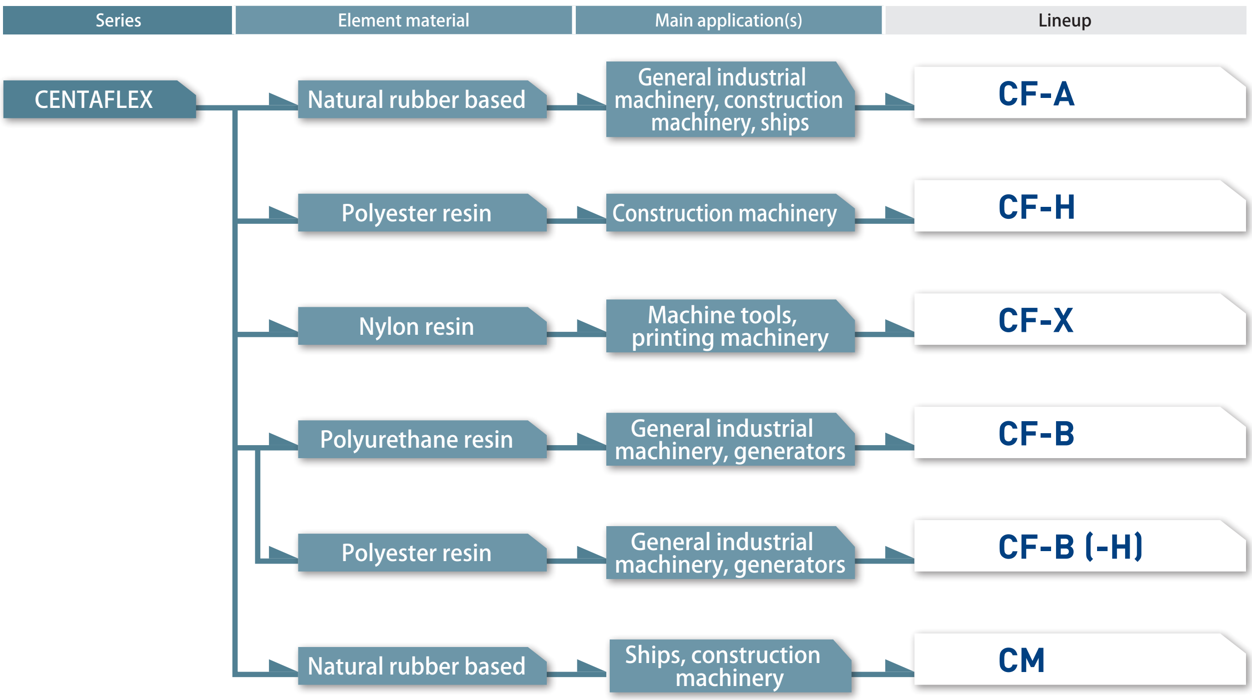
Driver	Engines, induction motors
Application	Construction machinery, agricultural machinery, ships, generators, special rolling stock, machine tools, testing machinery, wind turbin generator

Couplings Allow a Large Mounting Misalignment and Rapidly Absorb Vibration and Shock

These couplings use rubber or plastic in their power transmission elements. They reduce or absorb shock and vibration using the elasticity of those transmission elements. Their advantages include high flexibility, low noise, easy maintenance (because they do not require lubrication), simple construction, and long service life.

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Available Models



Series	Element material	Main application(s)	Lineup
CENTAFLEX	Natural rubber based	General industrial machinery, construction machinery, ships	CF-A
	Polyester resin	Construction machinery	CF-H
	Nylon resin	Machine tools, printing machinery	CF-X
	Polyurethane resin	General industrial machinery, generators	CF-B
	Polyester resin	General industrial machinery, generators	CF-B (-H)
	Natural rubber based	Ships, construction machinery	CM

Model Selection

Model/ Type	Nominal torque [N·m]	Element material	Oil-proof	Misalignment			Operating temperature [℃]	Torsion at rated torque[°]	Outer diameter [mm]	Max. shaft dia. [mm]	Max. nominal torque [N·m]
	1 10 100 1000 10000 100000			Parallel	Angular	Axial					
CF-A	10 ～ 5000	Natural rubber based (NR)	×	●	●	●	−30 ～ 95	3 ～ 6	56 ～ 370	130	5000
CF-H	100 ～ 2500	Polyester resin	●	○	△	●	−40 ～ 120	0.2 ～ 0.3	125 ～ 330	120	2500
CF-X	15 ～ 370	Nylon resin	●	△	△	○	−30 ～ 90	0.12	57 ～ 175	65	370
CF-B	30 ～ 1000	Polyurethane resin	●	●	○	○	−40 ～ 80	2.5	72 ～ 187	80	1000
CF-B (-H)	45 ～ 1400	Polyester resin	●	●	○	○	−40 ～ 120	4	72 ～ 187	80	1400
CM	700 ～ 18000	Natural rubber based (NR)	×	◎	△	●	−30 ～ 90	12	314.3 ～ 733.4	180	18000

* Symbols in the table indicate compatibility in five levels. The symbols are, highest compatibility to lowest, ●◎○△×. (Higher compatibility ← ●◎○△× → Lower compatibility)

Product Lineup

CF-A

No backlash
High flexibility
High damping
For special-order specific-length couplings

Applications: Construction machinery, ships, generators, compressors

Excellent Durability and Vibration/Shock Absorbance

Heat resistant rubber and pre-compressed construction were used to provide excellent durability and vibration/shock absorbance. Machinery noise is also reduced.

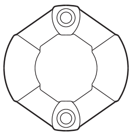
Two Ways to Mount

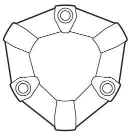
These couplings can be mounted on the shaft using bolts (O0) or by insertion (S0). Select the method that works best for your maintenance and mounting/removal circumstances. Both are easy to center.

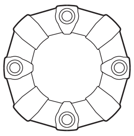
Specific Lengths Can be Ordered

Specific lengths can be ordered for the OG and OZ types. Select either low speed (OG) or high speed (OZ) types.

Shaped by Size

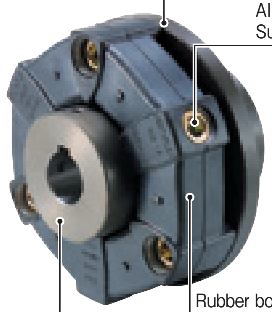

Size 001, 002


Size 004, 008, 016
025, 030, 090


Size 012, 022, 028, 050
080, 140, 200, 250,400

Max. nominal torque	[N·m]	5000
Pilot bore/added work ranges	[mm]	ϕ 9 ～ 130
Operating temperature	[℃]	− 30 ～ 95
Backlash		Zero

Materials Used for Main Parts


Flange hub material: FC200 or FCD450 or S45C
Surface finishing: Phosphate conversion coating

Bolt material:
Alloy steel for machine structural use
Surface finishing: Zinc plating

Rubber body material: Natural rubber (NR)

Cylindrical hub material: S45C
Surface finishing: Phosphate conversion coating

Component Construction by Type

Type	Structural components				
	Rubber body	Spring pin	Bolt	Cylindrical hub	Flange hub
00・S0	●				
0P・SP	●	●			
0B・SB	●		●		
0C・SC	●	●	●		
01・S1	●	●	●	●	
02・S2	●	●	●	●	●

CF-H

High stiffness
High flexibility
High damping
Thermal resistance
Oil resistance

Applications: Construction machinery

Excellent Environmental Resistance

In addition to absorbing vibration and shock, they have excellent resistance to cold, heat, and oil, enabling their use in punishing environments.

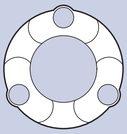
High Durability

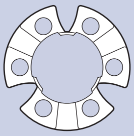
A clamping hub is available (made to order) that fully locks the cylindrical hub to the spline shaft to eliminate fretting wear.

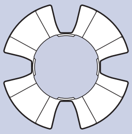
Easy to Maintain

Input and output can be coupled or separated easily by simply moving the coupling in the axial, facilitating maintenance.

Shaped by Size

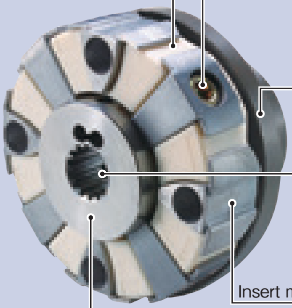

Size 008, 016


Size 030


Size 040, 050, 090
110, 160, 240

Max. nominal torque	[N·m]	2500
Pilot bore/added work ranges	[mm]	ϕ 13 ～ 120
Operating temperature	[℃]	− 40 ～ 120
Backlash		Yes

Materials Used for Main Parts


Element material: Polyester resin

Bolt material: Alloy steel for machine structural use
Surface finishing: Zinc plating

Flange hub material:
S45C or FCD450
Surface finishing:
Phosphate conversion coating

Special order parts:
Spline machining

Insert material: Aluminum alloy

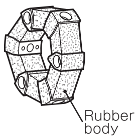
Cylindrical hub material: S45C
Surface finishing: Phosphate conversion coating

Component Construction by Type

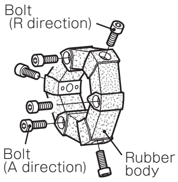
Type	Structural components					
	Element	Aluminum insert	Spring pin	Bolt	Cylindrical hub	Flange hub
00	●	●				
0P	●	●	●			
0B	●	●		●		
0C	●	●	●	●		
01	●	●	●	●	●	
02	●	●	●	●	●	●

0
Bolt Mounted Types

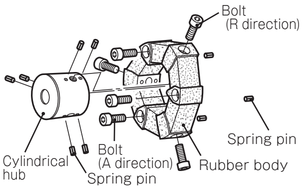
00 type



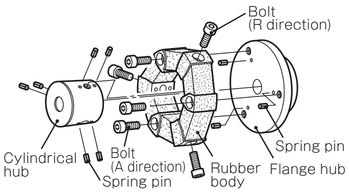
0B type



01 type

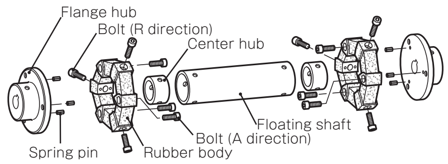


02 type



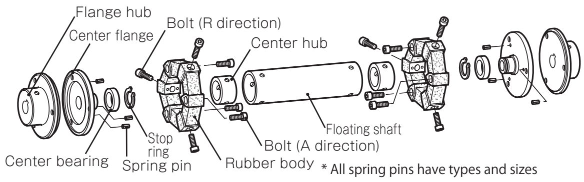
0G type

■ For Low Rotation Speeds



0Z type

■ For High Rotation Speeds

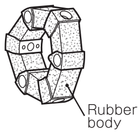


* All spring pins have types and sizes on which they are not used.

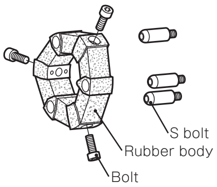
* The OP type is the O0 type with a spring pin. * The OC type is the OB type with a spring pin.

S
Insertion-Mounted Types

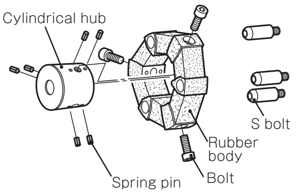
S0 type



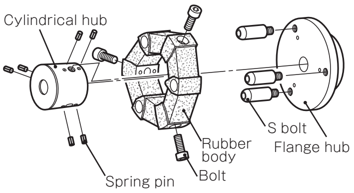
SB type



S1 type



S2 type

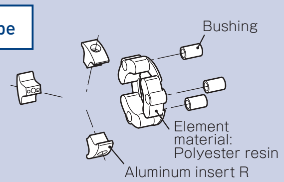


* The SP type is the S0 type with a spring pin. * The SC type is the SB type with a spring pin.

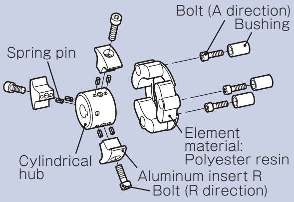
0
Bolt Mounted Types

Size 008, 016

00 type

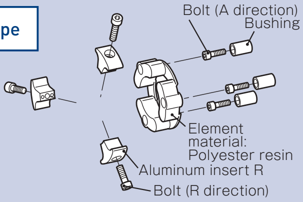


01 type

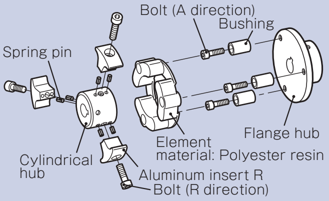


* There is no spring pin for size 008.

0B type



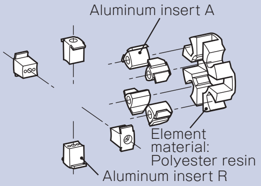
02 type



* There is no spring pin for size 008.

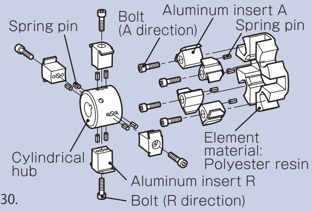
Size 030 to 240

00 type



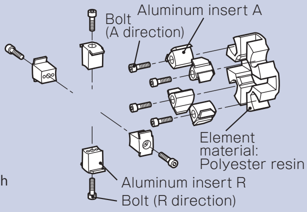
*There are three of each bolt for size 030.

01 type



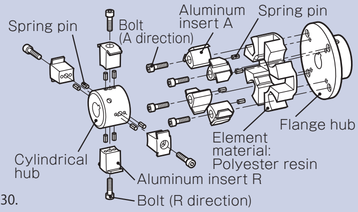
* There are three of each bolt for size 030.

0B type



* There are three of each bolt for size 030.

02 type



* There are three of each bolt for size 030.

* The OP type is the O0 type with a spring pin. * The OC type is the OB type with a spring pin.

Product Lineup

CF-X

Applications: Machine tools, printing machines, compressors

High Torsional Stiffness, High Strength

They have very high torsional stiffness for rubber/plastic couplings, as well as no backlash in constant-speed operation. They absorb vibration and shock while delivering accurate power transmission.

Specific Lengths Can be Ordered

The OG types allow specific lengths to be specified, and they can be removed without moving machinery.

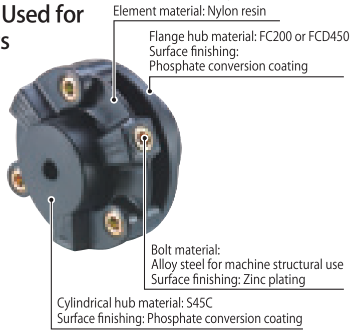
Two Types of Hubs

Cylindrical hubs and flange hubs can be selected with the key/set screw system or the clamp system.

Max. nominal torque	[N·m]	370
Pilot bore/added work ranges	[mm]	ϕ 9 ～ 65
Operating temperature	[℃]	－30 ～ 90
Backlash		Zero

High stiffness / No backlash / High flexibility / High damping / Oil resistance / For special-order specific-length couplings

Materials Used for Main Parts



Component Construction by Type

Type	Structural components			
	Element	Bolt	Cylindrical hub	Flange hub
00	●			
0B	●	●		
01	●	●	●	
02	●	●	●	●

CF-B

Applications: Electric motors, electric pumps, general industrial machinery

Excellent Vibration/Shock Absorbance

Excellent at absorbing shock and vibration and also reduces machinery noise.

Easy to Maintain

The simple design sandwiches the element between two hubs, facilitating mounting and removal.

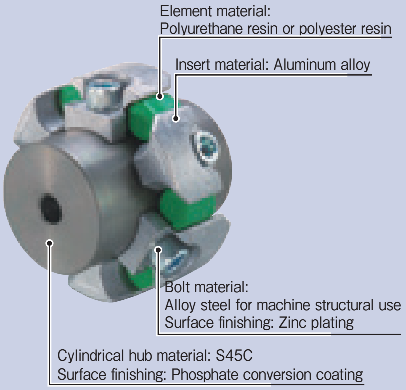
Two Types of Elements

Elements with differing characteristics are available. Select CF-B couplings to emphasize flexibility or CF-B-H couplings to emphasize torsional stiffness.

Max. nominal torque	[N·m]	1400
Pilot bore/added work ranges	[mm]	ϕ 10 ～ 80
Operating temperature	[℃]	CF-B: -40 - 80 CF-B-H: -40 - 120
Backlash		Insignificant

High flexibility / High damping / Oil resistance

Materials Used for Main Parts



CM Made to order

Applications: Ships, construction machinery, generators, compressors

Excellent Vibration/Shock Absorbance

These are very soft in the torsional direction and excellent at absorbing shock and vibration.

Easy to Mount and Remove

Input and output can be coupled or separated easily by simply moving the coupling in the axial, and these couplings can be mounted directly onto engine flywheels that conform to SAE standard J620.

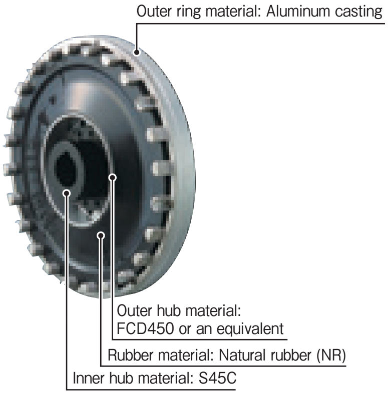
Excellent Durability

Two types of rubber with different transmission torques and hardnesses are available. They boast superior durability and require virtually no maintenance.

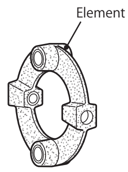
Max. nominal torque	[N·m]	18000
Pilot bore/added work ranges	[mm]	ϕ 19 ～ 180
Operating temperature	[℃]	－30 ～ 90
Backlash		Yes

For high output / High flexibility / High damping

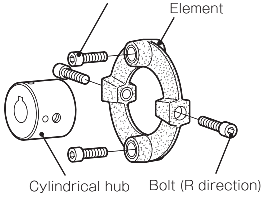
Materials Used for Main Parts



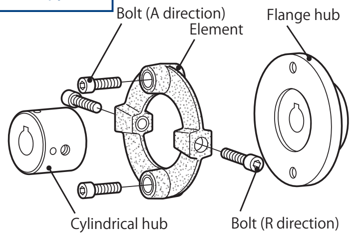
00 type



01 type

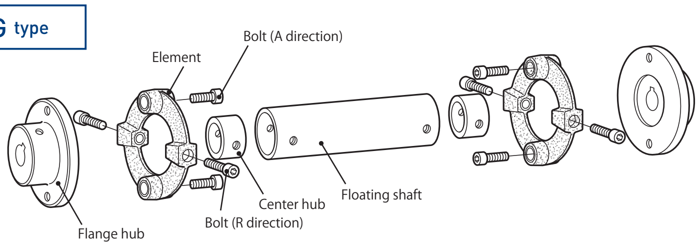


02 type

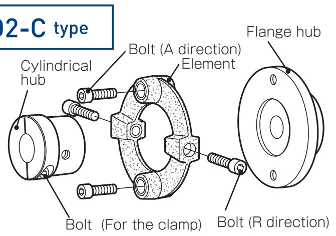


* The OB type is the O0 type with a bolt.

0G type

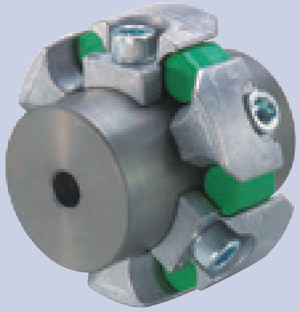


02-C type



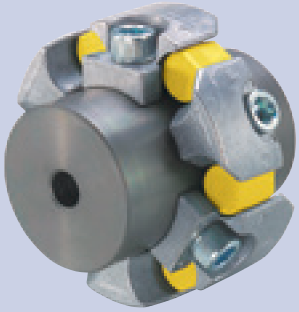
Clamp system, made to order

CF-B



Polyurethane resin used for elements. These can transmit power smoothly even when the two shafts get off center.

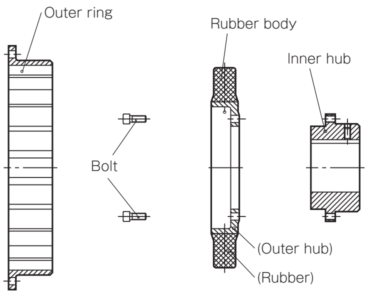
CF-B(-H)



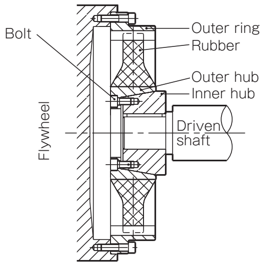
Polyester resin used for elements. These have double the torsional stiffness of polyurethane resins. They excel in resisting heat and cold.

Structural Components

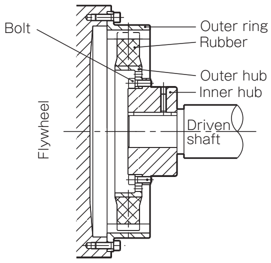
The rubber body is composed of rubber and an outer hub that are fully attached by vulcanizing adhesion.



Size
800 ～ 2400



Size
2800 ～ 18000



Component Construction by Type

Type	Structural components			
	Rubber body	Outer ring	Bolt	Inner hub
00	●			
S0	●	●		
SB	●	●	●	
S1	●	●	●	●

Product Lineup (for Ships)

The line-up of CENTAFLEX couplings includes products for generators and main and auxiliary ship engines.

CENTAX L Types

These are types that combine a high-elasticity CENTAX coupling with a center link. They are optimal for high-speed ferries, passenger boats, tugboats and the like that place engines on flexible mounts.

CENTAX G Types

These are types that combine a high-elasticity CENTAX coupling with a membrane. The membrane system can absorb ample mounting misalignment whether the engine has a rigid mount or flexible mount.

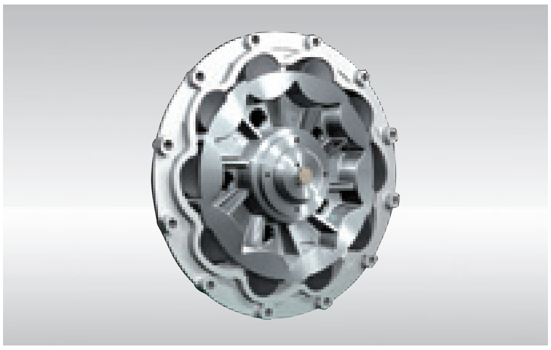
CENTAX B Types

These are simply constructed types that combine a high-elasticity CENTAX coupling with a pin/bushing system. They are ideal for flange-mounted large engine generators.

CENTAMAX

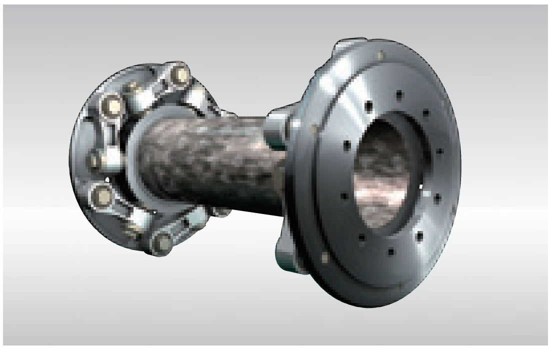
They come in a standard type for flange mounting and a no-backlash type for base mounting. They are optimal for medium-sized engine compressors and generators.

CENTAFLEX R Types



These are rubber roller couplings for small main ship engines. They are supple in the torsional direction at low torques and shift the resonance point below the idle RPM. These are optimal for small fishing boats, stern drives, and the like.

CENTALINK Carbon Drive Shaft



The drive shaft is made of carbon fiber. These are optimal for high-speed ferry and tugboat propulsion shafts and for wind power generation. Total shaft systems can be designed that include a center link coupling, bearings, bulkhead seals, and the like.

FAQ

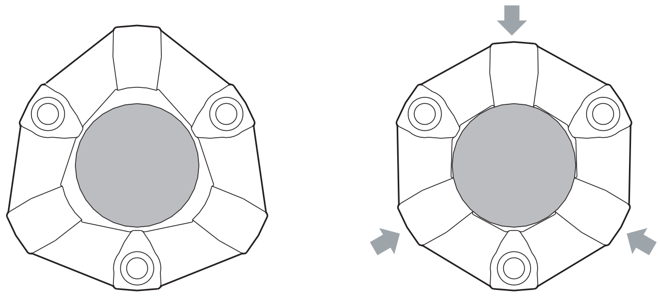
Q1 Resonance occurs on equipment that is driven by diesel engines. What can I do about it?

A If you are using a diesel engine as your drive source, resonance will occur when the natural frequency in the rotation direction of the torque transmission system as a whole coincides with the vibration frequency caused by engine rotation speed. Engine couplings not only transmit rotation and absorb vibration, they also serve the role of avoiding resonant rotation speeds. This means that any resonant rotation speed that may exist can be shifted away from the rotation speed at which the engine is used by changing the torsional stiffness of the coupling (accomplished by changing the coupling, the shore hardness, or the like). With models with low torsional stiffness that use natural rubber-based elements, such as the CF-A and CM, the resonant rotation speed tends to be below the low idle, while on models with high torsional stiffness such as the CF-H, it tends to be in a speed band that is higher than the high-idle rotation speed.

Q2 What does the "pre-compressed construction" of CF-A models refer to?

A It is a characteristic of rubber that its service life is longer when it is compressed rather than extended during use. It also has a longer life, even when compressed, if force is only applied to it after it has been somewhat compressed. This somewhat-compressed state is called pre-compression.

CF-A models are assembled with pre-compression applied to the rubber body. The compressed portion has longer life, and even the pulled portion will not go into an extended state if the torque on it does not exceed a certain level, so a longer overall life is achieved.

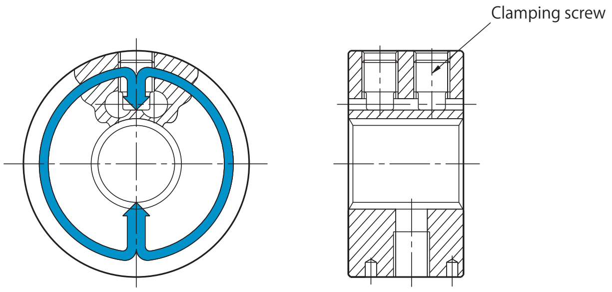

■ Before compression
■ After compression

Q3 Do rubber couplings have heat and maintenance issues?

A When natural rubber is heated, it loses its surface oil, decreasing its elasticity and hardening it. While the progress of that hardening will vary with the temperature, when a CF-A coupling used inside an engine housing is subjected to heat, the rubber body surface hardens, so that when torque is applied to that part of it, cracks can start in the hardened layer, damaging it. As a maintenance guide, we recommend replacing the coupling when rubber hardness increases about 15 Hs from the pre-use level.

Q4 What is CENTA-LOCK?

A Hubs can be mounted on shafts using a CENTA-LOCK mechanism. Tightening the clamping screw changes the shape of the spline part of the clamping hub, pressing it against the spline part of the shaft and completely locking the hub to the spline shaft. While size also matters, when the clamping screw is tightened to the stipulated torque, about one ton of axial holding force is generated per clamping screw. This means that under normal conditions of use, they are locked to a degree that you never have to think about.



Center lock mechanism on the clamping hub

CF-A 00/01/02 Types Bolt-mounted Type

Specifications

Model	Torque			Misalignment			Max. rotation speed [min^{-1}]	Dynamic torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-A-001-00-1360	10	25	± 4	0.5	3	± 2	10000	1.47×10^2	2.5×10^{-5}	0.08
CF-A-002-00-1360	20	50	± 8	1.0	3	± 3	8000	2.92×10^2	1.3×10^{-4}	0.2
CF-A-004-00-1360	40	100	± 16	1.0	3	± 3	7000	7.59×10^2	2.8×10^{-4}	0.2
CF-A-008-00-1360	80	200	± 32	1.0	3	± 4	6500	1.44×10^3	7.6×10^{-4}	0.3
CF-A-012-00-1360	120	300	± 48	1.0	2	± 4	6500	4.38×10^3	8.3×10^{-4}	0.3
CF-A-016-00-1360	160	400	± 64	1.5	3	± 5	6000	3.28×10^3	2.5×10^{-3}	0.7
CF-A-022-00-1360	220	550	± 88	1.5	2	± 5	6000	8.26×10^3	2.7×10^{-3}	0.7
CF-A-025-00-1360	250	630	± 100	1.5	3	± 5	5000	4.12×10^3	4.2×10^{-3}	0.8
CF-A-028-00-1360	350	880	± 140	1.5	2	± 5	5000	1.05×10^4	4.6×10^{-3}	1.0
CF-A-030-00-1360	400	1000	± 160	1.5	3	± 5	4000	6.40×10^3	1.1×10^{-2}	1.5
CF-A-050-00-1360	600	1500	± 240	1.5	2	± 5	4000	1.48×10^4	1.2×10^{-2}	1.7
CF-A-080-00-1360	800	2000	± 320	1.5	2	± 4	4000	2.17×10^4	1.5×10^{-2}	2.3
CF-A-090-00-1360	900	2250	± 360	1.5	3	± 5	3600	1.37×10^4	3.8×10^{-2}	3.2
CF-A-140-00-1360	1400	3500	± 560	1.5	2	± 5	3600	2.90×10^4	4.2×10^{-2}	3.7
CF-A-200-00-1360	2000	5000	± 800	1.5	2	± 5	3200	6.08×10^4	7.8×10^{-2}	5.5
CF-A-250-00-1360	3000	8750	± 1250	1.5	2	± 5	3000	8.28×10^4	0.14	7.8
CF-A-400-00-1360	5000	12500	± 2000	1.5	2	± 5	2800	1.25×10^5	0.24	11.5

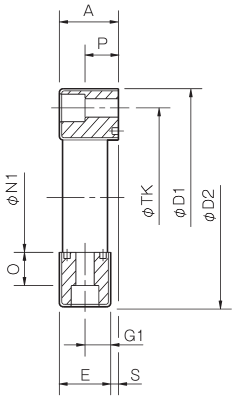
Model	Torque			Misalignment			Max. rotation speed [min^{-1}]	Dynamic torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-A-001-01-1360	10	25	± 4	0.5	3	± 2	10000	1.47×10^2	5.8×10^{-5}	0.3
CF-A-002-01-1360	20	50	± 8	1.0	3	± 3	8000	2.92×10^2	2.5×10^{-4}	0.5
CF-A-004-01-1360	40	100	± 16	1.0	3	± 3	7000	7.59×10^2	5.4×10^{-4}	0.6
CF-A-008-01-1360	80	200	± 32	1.0	3	± 4	6500	1.44×10^3	1.6×10^{-3}	1.3
CF-A-012-01-1360	120	300	± 48	1.0	2	± 4	6500	4.38×10^3	1.8×10^{-3}	1.3
CF-A-016-01-1360	160	400	± 64	1.5	3	± 5	6000	3.28×10^3	4.3×10^{-3}	2.3
CF-A-022-01-1360	220	550	± 88	1.5	2	± 5	6000	8.26×10^3	4.8×10^{-3}	2.4
CF-A-025-01-1360	250	630	± 100	1.5	3	± 5	5000	4.12×10^3	8.5×10^{-3}	3.6
CF-A-028-01-1360	350	880	± 140	1.5	2	± 5	5000	1.05×10^4	9.6×10^{-3}	3.8
CF-A-030-01-1360	400	1000	± 160	1.5	3	± 5	4000	6.40×10^3	2.1×10^{-2}	6.0
CF-A-050-01-1360	600	1500	± 240	1.5	2	± 5	4000	1.48×10^4	2.3×10^{-2}	6.3
CF-A-080-01-1360	800	2000	± 320	1.5	2	± 4	4000	2.17×10^4	2.6×10^{-2}	7.6
CF-A-090-01-1360	900	2250	± 360	1.5	3	± 5	3600	1.37×10^4	6.7×10^{-2}	11.8
CF-A-140-01-1360	1400	3500	± 560	1.5	2	± 5	3600	2.90×10^4	7.4×10^{-2}	12.6
CF-A-200-01-1360	2000	5000	± 800	1.5	2	± 5	3200	6.08×10^4	0.14	17.8
CF-A-250-01-1360	3000	8750	± 1250	1.5	2	± 5	3000	8.28×10^4	0.24	24.5
CF-A-400-01-1360	5000	12500	± 2000	1.5	2	± 5	2800	1.25×10^5	0.44	37.6

Model	Torque			Misalignment			Max. rotation speed [min^{-1}]	Dynamic torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-A-001-02-1360	10	25	± 4	0.5	3	± 2	10000	1.47×10^2	1.3×10^{-4}	0.5
CF-A-002-02-1360	20	50	± 8	1.0	3	± 3	8000	2.92×10^2	6.3×10^{-4}	1.1
CF-A-004-02-1360	40	100	± 16	1.0	3	± 3	7000	7.59×10^2	1.3×10^{-3}	1.5
CF-A-008-02-1360	80	200	± 32	1.0	3	± 4	6500	1.44×10^3	3.7×10^{-3}	3.0
CF-A-012-02-1360	120	300	± 48	1.0	2	± 4	6500	4.38×10^3	3.9×10^{-3}	3.1
CF-A-016-02-1360	160	400	± 64	1.5	3	± 5	6000	3.28×10^3	1.1×10^{-2}	5.5
CF-A-022-02-1360	220	550	± 88	1.5	2	± 5	6000	8.26×10^3	1.1×10^{-2}	5.6
CF-A-025-02-1360	250	630	± 100	1.5	3	± 5	5000	4.12×10^3	2.1×10^{-2}	8.5
CF-A-028-02-1360	350	880	± 140	1.5	2	± 5	5000	1.05×10^4	2.2×10^{-2}	8.7
CF-A-030-02-1360	400	1000	± 160	1.5	3	± 5	4000	6.40×10^3	4.7×10^{-2}	13.8
CF-A-050-02-1360	600	1500	± 240	1.5	2	± 5	4000	1.48×10^4	5.0×10^{-2}	14.2
CF-A-080-02-1360	800	2000	± 320	1.5	2	± 4	4000	2.17×10^4	5.4×10^{-2}	15.5
CF-A-090-02-1360	900	2250	± 360	1.5	3	± 5	3600	1.37×10^4	0.15	26.1
CF-A-140-02-1360	1400	3500	± 560	1.5	2	± 5	3600	2.90×10^4	0.16	26.8
CF-A-200-02-1360	2000	5000	± 800	1.5	2	± 5	3200	6.08×10^4	0.30	39.4
CF-A-250-02-1360	3000	8750	± 1250	1.5	2	± 5	3000	8.28×10^4	0.50	52.3
CF-A-400-02-1360	5000	12500	± 2000	1.5	2	± 5	2800	1.25×10^5	0.97	85.0

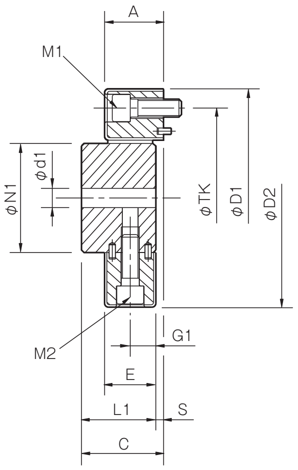
* Max. rotation speed does not take into account dynamic balance.
* The dynamic torsional stiffness is about 1.3 times that of the static torsional stiffness.
* Values for moment of inertia and mass are those when the cylindrical hub and flange hub have pilot bores.

Dimensions

■ CF-A OO



■ CF-AO1



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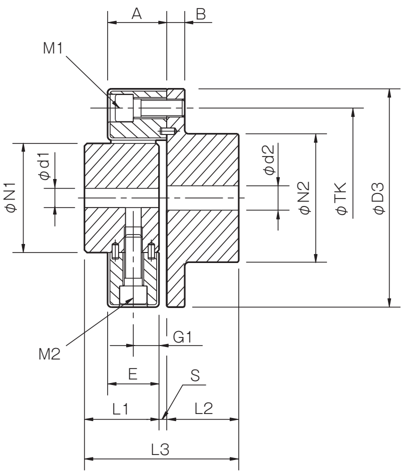

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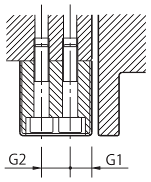


Unit [mm]

Model	d1			d2			D1	D2	D3	N1	N2	L1	L2	L3	A	B	C	E	G1	G2	O	P	S	TK	M1	M2
	Pilot bore	Min.	Max.	Pilot bore	Min.	Max.																				
CF-A-001	8	9	19	8	9	22	57	56	56	30	36	32	24	58	24	7	34	22	11	—	5	18	2	44	2-M6	2-M6
CF-A-002	10	11	28	9	10	30	86	85	85	40	45	30	28	62	24	8	34	20	10	—	14	12	4	68	2-M8	2-M8
CF-A-004	12	14	30	11	12	36	100	97	100	45	55	34	30	68	28	8	38	24	12	—	18	17	4	80	3-M8	3-M8
CF-A-008	12	14	38	15	16	46	122	120	120	60	70	40	42	86	32	10	44	28	14	—	20	20	4	100	3-M10	3-M10
CF-A-012	12	14	38	15	16	46	122	120	120	60	70	40	42	86	32	10	44	28	14	—	20	20	4	100	4-M10	4-M10
CF-A-016	15	16	48	19	20	56	150	150	150	70	85	52	50	108	42	12	58	36	18	—	25	24	6	125	3-M12	3-M12
CF-A-022	15	16	48	19	20	56	150	150	150	70	85	52	50	108	42	12	58	36	18	—	25	24	6	125	4-M12	4-M12
CF-A-025	15	16	55	19	20	65	170	170	170	85	100	58	56	120	46	14	64	40	20	—	26	26	6	140	3-M14	3-M14
CF-A-028	15	16	55	19	20	65	170	170	170	85	100	58	56	120	46	14	64	40	20	—	26	26	6	140	4-M14	4-M14
CF-A-030	20	22	65	28	30	80	200	200	200	100	120	68	66	142	58	16	76	50	25	—	33	35	8	165	3-M16	3-M16
CF-A-050	20	22	65	28	30	80	200	200	200	100	120	68	66	142	58	16	76	50	25	—	33	35	8	165	4-M16	4-M16
CF-A-080	20	22	65	28	30	80	205	205	200	100	120	80	66	150	65	16	84	61	30.5	—	33	35	4	165	4-M16	4-M16
CF-A-090	30	32	85	30	32	95	260	260	260	125	140	84	80	172	70	19	92	62	31	—	46	45	8	215	3-M20	3-M20
CF-A-140	30	32	85	30	32	95	260	260	260	125	140	84	80	172	70	19	92	62	31	—	46	45	8	215	4-M20	4-M20
CF-A-200	35	38	105	35	38	110	300	300	300	145	160	94	90	192	80	19	102	72	36	—	46	45	8	250	4-M20	4-M20
CF-A-250	40	42	115	40	42	120	340	340	340	160	180	100	100	208	85	19	108	77	22.5	32	60	60	8	280	4-M20	8-M20
CF-A-400	40	42	115	40	42	130	370	370	370	170	200	125	125	260	105	29	135	95	28.5	38	70.5	67	10	300	4-M24	8-M20

* Pilot bores are to be drilled into the part. Minimum values for d1 and d2 are given by the minimum bore diameter values in the MIKI PULLEY standard hole-drilling standards and maximum values from the maximum allowable drilled bore diameters.

* The above table values are dimensions when the rubber body is assembled, so the N1, TK, D1, and D2 dimensions prior to rubber body assembly will differ from those above.

* The TK dimension is the bolt mounting pitch diameter of the flange hub or paired mounting part.

* The nominal diameters for bolts M1/M2 are equal to the quantity minus the nominal diameter of the screw threads.

* Using a hex-socket-head bolt with the CF-A-400 requires a special flat washer.

* CF-A-O2 data is used as the CAD data.

How to Place an Order

CF-A-001-O2-1360 12H-14N

Size

Type
O0: Rubber body only
OB: O0 and bolts
O1: OC and cylindrical hub
OP: O0 and spring pin
OC: OB and spring pin
O2: O1 and flange hub

Rubber material
13: Natural rubber (NR)

Shore hardness (Rubber)
60: 60 hardness (JIS A)
50: 50 hardness (JIS A) (made to order)

Bore diameter: d1 (Cylindrical hub) - d2 (Flange hub)
Blank: Pilot bore

Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
N: Compliant with the new motor standards

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

CF-A S0/S1/S2 Types Bolt-insertion Mounted Type

Specifications

Model	Torque			Misalignment			Max. rotation speed [min^{-1}]	Dynamic torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-A-001-S0-1360	10	25	± 4	0.5	3	± 2	10000	1.47×10^2	1.9×10^{-5}	0.07
CF-A-002-S0-1360	20	50	± 8	1.0	3	± 3	8000	2.92×10^2	1.2×10^{-4}	0.1
CF-A-004-S0-1360	40	100	± 16	1.0	3	± 3	7000	7.59×10^2	2.6×10^{-4}	0.2
CF-A-008-S0-1360	80	200	± 32	1.0	3	± 4	6500	1.44×10^3	7.2×10^{-4}	0.3
CF-A-012-S0-1360	120	300	± 48	1.0	2	± 4	6500	4.38×10^3	7.6×10^{-4}	0.3
CF-A-016-S0-1360	160	400	± 64	1.5	3	± 5	6000	3.28×10^3	2.4×10^{-3}	0.6
CF-A-022-S0-1360	220	550	± 88	1.5	2	± 5	6000	8.26×10^3	2.6×10^{-3}	0.7
CF-A-025-S0-1360	250	630	± 100	1.5	3	± 5	5000	4.12×10^3	4.0×10^{-3}	0.8
CF-A-028-S0-1360	350	880	± 140	1.5	2	± 5	5000	1.05×10^4	4.3×10^{-3}	0.9
CF-A-030-S0-1360	400	1000	± 160	1.5	3	± 5	4000	6.40×10^3	1.0×10^{-2}	1.4
CF-A-050-S0-1360	600	1500	± 240	1.5	2	± 5	4000	1.48×10^4	1.1×10^{-2}	1.7
CF-A-080-S0-1360	800	2000	± 320	1.5	2	± 4	4000	2.17×10^4	1.5×10^{-2}	2.3
CF-A-090-S0-1360	900	2250	± 360	1.5	3	± 5	3600	1.37×10^4	3.6×10^{-2}	3.1
CF-A-140-S0-1360	1400	3500	± 560	1.5	2	± 5	3600	2.90×10^4	3.8×10^{-2}	3.4
CF-A-200-S0-1360	2000	5000	± 800	1.5	2	± 5	3200	6.08×10^4	7.5×10^{-2}	5.3
CF-A-250-S0-1360	3000	8750	± 1250	1.5	2	± 5	3000	8.28×10^4	0.14	7.0
CF-A-400-S0-1360	5000	12500	± 2000	1.5	2	± 5	2800	1.25×10^5	0.22	10.7

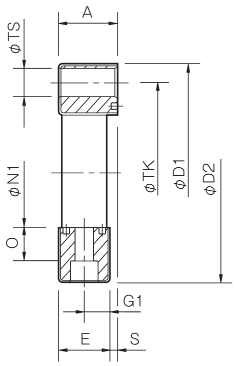
Model	Torque			Misalignment			Max. rotation speed [min^{-1}]	Dynamic torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-A-001-S1-1360	10	25	± 4	0.5	3	± 2	10000	1.47×10^2	6.0×10^{-5}	0.3
CF-A-002-S1-1360	20	50	± 8	1.0	3	± 3	8000	2.92×10^2	2.8×10^{-4}	0.5
CF-A-004-S1-1360	40	100	± 16	1.0	3	± 3	7000	7.59×10^2	5.8×10^{-4}	0.7
CF-A-008-S1-1360	80	200	± 32	1.0	3	± 4	6500	1.44×10^3	1.8×10^{-3}	1.4
CF-A-012-S1-1360	120	300	± 48	1.0	2	± 4	6500	4.38×10^3	2.0×10^{-3}	1.4
CF-A-016-S1-1360	160	400	± 64	1.5	3	± 5	6000	3.28×10^3	4.7×10^{-3}	2.5
CF-A-022-S1-1360	220	550	± 88	1.5	2	± 5	6000	8.26×10^3	5.4×10^{-3}	2.6
CF-A-025-S1-1360	250	630	± 100	1.5	3	± 5	5000	4.12×10^3	9.2×10^{-3}	3.8
CF-A-028-S1-1360	350	880	± 140	1.5	2	± 5	5000	1.05×10^4	1.1×10^{-3}	4.0
CF-A-030-S1-1360	400	1000	± 160	1.5	3	± 5	4000	6.40×10^3	2.2×10^{-2}	6.3
CF-A-050-S1-1360	600	1500	± 240	1.5	2	± 5	4000	1.48×10^4	2.5×10^{-2}	6.8
CF-A-080-S1-1360	800	2000	± 320	1.5	2	± 4	4000	2.17×10^4	2.9×10^{-2}	8.1
CF-A-090-S1-1360	900	2250	± 360	1.5	3	± 5	3600	1.37×10^4	7.1×10^{-2}	12.4
CF-A-140-S1-1360	1400	3500	± 560	1.5	2	± 5	3600	2.90×10^4	7.9×10^{-2}	13.3
CF-A-200-S1-1360	2000	5000	± 800	1.5	2	± 5	3200	6.08×10^4	0.15	18.5
CF-A-250-S1-1360	3000	8750	± 1250	1.5	2	± 5	3000	8.28×10^4	0.25	24.5
CF-A-400-S1-1360	5000	12500	± 2000	1.5	2	± 5	2800	1.25×10^5	0.49	39.5

Model	Torque			Misalignment			Max. rotation speed [min^{-1}]	Dynamic torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-A-001-S2-1360	10	25	± 4	0.5	3	± 2	10000	1.47×10^2	1.4×10^{-4}	0.5
CF-A-002-S2-1360	20	50	± 8	1.0	3	± 3	8000	2.92×10^2	6.6×10^{-4}	1.1
CF-A-004-S2-1360	40	100	± 16	1.0	3	± 3	7000	7.59×10^2	1.4×10^{-3}	1.5
CF-A-008-S2-1360	80	200	± 32	1.0	3	± 4	6500	1.44×10^3	3.9×10^{-3}	3.1
CF-A-012-S2-1360	120	300	± 48	1.0	2	± 4	6500	4.38×10^3	4.1×10^{-3}	3.2
CF-A-016-S2-1360	160	400	± 64	1.5	3	± 5	6000	3.28×10^3	1.1×10^{-2}	5.6
CF-A-022-S2-1360	220	550	± 88	1.5	2	± 5	6000	8.26×10^3	1.2×10^{-2}	5.8
CF-A-025-S2-1360	250	630	± 100	1.5	3	± 5	5000	4.12×10^3	2.2×10^{-2}	8.7
CF-A-028-S2-1360	350	880	± 140	1.5	2	± 5	5000	1.05×10^4	2.3×10^{-2}	8.9
CF-A-030-S2-1360	400	1000	± 160	1.5	3	± 5	4000	6.40×10^3	4.9×10^{-2}	14.2
CF-A-050-S2-1360	600	1500	± 240	1.5	2	± 5	4000	1.48×10^4	5.2×10^{-2}	14.6
CF-A-080-S2-1360	800	2000	± 320	1.5	2	± 4	4000	2.17×10^4	5.6×10^{-2}	16.0
CF-A-090-S2-1360	900	2250	± 360	1.5	3	± 5	3600	1.37×10^4	0.16	26.6
CF-A-140-S2-1360	1400	3500	± 560	1.5	2	± 5	3600	2.90×10^4	0.17	27.5
CF-A-200-S2-1360	2000	5000	± 800	1.5	2	± 5	3200	6.08×10^4	0.32	40.1
CF-A-250-S2-1360	3000	8750	± 1250	1.5	2	± 5	3000	8.28×10^4	0.50	52.3
CF-A-400-S2-1360	5000	12500	± 2000	1.5	2	± 5	2800	1.25×10^5	1.00	86.9

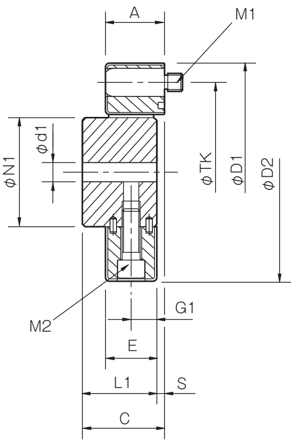
* Max. rotation speed does not take into account dynamic balance.
* The dynamic torsional stiffness is about 1.3 times that of the static torsional stiffness.
* Values for moment of inertia and mass are those when the cylindrical hub and flange hub have pilot bores.

Dimensions

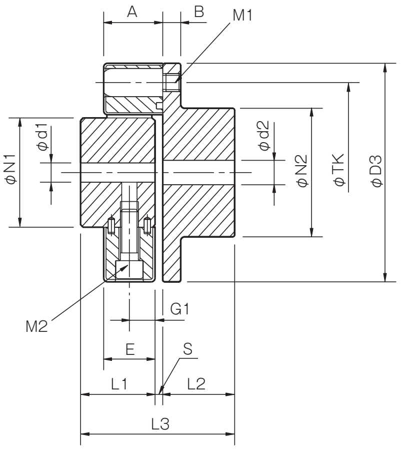
■ CF-A S0



■ CF-A S1



■ CF-A S2



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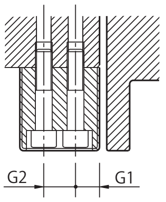


Unit [mm]

Model	d1			d2			D1	D2	D3	N1	N2	L1	L2	L3	A	B	C	E	G1	G2	O	S	TS	TK	M1	M2
	Pilot bore	Min.	Max.	Pilot bore	Min.	Max.																				
CF-A-001	8	9	19	8	9	22	57	56	56	30	36	32	24	58	24	7	34	22	11	—	5	2	10	44	2-M6	2-M6
CF-A-002	10	11	28	9	10	30	86	85	85	40	45	30	28	62	24	8	34	20	10	—	14	4	14	68	2-M8	2-M8
CF-A-004	12	14	30	11	12	36	100	97	100	45	55	34	30	68	28	8	38	24	12	—	18	4	14	80	3-M8	3-M8
CF-A-008	12	14	38	15	16	46	122	120	120	60	70	40	42	86	32	10	4	28	14	—	20	4	17	100	3-M10	3-M10
CF-A-012	12	14	38	15	16	46	122	120	120	60	70	40	42	86	32	10	44	28	14	—	20	4	17	100	4-M10	4-M10
CF-A-016	15	16	48	19	20	56	150	150	150	70	85	52	50	108	42	12	58	36	18	—	25	6	19	125	3-M12	3-M12
CF-A-022	15	16	48	19	20	56	150	150	150	70	85	52	50	108	42	12	58	36	18	—	25	6	19	125	4-M12	4-M12
CF-A-025	15	16	55	19	20	65	170	170	170	85	100	58	56	120	46	14	64	40	20	—	26	6	22	140	3-M14	3-M14
CF-A-028	15	16	55	19	20	65	170	170	170	85	100	58	56	120	46	14	64	40	20	—	26	6	22	140	4-M14	4-M14
CF-A-030	20	22	65	28	30	80	200	200	200	100	120	68	66	142	58	16	76	50	25	—	33	8	25	165	3-M16	3-M16
CF-A-050	20	22	65	28	30	80	200	200	200	100	120	68	66	142	58	16	76	50	25	—	33	8	25	165	4-M16	4-M16
CF-A-080	20	22	65	28	30	80	205	205	200	100	120	80	66	150	65	16	84	61	30.5	—	33	4	25	165	4-M16	4-M16
CF-A-090	30	32	85	30	32	95	260	260	260	125	140	84	80	172	70	19	92	62	31	—	46	8	32	215	3-M20	3-M20
CF-A-140	30	32	85	30	32	95	260	260	260	125	140	84	80	172	70	19	92	62	31	—	46	8	32	215	4-M20	4-M20
CF-A-200	35	38	105	35	38	110	300	300	300	145	160	94	90	192	80	19	102	72	36	—	46	8	32	250	4-M20	4-M20
CF-A-250	40	42	115	40	42	120	340	340	340	160	180	100	100	208	85	19	108	77	22.5	32	60	8	32	280	4-M20	8-M20
CF-A-400	40	42	115	40	42	130	370	370	370	170	200	125	125	260	105	29	135	95	28.5	38	70.5	10	45	300	4-M24	8-M20

* Pilot bores are to be drilled into the part. Minimum values for d1 and d2 are given by the minimum bore diameter values in the MIKI PULLEY standard hole-drilling standards and maximum values from the maximum allowable drilled bore diameters.

* The above table values are dimensions when the rubber body is assembled, so the N1, TK, D1, and D2 dimensions prior to rubber body assembly will differ from those above.

* The TK dimension is the bolt mounting pitch diameter of the flange hub or paired mounting part, but it is possible to change to make the mounting easier. Please contact MIKI PULLEY for the details.

* The TS dimension is the H8 plug gauge reference dimension. However, size 001 has a tolerance of $^{+0.15}_{0}$ while sizes 002 and 004 have tolerances of $^{+0.1}_{0}$.

* The nominal diameters for bolts M1/M2 are equal to the quantity minus the nominal diameter of the screw threads.

* Using a hex-socket-head bolt with the CF-A-400 requires a special flat washer.

How to Place an Order

CF-A-001-S2-1360 12H-14N

Size

Bore diameter: d1 (Cylindrical hub) - d2 (Flange hub)
Blank: Pilot bore

Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
N: Compliant with the new motor standards

Shore hardness (Rubber)
60: 60 hardness (JIS A)
50: 50 hardness (JIS A) (made to order)

Rubber material
13: Natural rubber (NR)

Type
S0: Rubber body only
SB: S0 and bolts
S1: SC and cylindrical hub
SP: S0 and spring pin
SC: SB and spring pin
S2: S1 and flange hub

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

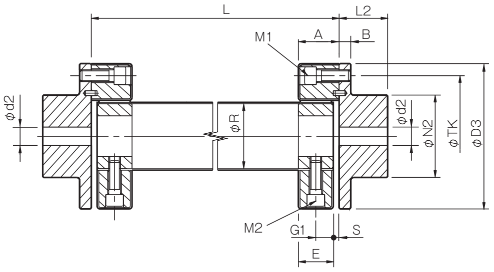
CF-A OG Types Floating Shaft (Low-speed Rotation) Type

Specifications

Model	Torque			Misalignment			Max. rotation speed [min^{-1}]	Dynamic torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-A-001-OG-1360	10	25	± 4	24.8	3	± 2	1000	7.35×10^1	3.5×10^{-4}	1.4
CF-A-002-OG-1360	20	50	± 8	24.7	3	± 3	1000	1.46×10^2	1.5×10^{-3}	2.5
CF-A-004-OG-1360	40	100	± 16	24.5	3	± 3	1000	3.80×10^2	2.9×10^{-3}	3.3
CF-A-008-OG-1360	80	200	± 32	24.3	3	± 4	1000	7.20×10^2	8.0×10^{-3}	6.2
CF-A-012-OG-1360	120	300	± 48	16.2	2	± 4	1000	2.19×10^3	8.4×10^{-3}	6.4
CF-A-016-OG-1360	160	400	± 64	23.7	3	± 5	1000	1.64×10^3	2.1×10^{-2}	10.6
CF-A-022-OG-1360	220	550	± 88	15.8	2	± 5	1000	4.13×10^3	2.3×10^{-2}	11.0
CF-A-025-OG-1360	250	630	± 100	23.5	3	± 5	1000	2.06×10^3	4.2×10^{-2}	15.9
CF-A-028-OG-1360	350	880	± 140	15.6	2	± 5	1000	0.53×10^4	4.4×10^{-2}	16.5
CF-A-030-OG-1360	400	1000	± 160	22.7	3	± 5	1000	3.20×10^3	9.6×10^{-2}	25.8
CF-A-050-OG-1360	600	1500	± 240	15.2	2	± 5	1000	7.40×10^3	0.10	26.6
CF-A-080-OG-1360	800	2000	± 320	15.1	2	± 4	1000	1.09×10^4	0.11	28.7
CF-A-090-OG-1360	900	2250	± 360	22.1	3	± 5	1000	6.85×10^3	0.30	47.8
CF-A-140-OG-1360	1400	3500	± 560	14.7	2	± 5	1000	1.45×10^4	0.31	49.3
CF-A-200-OG-1360	2000	5000	± 800	14.4	2	± 5	1000	3.04×10^4	0.55	74.3
CF-A-250-OG-1360	3000	8750	± 1250	14.2	2	± 5	1000	4.14×10^4	0.99	97.7
CF-A-400-OG-1360	5000	12500	± 2000	13.4	2	± 5	1000	6.25×10^4	1.77	164.6

* The values of the above table are for a flange hub with pilot bore when L = 500.
* Max. rotation speed does not take into account dynamic balance.
* The dynamic torsional stiffness is about 1.3 times that of the static torsional stiffness.

Dimensions



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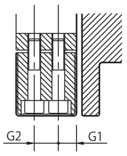


Unit [mm]

Model	d2			D3	N2	L2	A	B	R	E	G1	G2	S	TK	M1	M2
	Pilot bore	Min.	Max.													
CF-A-001-OG-1360	8	9	22	56	36	24	24	7	30	22	11	—	2	44	2-M6	2-M6
CF-A-002-OG-1360	9	10	30	85	45	28	24	8	40	20	10	—	4	68	2-M8	2-M8
CF-A-004-OG-1360	11	12	36	100	55	30	28	8	45	24	12	—	4	80	3-M8	3-M8
CF-A-008-OG-1360	15	16	46	120	70	42	32	10	60	28	14	—	4	100	3-M10	3-M10
CF-A-012-OG-1360	15	16	46	120	70	42	32	10	60	28	14	—	4	100	4-M10	4-M10
CF-A-016-OG-1360	19	20	56	150	85	50	42	12	70	36	18	—	6	125	3-M12	3-M12
CF-A-022-OG-1360	19	20	56	150	85	50	42	12	70	36	18	—	6	125	4-M12	4-M12
CF-A-025-OG-1360	19	20	65	170	100	56	46	14	85	40	20	—	6	140	3-M14	3-M14
CF-A-028-OG-1360	19	20	65	170	100	56	46	14	85	40	20	—	6	140	4-M14	4-M14
CF-A-030-OG-1360	28	30	80	200	120	66	58	16	100	50	25	—	8	165	3-M16	3-M16
CF-A-050-OG-1360	28	30	80	200	120	66	58	16	100	50	25	—	8	165	4-M16	4-M16
CF-A-080-OG-1360	28	30	80	205	120	66	65	16	100	61	30.5	—	4	165	4-M16	4-M16
CF-A-090-OG-1360	30	32	95	260	140	80	70	19	125	62	31	—	8	215	3-M20	3-M20
CF-A-140-OG-1360	30	32	95	260	140	80	70	19	125	62	31	—	8	215	4-M20	4-M20
CF-A-200-OG-1360	35	38	110	300	160	90	80	19	145	72	36	—	8	250	4-M20	4-M20
CF-A-250-OG-1360	40	42	120	340	180	100	85	19	160	77	22.5	32	8	280	4-M20	8-M20
CF-A-400-OG-1360	40	42	130	370	200	125	105	29	170	95	28.5	38	10	300	4-M24	8-M20

* Pilot bores are to be drilled into the part. Minimum values for d2 are given by the minimum bore diameter values in the MIKI PULLEY standard hole-drilling standards and maximum values from the maximumallowable drilled bore diameters.
* The nominal diameters for bolts M1/M2 are equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for one side.
* The L dimension has a standard length of 1000 mm or less. Dimension L must at least allow enough space for an M1 bolt to be mounted.

How to Place an Order

CF-A-001-OG-1360 12H-14N L=600

Size: 001
Type: OG
OG: Floating shaft
Low-speed type
Rubber material: 13
13: Natural rubber (NR)
Shore hardness (Rubber): 60
60: 60 hardness (JIS A)
50: 50 hardness (JIS A) (made to order)
Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore
Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
N: Compliant with the new motor standards
Floating shaft length *Use mm units for L dimensions.

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

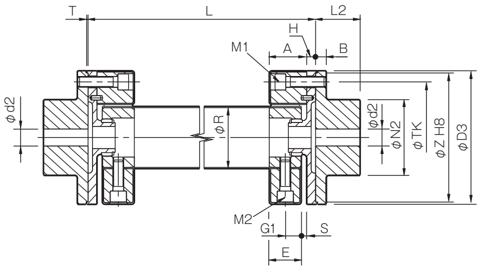
CF-A OZ Types Floating Shaft (High-speed Rotation) Type

Specifications

Model	Torque			Misalignment			Max. rotation speed [min^{-1}]	Dynamic torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-A-001-OZ-1360	10	25	±4	8.1	1	±2	10000	7.35×10^{1}	4.3×10^{-4}	1.6
CF-A-002-OZ-1360	20	50	±8	8.1	1	±3	8000	1.46×10^{2}	2.0×10^{-3}	3.1
CF-A-004-OZ-1360	40	100	±16	8.0	1	±3	7000	3.80×10^{2}	3.6×10^{-3}	4.0
CF-A-008-OZ-1360	80	200	±32	7.8	1	±4	6500	7.20×10^{2}	1.1×10^{-2}	7.7
CF-A-012-OZ-1360	120	300	±48	7.8	1	±4	6500	2.19×10^{3}	1.1×10^{-2}	7.8
CF-A-016-OZ-1360	160	400	±64	7.5	1	±5	6000	1.64×10^{3}	2.9×10^{-2}	13.1
CF-A-022-OZ-1360	220	550	±88	7.5	1	±5	6000	4.13×10^{3}	3.0×10^{-2}	13.4
CF-A-025-OZ-1360	250	630	±100	7.5	1	±5	5000	2.06×10^{3}	5.4×10^{-2}	19.1
CF-A-028-OZ-1360	350	880	±140	7.5	1	±5	5000	0.53×10^{4}	5.7×10^{-2}	19.6
CF-A-030-OZ-1360	400	1000	±160	7.2	1	±5	4000	3.20×10^{3}	0.12	30.2
CF-A-050-OZ-1360	600	1500	±240	7.2	1	±5	4000	7.40×10^{3}	0.12	30.9
CF-A-080-OZ-1360	800	2000	±320	7.2	1	±4	4000	1.09×10^{4}	0.13	33.0
CF-A-090-OZ-1360	900	2250	±360	7.0	1	±5	3600	6.85×10^{3}	0.37	55.3
CF-A-140-OZ-1360	1400	3500	±560	7.0	1	±5	3600	1.45×10^{4}	0.38	56.7
CF-A-200-OZ-1360	2000	5000	±800	6.7	1	±5	3200	3.04×10^{4}	0.74	91.3
CF-A-250-OZ-1360	3000	8750	±1250	6.6	1	±5	3000	4.14×10^{4}	1.19	111.9
CF-A-400-OZ-1360	5000	12500	±2000	6.2	1	±5	2800	6.25×10^{4}	2.47	190.0

* The values of the above table are for a flange hub with pilot bore when L = 500.
* Max. rotation speed does not take into account dynamic balance.
* The dynamic torsional stiffness is about 1.3 times that of the static torsional stiffness.

Dimensions



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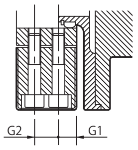


Unit [mm]

Model	d2			D3	N2	L2	A	B	H	R	E	T	G1	G2	S	TK	Z	M1	M2
	Pilot bore	Min.	Max.																
CF-A-001-OZ-1360	8	9	22	56	36	24	24	7	5	30	22	1.5	11	—	2	44	52	2-M6	2-M6
CF-A-002-OZ-1360	9	10	30	85	45	28	24	8	5	40	20	1.5	10	—	4	68	80	2-M8	2-M8
CF-A-004-OZ-1360	11	12	36	100	55	30	28	8	5	45	24	1.5	12	—	4	80	95	3-M8	3-M8
CF-A-008-OZ-1360	15	16	46	120	70	42	32	10	10	60	28	1.5	14	—	4	100	115	3-M10	3-M10
CF-A-012-OZ-1360	15	16	46	120	70	42	32	10	10	60	28	1.5	14	—	4	100	115	4-M10	4-M10
CF-A-016-OZ-1360	19	20	56	150	85	50	42	12	10	70	36	1.5	18	—	6	125	145	3-M12	3-M12
CF-A-022-OZ-1360	19	20	56	150	85	50	42	12	10	70	36	1.5	18	—	6	125	145	4-M12	4-M12
CF-A-025-OZ-1360	19	20	65	170	100	56	46	14	10	85	40	1.5	20	—	6	140	165	3-M14	3-M14
CF-A-028-OZ-1360	19	20	65	170	100	56	46	14	10	85	40	1.5	20	—	6	140	165	4-M14	4-M14
CF-A-030-OZ-1360	28	30	80	200	120	66	58	16	10	100	50	1.5	25	—	8	165	195	3-M16	3-M16
CF-A-050-OZ-1360	28	30	80	200	120	66	58	16	10	100	50	1.5	25	—	8	165	195	4-M16	4-M16
CF-A-080-OZ-1360	28	30	80	205	120	66	65	16	10	100	61	1.5	30.5	—	4	165	195	4-M16	4-M16
CF-A-090-OZ-1360	30	32	95	260	140	80	70	19	10	125	62	2	31	—	8	215	250	3-M20	3-M20
CF-A-140-OZ-1360	30	32	95	260	140	80	70	19	10	125	62	2	31	—	8	215	250	4-M20	4-M20
CF-A-200-OZ-1360	35	38	110	300	160	90	80	19	15	145	72	2	36	—	8	250	290	4-M20	4-M20
CF-A-250-OZ-1360	40	42	120	340	180	100	85	19	15	160	77	2.5	22.5	32	8	280	330	4-M20	8-M20
CF-A-400-OZ-1360	40	42	130	370	200	125	105	29	15	170	95	2	28.5	38	10	300	360	4-M24	8-M20

* Pilot bores are to be drilled into the part. Minimum values for d2 are given by the minimum bore diameter values in the MIKI PULLEY standard hole-drilling standards and maximum values from the maximum allowable drilled bore diameters.
* The nominal diameters for bolts M1/M2 are equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for one side.
* See the floating length graph on P.167 for the L dimension. Dimension L must at least allow enough space for an M1 bolt to be mounted.

How to Place an Order

CF-A-001-OZ-1360 12H-14N L=600

Floating shaft length *Use mm units for L dimensions.

Size

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore

Type
OZ: Floating shaft
High-speed type

Rubber material
13: Natural rubber (NR)

Shore hardness (Rubber)
60: 60 hardness (JIS A)
50: 50 hardness (JIS A) (made to order)

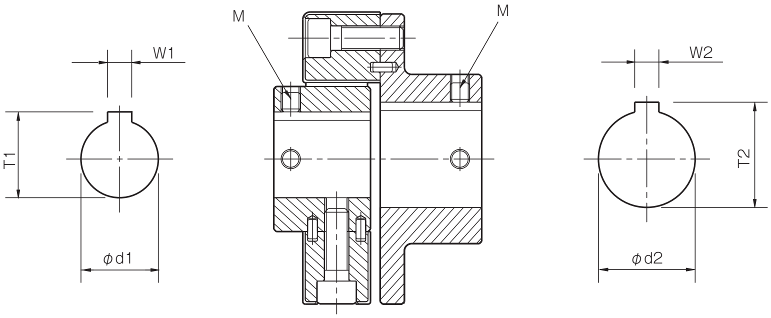
Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
N: Compliant with the new motor standards

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

CF-A Models

Standard Hole-Drilling Standards

- Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular hub.
- Set screw positions are not on the same plane.
- The set screws are included with the product.
- The spline can also be processed. Contact Miki Pulley regarding such processing.



Unit [mm]

Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]
Toler-ance	H7, H8	E9	$^{+0.3}_{0}$	—	Toler-ance	H7	H9	$^{+0.3}_{0}$	—	Toler-ance	G7, F7	H9	$^{+0.3}_{0}$	—
9	$9^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
10	$10^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
11	$11^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
12	$12^{+0.018}_{0}$	$4^{+0.050}_{+0.020}$	13.5	2-M4	12H	$12^{+0.018}_{0}$	$4^{+0.030}_{0}$	13.8	2-M4	—	—	—	—	—
14	$14^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	16.0	2-M4	14H	$14^{+0.018}_{0}$	$5^{+0.030}_{0}$	16.3	2-M4	14N	$14^{+0.024}_{+0.006}$	$5^{+0.030}_{0}$	16.3	2-M4
15	$15^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	17.0	2-M4	15H	$15^{+0.018}_{0}$	$5^{+0.030}_{0}$	17.3	2-M4	—	—	—	—	—
16	$16^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	18.0	2-M4	16H	$16^{+0.018}_{0}$	$5^{+0.030}_{0}$	18.3	2-M4	—	—	—	—	—
17	$17^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	19.0	2-M4	17H	$17^{+0.018}_{0}$	$5^{+0.030}_{0}$	19.3	2-M4	—	—	—	—	—
18	$18^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	20.0	2-M4	18H	$18^{+0.018}_{0}$	$6^{+0.030}_{0}$	20.8	2-M5	—	—	—	—	—
19	$19^{+0.021}_{0}$	$5^{+0.050}_{+0.020}$	21.0	2-M4	19H	$19^{+0.021}_{0}$	$6^{+0.030}_{0}$	21.8	2-M5	19N	$19^{+0.028}_{+0.007}$	$6^{+0.030}_{0}$	21.8	2-M5
20	$20^{+0.021}_{0}$	$5^{+0.050}_{+0.020}$	22.0	2-M4	20H	$20^{+0.021}_{0}$	$6^{+0.030}_{0}$	22.8	2-M5	—	—	—	—	—
22	$22^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	25.0	2-M6	22H	$22^{+0.021}_{0}$	$6^{+0.030}_{0}$	24.8	2-M5	—	—	—	—	—
24	$24^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	27.0	2-M6	24H	$24^{+0.021}_{0}$	$8^{+0.036}_{0}$	27.3	2-M6	24N	$24^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	27.3	2-M6
25	$25^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	28.0	2-M6	25H	$25^{+0.021}_{0}$	$8^{+0.036}_{0}$	28.3	2-M6	—	—	—	—	—
28	$28^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	31.0	2-M6	28H	$28^{+0.021}_{0}$	$8^{+0.036}_{0}$	31.3	2-M6	28N	$28^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	31.3	2-M6
30	$30^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	33.0	2-M6	30H	$30^{+0.021}_{0}$	$8^{+0.036}_{0}$	33.3	2-M6	—	—	—	—	—
32	$32^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	35.5	2-M8	32H	$32^{+0.025}_{0}$	$10^{+0.036}_{0}$	35.3	2-M8	—	—	—	—	—
35	$35^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	38.5	2-M8	35H	$35^{+0.025}_{0}$	$10^{+0.036}_{0}$	38.3	2-M8	—	—	—	—	—
38	$38^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	41.5	2-M8	38H	$38^{+0.025}_{0}$	$10^{+0.036}_{0}$	41.3	2-M8	38N	$38^{+0.050}_{+0.025}$	$10^{+0.036}_{0}$	41.3	2-M8
40	$40^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	43.5	2-M8	40H	$40^{+0.025}_{0}$	$12^{+0.043}_{0}$	43.3	2-M8	—	—	—	—	—
42	$42^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	45.5	2-M8	42H	$42^{+0.025}_{0}$	$12^{+0.043}_{0}$	45.3	2-M8	42N	$42^{+0.050}_{+0.025}$	$12^{+0.043}_{0}$	45.3	2-M8
45	$45^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	48.5	2-M8	45H	$45^{+0.025}_{0}$	$14^{+0.043}_{0}$	48.8	2-M10	—	—	—	—	—
48	$48^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	51.5	2-M8	48H	$48^{+0.025}_{0}$	$14^{+0.043}_{0}$	51.8	2-M10	48N	$48^{+0.050}_{+0.025}$	$14^{+0.043}_{0}$	51.8	2-M10
50	$50^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	53.5	2-M8	50H	$50^{+0.025}_{0}$	$14^{+0.043}_{0}$	53.8	2-M10	—	—	—	—	—
55	$55^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	60.0	2-M10	55H	$55^{+0.030}_{0}$	$16^{+0.043}_{0}$	59.3	2-M10	55N	$55^{+0.060}_{+0.030}$	$16^{+0.043}_{0}$	59.3	2-M10
56	$56^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	61.0	2-M10	56H	$56^{+0.030}_{0}$	$16^{+0.043}_{0}$	60.3	2-M10	—	—	—	—	—
60	$60^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	65.0	2-M10	60H	$60^{+0.030}_{0}$	$18^{+0.043}_{0}$	64.4	2-M10	60N	$60^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	64.4	2-M10
63	$63^{+0.030}_{0}$	$18^{+0.075}_{+0.032}$	69.0	2-M10	63H	$63^{+0.030}_{0}$	$18^{+0.043}_{0}$	67.4	2-M10	—	—	—	—	—
65	$65^{+0.030}_{0}$	$18^{+0.075}_{+0.032}$	71.0	2-M10	65H	$65^{+0.030}_{0}$	$18^{+0.043}_{0}$	69.4	2-M10	65N	$65^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	69.4	2-M10

* The ø11 or below requirement under the new JIS standards and ø11 requirement for the new motor standards are the same as the old JIS standards (class 2).

Distance from Set Screw Edge (Cylindrical Hub)

Coupling size	001	002	004	008	012	016	022	025	028	030	050	080	090	140	200	250	400
Distance from set screw edge [mm]	6	6	6	7	7	10	10	10	10	11	11	11	13	13	13	13	13

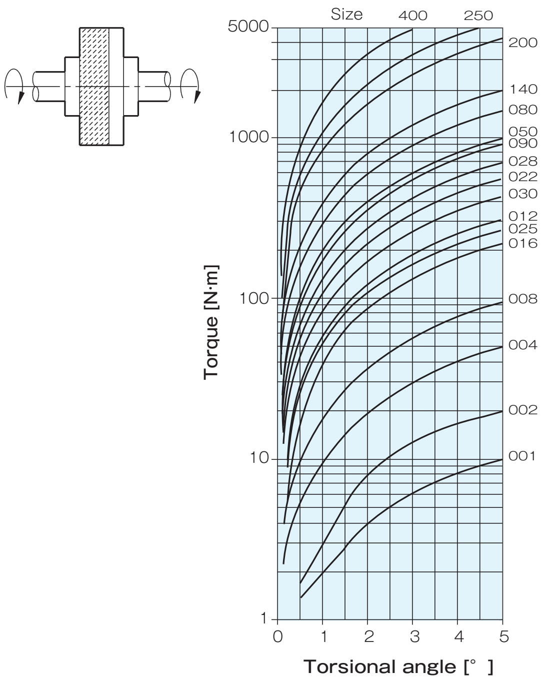
Distance from Set Screw Edge (Flange Hub)

Coupling size	001	002	004	008	012	016	022	025	028	030	050	080	090	140	200	250	400
Distance from set screw edge [mm]	6	7	7	9	9	10	10	10	10	15	15	15	15	15	16	16	16

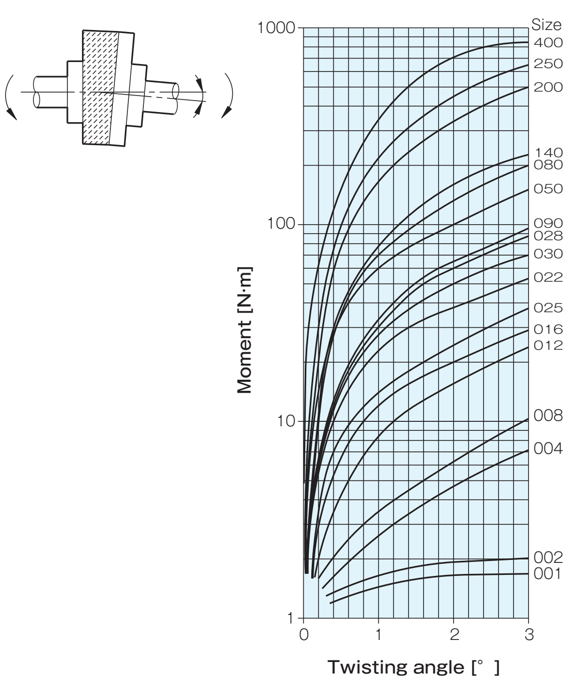
Items Checked for Design Purposes

Static Spring Characteristics

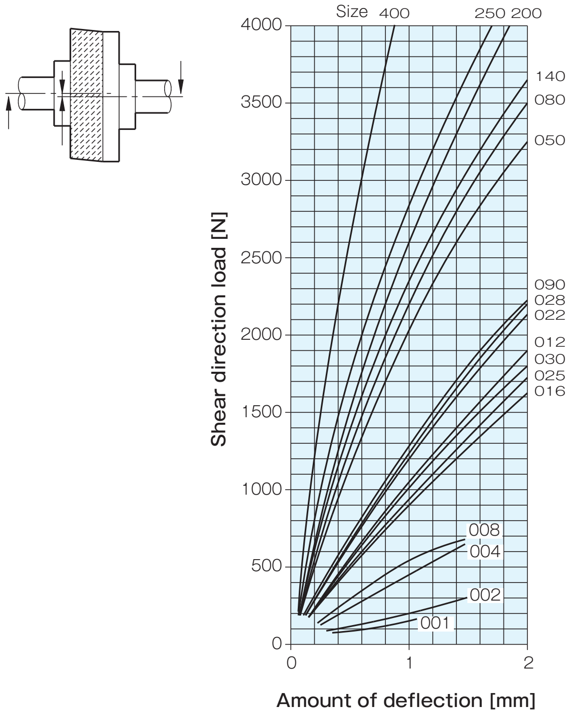
■ Torsional angle vs. torque diagram



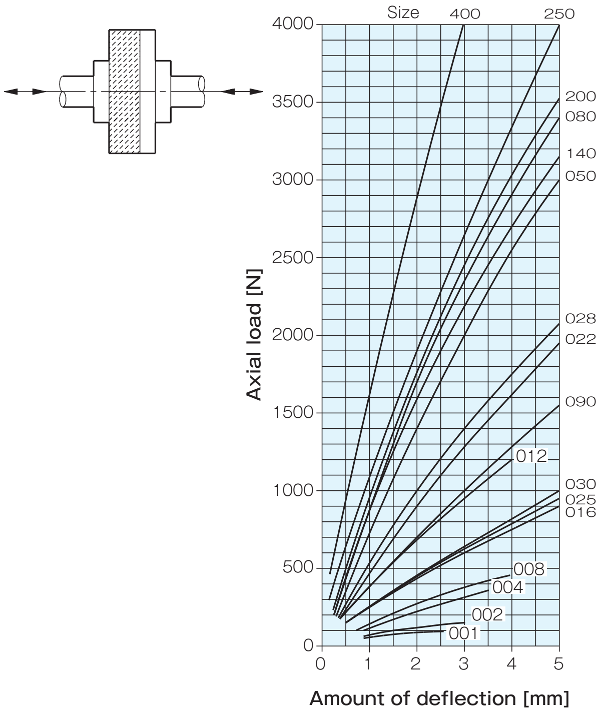
■ Twisting angle vs. moment diagram



■ Shear direction load vs. deflection diagram



■ Axial load vs. deflection diagram



CF-A Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

CF-A models are delivered in component form. Pay close attention to the misalignments for mounting and assembly methods shown below when you mount couplings.

(1) Couplings are designed for use within an operating temperature range of -30℃ to 95℃ .

(2) Rubber bodies are not sufficiently resistant to oil and grease, so avoid contact with these substances. Use and storage in direct sunlight may shorten service life of the rubber body, so cover it appropriately.

(3) Bolts for mounting are given a microcapsule coating that takes effect after mounting to stop loosening. Screw fixatives or other adhesives are therefore unnecessary. Be particularly careful to never use liquid anaerobic screw fixatives, as they have adverse effects on the rubber body. Also, store the couplings in well ventilated locations away from moisture to preserve their efficacy and keep them out of contact with oils.

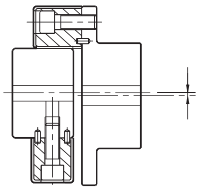
Mounting Misalignment

To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table. When used at rotation speeds exceeding 1000 min^{-1}, however, we recommend parallel misalignment of 0.5 mm or less and angular deflection of 1° or less.

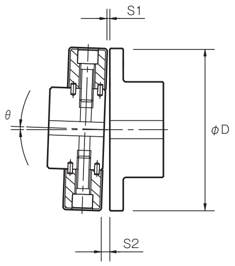
■ Mounting misalignment

Model	Parallel [mm]	Angular [°]	Axial [mm]
CF-A-001	0.5	3	± 2
CF-A-002	1.0	3	± 3
CF-A-004	1.0	3	± 3
CF-A-008	1.0	3	± 4
CF-A-012	1.0	2	± 4
CF-A-016	1.5	3	± 5
CF-A-022	1.5	2	± 5
CF-A-025	1.5	3	± 5
CF-A-028	1.5	2	± 5
CF-A-030	1.5	3	± 5
CF-A-050	1.5	2	± 5
CF-A-080	1.5	2	± 4
CF-A-090	1.5	3	± 5
CF-A-140	1.5	2	± 5
CF-A-200	1.5	2	± 5
CF-A-250	1.5	2	± 5
CF-A-400	1.5	2	± 5

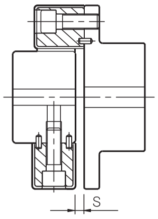
■ Parallel



■ Angular



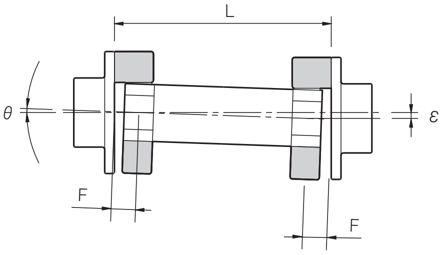
■ Axial



$$\theta = \sin^{-1}\frac{S2 - S1}{D}$$

The allowable values for parallel misalignment and angular deflection of the floating-shaft type OG and OZ types will vary with the floating length used. Calculate them using the equations below.

■ Calculating parallel misalignment and angular deflection for OG and OZ types



$$\varepsilon = \tan\theta\ (L-2F)$$

Calculate F from the dimensions table as follows.

- For OG types, $F = G1 + S$

  For sizes 250 and 400, however, $F = (E/2) + S$

- For OZ types, $F = G1 + S + H$

  For sizes 250 and 400, however, $F = (E/2) + S + H$

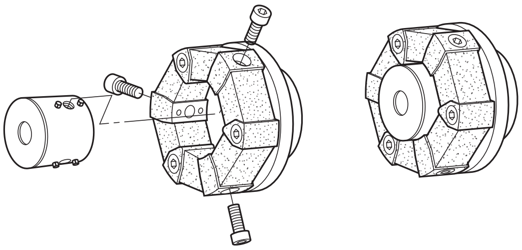
ε : Parallel misalignment of two shafts, θ : Angular deflection of coupling,

L: Length of floating shaft

Assembly

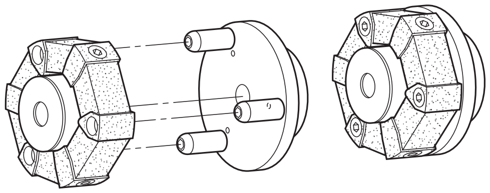
■ O□ Types

Push the spring pin into the cylindrical hub and flange hub, and then lock the rubber body first to the flange hub and then to the cylindrical hub. (Use a spring pin of size 008 or larger.)



■ S□ Types

Push the spring pin into the cylindrical hub, and then lock the S bolt into the flange hub. Assemble by first locking the rubber body into the cylindrical hub and then pushing the rubber body onto the S bolt. (Use a spring pin of size 008 or larger.)



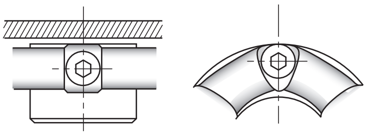
(1) To lock the cylindrical hub and flange hub to the rubber body, use a torque wrench to tighten the bolt to the prescribed torque. To ensure secure fastening, apply an extremely small amount of grease to the seat surface of the bolt. (Be careful not to get grease on the threads of the bolt.) Also be careful to never use liquid anaerobic screw fixatives, as they have adverse effects on the rubber body.

(2) When mounting a rubber body on a flange hub and then mounting it on a cylindrical hub, the rubber body can become significantly warped by the frictional force of the bolt's seat surface, so tighten the bolt after the cylindrical hub is locked in place.

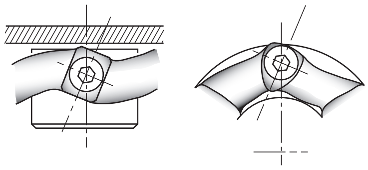
(3) When mounting a rubber body onto a cylindrical hub, screw each bolt in by two threads each and then tighten.

(4) Once assembly is complete, recheck the mounting situation of the rubber body, as shown in the next page.

Good mountings

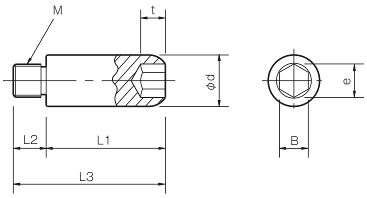


Bad mountings



Bolt Specifications and Tightening Torques

The bolts are hex-socket-head bolts that conform to JIS B1176, are zinc plated, and have microcapsule coatings (to prevent loosening). Dedicated S bolts are used for bolts in the A (axial) direction that are insertion-mounted (S□ types). Check the dimensions in the following.



S bolt dimensions

Coupling size	d	L1	L2	L3	t	B	e	M
001	10	24	7	31	5.0	5	5.9	M6 × 1
002･004	14	24	8	32	6.0	6	7.0	M8 × 1.25
008･012	17	32	10	42	9.0	8	9.4	M10 × 1.5
016･022	19	42	12	54	9.0	10	11.7	M12 × 1.75
025･028	22	46	14	60	10.5	12	14.0	M14 × 2
030･050･080	25	58	16	74	12.0	14	16.3	M16 × 2
090･140･200･250	32	70	20	90	14.0	17	19.8	M20 × 2.5

* The nominal diameter for the bolt M is equal to the nominal diameter of the screw thread times pitch.
* Size 400 uses the spacer system, so S bolts are not used.

Tighten each of the bolts to the tightening torques given in the following tables, using a torque wrench or the like.

Bolt specifications and tightening torques in direction R

Model	Strength classification	Direction R bolt specification		Tightening torque [N･m]
		O1・O2・S1・S2・OG	OZ	
CF-A-001	8.8 or over	2-M6 × 10	2-M6 × 10	9 ～ 11
CF-A-002	8.8 or over	2-M8 × 20	2-M8 × 20	24 ～ 27
CF-A-004	8.8 or over	3-M8 × 25	3-M8 × 25	24 ～ 27
CF-A-008	8.8 or over	3-M10 × 30	3-M10 × 30	49 ～ 54
CF-A-012	8.8 or over	4-M10 × 30	4-M10 × 30	49 ～ 54
CF-A-016	8.8 or over	3-M12 × 35	3-M12 × 35	85 ～ 94
CF-A-022	8.8 or over	4-M12 × 35	4-M12 × 35	85 ～ 94
CF-A-025	8.8 or over	3-M14 × 40	3-M14 × 40	130 ～ 150
CF-A-028	8.8 or over	4-M14 × 40	4-M14 × 40	130 ～ 150
CF-A-030	8.8 or over	3-M16 × 50	3-M16 × 50	210 ～ 230
CF-A-050	8.8 or over	4-M16 × 50	4-M16 × 50	210 ～ 230
CF-A-080	8.8 or over	4-M16 × 50	4-M16 × 50	210 ～ 230
CF-A-090	10.9 or over	3-M20 × 65	3-M20 × 65	440 ～ 490
CF-A-140	10.9 or over	4-M20 × 65	4-M20 × 65	440 ～ 490
CF-A-200	10.9 or over	4-M20 × 65	4-M20 × 65	440 ～ 490
CF-A-250	10.9 or over	8-M20 × 80	8-M20 × 90	440 ～ 490
CF-A-400	10.9 or over	8-M20 × 100	8-M20 × 100	440 ～ 490

* The nominal diameters for bolts are equal to the quantity minus the nominal diameter of the screw threads times the nominal length. The OG and OZ quantities are for one side only.
* Contact Miki Pulley if you plan to use bolts with specifications other than those shown.

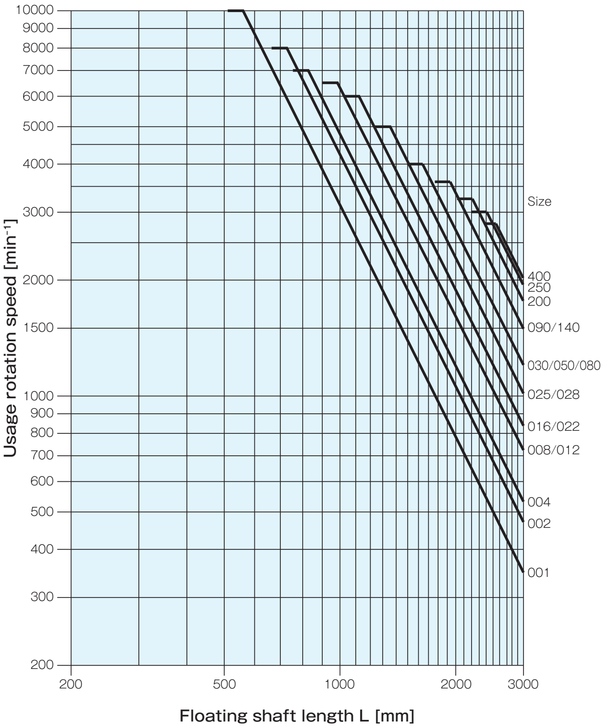
Bolt specifications and tightening torques in direction A

Model	Strength classification	Direction A bolt specification			Tightening torque [N･m]
		O1・O2・OG	OZ	S1・S2	
CF-A-001	8.8 or over	2-M6 × 25	2-M6 × 30	2-M6	9 ～ 11
CF-A-002	8.8 or over	2-M8 × 20	2-M8 × 25	2-M8	24 ～ 27
CF-A-004	8.8 or over	3-M8 × 25	3-M8 × 30	3-M8	24 ～ 27
CF-A-008	8.8 or over	3-M10 × 30	3-M10 × 40	3-M10	49 ～ 54
CF-A-012	8.8 or over	4-M10 × 30	4-M10 × 40	4-M10	49 ～ 54
CF-A-016	8.8 or over	3-M12 × 35	3-M12 × 45	3-M12	85 ～ 94
CF-A-022	8.8 or over	4-M12 × 35	4-M12 × 45	4-M12	85 ～ 94
CF-A-025	8.8 or over	3-M14 × 40	3-M14 × 50	3-M14	130 ～ 150
CF-A-028	8.8 or over	4-M14 × 40	4-M14 × 50	4-M14	130 ～ 150
CF-A-030	8.8 or over	3-M16 × 50	3-M16 × 60	3-M16	210 ～ 230
CF-A-050	8.8 or over	4-M16 × 50	4-M16 × 60	4-M16	210 ～ 230
CF-A-080	8.8 or over	4-M16 × 50	4-M16 × 60	4-M16	210 ～ 230
CF-A-090	10.9 or over	3-M20 × 65	3-M20 × 75	3-M20	440 ～ 490
CF-A-140	10.9 or over	4-M20 × 65	4-M20 × 75	4-M20	440 ～ 490
CF-A-200	10.9 or over	4-M20 × 65	4-M20 × 80	4-M20	440 ～ 490
CF-A-250	10.9 or over	4-M20 × 80	4-M20 × 95	4-M20	440 ～ 490
CF-A-400	10.9 or over	4-M24 × 100	4-M24 × 115	4-M24	850 ～ 900

* The nominal diameters for bolts are equal to the quantity minus the nominal diameter of the screw threads times the nominal length. The OG and OZ quantities are for one side only.
* Contact Miki Pulley if you plan to use bolts with specifications other than those shown.

Usage Rotation Speed Limits for OZ Types

For OZ types, the rotation speeds at which the coupling can be used will vary with the length of floating shaft selected. Use the following figure to confirm that the rotation speed you will use is at or below the limit speed.



CF-A Models

Designing a Cylindrical or Flange Hub

Materials

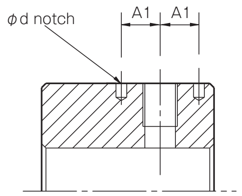
When designing a new cylindrical or flange hub, use the following materials or materials that have at least the following tensile strength.

Hub type	Size	Material	Tensile strength
Cylindrical hub	Total size	S 45 C	569 N/mm² or higher
Flange hub	001 ～ 004	FC 200	200N/mm² or higher
	008 ～ 400	FCD 450	450N/mm² or higher

Spring pin bore dimensions

Contact the following table for spring pin bore dimensions for cylindrical or flange hubs. (Coupling size 008 or larger)

Cylindrical hub

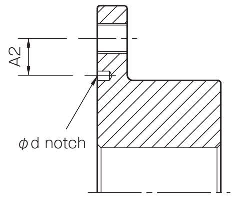


Unit [mm]

Model	A1 ± 0.1	d	Depth	Spring pin specification
CF-A-008	10.0	4	5.5	6- ϕ 4 × 8
CF-A-012	10.0	4	5.5	8- ϕ 4 × 8
CF-A-016	13.5	5	6.5	6- ϕ 5 × 10
CF-A-022	13.5	5	6.5	8- ϕ 5 × 10
CF-A-025	14.0	5	6.5	6- ϕ 5 × 10
CF-A-028	14.0	5	6.5	8- ϕ 5 × 10
CF-A-030	18.0	5	6.5	6- ϕ 5 × 10
CF-A-050	18.0	5	6.5	8- ϕ 5 × 10
CF-A-080	18.0	5	6.5	8- ϕ 5 × 10
CF-A-090	22.5	8	13.0	6- ϕ 8 × 16
CF-A-140	22.5	8	13.0	8- ϕ 8 × 16
CF-A-200	22.5	8	13.0	8- ϕ 8 × 16

* The nominal diameter of the spring pin is equal to the quantity minus the diameter times the length.
* Coupling sizes 250 and 400 do not require a spring pin bore on the cylindrical hub side.

Flange hubs (flywheel side)



Unit [mm]

Model	A2 ± 0.1	d	Depth	Spring pin specification
CF-A-008	12	4	5.5	3- ϕ 4 × 8
CF-A-012	12	4	5.5	4- ϕ 4 × 8
CF-A-016	18	5	6.5	3- ϕ 5 × 10
CF-A-022	18	5	6.5	4- ϕ 5 × 10
CF-A-025	18	5	6.5	3- ϕ 5 × 10
CF-A-028	18	5	6.5	4- ϕ 5 × 10
CF-A-030	20	5	6.5	3- ϕ 5 × 10
CF-A-050	20	5	6.5	4- ϕ 5 × 10
CF-A-080	20	5	6.5	4- ϕ 5 × 10
CF-A-090	25	8	13.0	3- ϕ 8 × 16
CF-A-140	25	8	13.0	4- ϕ 8 × 16
CF-A-200	25	8	13.0	4- ϕ 8 × 16
CF-A-250	30	10	13.0	4- ϕ 10 × 18
CF-A-400	40	10	13.0	4- ϕ 10 × 18

* The nominal diameter of the spring pin is equal to the quantity minus the diameter times the length.

Standard spring pin specifications for products with spring pins are given below.

Standard spring pin specification

Size	OP・OC・O1・O2		SP・SC・S1・S2		OG	OZ
	Cylindrical hub	Flange hub	Cylindrical hub	Flange hub	Flange hub	Center hub
001	—	—	—	—	—	—
002	—	—	—	—	—	—
004	—	—	—	—	—	—
008	6-ϕ4×8	3-ϕ4×8	6-ϕ4×8	—	3-ϕ4×8	—
012	8-ϕ4×8	4-ϕ4×8	8-ϕ4×8	—	4-ϕ4×8	—
016	6-ϕ5×10	3-ϕ5×10	6-ϕ5×10	—	3-ϕ5×10	3-ϕ5×10
022	8-ϕ5×10	4-ϕ5×10	8-ϕ5×10	—	4-ϕ5×10	4-ϕ5×10
025	6-ϕ5×10	3-ϕ5×10	6-ϕ5×10	—	3-ϕ5×10	3-ϕ5×10
028	8-ϕ5×10	4-ϕ5×10	8-ϕ5×10	—	4-ϕ5×10	4-ϕ5×10
030	6-ϕ5×10	3-ϕ5×10	6-ϕ5×10	—	3-ϕ5×10	3-ϕ5×10
050	8-ϕ5×10	4-ϕ5×10	8-ϕ5×10	—	4-ϕ5×10	4-ϕ5×10
080	8-ϕ5×10	4-ϕ5×10	8-ϕ5×10	—	4-ϕ5×10	4-ϕ5×10
090	6-ϕ8×16	3-ϕ8×16	6-ϕ8×16	—	3-ϕ8×16	3-ϕ8×10
140	8-ϕ8×16	4-ϕ8×16	8-ϕ8×16	—	4-ϕ8×16	4-ϕ8×10
200	8-ϕ8×16	4-ϕ8×16	8-ϕ8×16	—	4-ϕ8×16	4-ϕ8×10
250	—	4-ϕ10×18	—	—	4-ϕ10×18	—
400	—	4-ϕ10×18	—	—	4-ϕ10×18	—

* The nominal diameter of the spring pin is equal to the quantity minus the diameter times the length.
* The number of spring pins given for OG and OZ flange (center) hubs is for one side.

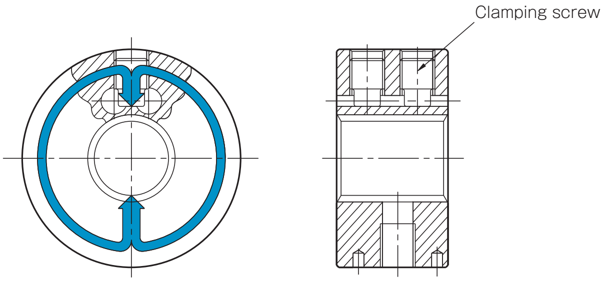
Coupling a pump shaft (spline shaft) to a cylindrical hub

(1) Movable splines

Heat treat (carburize and quench) the spline teeth of the cylindrical hub. Contact Miki Pulley regarding materials, heat-treated hardness, and the like. Only use type O0 rubber bodies for movable splines.

(2) Fixed splines

We can design a clamping hub that completely locks a cylindrical hub to a spline shaft using center lock action. Contact Miki Pulley for details. Clamping hubs must be made to order.



CENTA-LOCK mechanism on the clamping hub

Recommended spline-shaft fit grades

Standards	Grade of fit
JIS D2001	Class b
SAE J498b	Class 2
ANSI B92.1	Class 5

Induction Motor Specifications and Easy Selection Table

Motor		50 Hz: 3000 min^{-1}, 60 Hz: 3600 min^{-1}				50 Hz: 1500min^{-1}, 60 Hz: 1800min^{-1}			
		Two-pole motor		CENTAFLEX		Four-pole motor		CENTAFLEX	
Output [kW]	Frequency [Hz]	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter
0.4	50	14	1.3	CF-A-001	14N	14	2.6	CF-A-001	14N
	60	14	1.1	CF-A-001	14N	14	2.2	CF-A-001	14N
0.75	50	19	2.4	CF-A-001	19N	19	4.9	CF-A-001	19N
	60	19	2	CF-A-001	19N	19	4.1	CF-A-001	19N
1.5	50	24	4.9	CF-A-002	24N	24	9.7	CF-A-002	24N
	60	24	4.1	CF-A-002	24N	24	8.1	CF-A-002	24N
2.2	50	24	7.1	CF-A-002	24N	28	14	CF-A-004	28N
	60	24	6	CF-A-002	24N	28	12	CF-A-004	28N
3.7	50	28	12	CF-A-002	28N	28	24	CF-A-008	28N
	60	28	10	CF-A-002	28N	28	20	CF-A-004	28N
5.5	50	38	18	CF-A-008	38N	38	36	CF-A-008	38N
	60	38	15	CF-A-008	38N	38	30	CF-A-008	38N
7.5	50	38	24	CF-A-008	38N	38	49	CF-A-012	38N
	60	38	20	CF-A-008	38N	38	41	CF-A-008	38N
11	50	42	36	CF-A-008	42N	42	71	CF-A-016	42N
	60	42	30	CF-A-008	42N	42	59	CF-A-012	42N
15	50	42	49	CF-A-012	42N	42	97	CF-A-022	42N
	60	42	41	CF-A-008	42N	42	81	CF-A-016	42N
18.5	50	42	60	CF-A-012	42N	48	120	CF-A-025	48N
	60	42	50	CF-A-012	42N	48	100	CF-A-022	48N
22	50	48	71	CF-A-016	48N	48	143	CF-A-028	48N
	60	48	59	CF-A-012	48N	48	119	CF-A-022	48N
30	50	55	97	CF-A-022	55N	55	195	CF-A-030	55N
	60	55	81	CF-A-016	55N	55	162	CF-A-028	55N
37	50	55	120	CF-A-025	55N	60	240	CF-A-050	60N
	60	55	100	CF-A-022	55N	60	200	CF-A-030	60N
45	50	55	146	CF-A-028	55N	60	292	CF-A-050	60N
	60	55	122	CF-A-025	55N	60	243	CF-A-050	60N

* The above table shows generally suitable sizes for use on an induction motor drive unit.
* Motor rotation speed and output torque are calculated (reference) values.

CF-H 00/01/02 Types

Specifications

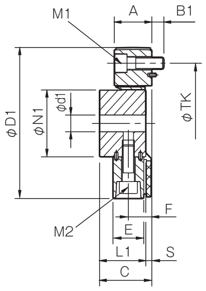
Model	Torque		Misalignment			Max. rotation speed [min^1]	Dynamic torsional stiffness [N·m/rad]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]		
CF-H-008	100	200	0.3	0.5	± 3	6500	1.27×10^4
CF-H-016	200	400	0.3	0.5	± 3	5500	2.46×10^4
CF-H-030	400	800	0.4	0.5	± 3	4000	5.91×10^4
CF-H-040	600	1200	0.4	0.5	± 3	4000	1.87×10^5
CF-H-050	800	1600	0.4	0.5	± 3	4000	1.91×10^5
CF-H-090	950	1900	0.4	0.5	± 3	4000	2.69×10^5
CF-H-110	1100	2200	0.4	0.5	± 3	4000	2.79×10^5
CF-H-160	1600	3200	0.4	0.5	± 3	3600	5.11×10^5
CF-H-240	2500	5000	0.4	0.5	± 3	3000	5.10×10^5

Model	Moment of inertia [kg·m^2]	Mass [kg]	Model	Moment of inertia [kg·m^2]	Mass [kg]	Model	Moment of inertia [kg·m^2]	Mass [kg]
CF-H-008-00	9.4×10^{-4}	0.4	**CF-H-008-01**	1.8×10^{-3}	1.3	**CF-H-008-02**	3.9×10^{-3}	3.1
CF-H-016-00	3.0×10^{-3}	0.8	**CF-H-016-01**	4.9×10^{-3}	2.5	**CF-H-016-02**	1.1×10^{-2}	5.6
CF-H-030-00	9.2×10^{-3}	1.5	**CF-H-030-01**	1.9×10^{-2}	6.0	**CF-H-030-02**	4.6×10^{-2}	13.9
CF-H-040-00	6.9×10^{-3}	1.4	**CF-H-040-01**	1.3×10^{-2}	4.4	**CF-H-040-02**	2.8×10^{-2}	9.8
CF-H-050-00	1.2×10^{-2}	1.8	**CF-H-050-01**	2.3×10^{-2}	6.5	**CF-H-050-02**	5.0×10^{-2}	14.4
CF-H-090-00	1.5×10^{-2}	2.3	**CF-H-090-01**	2.6×10^{-2}	6.9	**CF-H-090-02**	5.3×10^{-2}	14.8
CF-H-110-00	2.3×10^{-2}	2.8	**CF-H-110-01**	3.7×10^{-2}	9.7	**CF-H-110-02**	8.2×10^{-2}	18.3
CF-H-160-00	3.6×10^{-2}	3.4	**CF-H-160-01**	7.0×10^{-2}	11.9	**CF-H-160-02**	0.16	26.1
CF-H-240-00	0.10	5.8	**CF-H-240-01**	0.18	20.9	**CF-H-240-02**	0.39	48.8

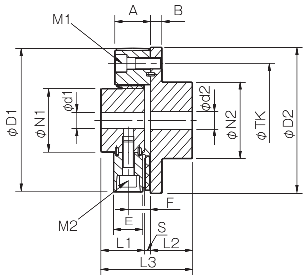
* Max. rotation speed does not take into account dynamic balance.
* Dynamic torsion spring characteristics are non-linear, so use a dynamic torsional stiffness that is at least roughly 20% of rated torque.
* The dynamic torsional stiffness is about 1.3 times that of the static torsional stiffness.
* Values for moment of inertia and mass are those when the cylindrical hub and flange hub have pilot bores.

Dimensions

■ CF-H-01



■ CF-H-02



Unit [mm]

Model	d1			d2			D1	D2	N1	N2	L1	L2	L3	A	B	B1	C	E	F	S	TK	M1	M2
	Pilot bore	Min.	Max.	Pilot bore	Min.	Max.																	
CF-H-008	12	14	38	15	16	46	125	120	60	70	40	42	88	32	10	10	46	25	20	6	100	3-M10	3-M10
CF-H-016	15	16	48	19	20	56	155	150	70	85	52	50	110	41	12	12	60	34	26	8	125	3-M12	3-M12
CF-H-030	20	22	65	28	30	80	205	200	100	120	68	66	144	56	16	15	78	46	35	10	165	3-M16	3-M16
CF-H-040	22	24	50	22	24	65	175	180	85	100	58	56	124	50	16	16	68	42	31	10	140	4-M16	4-M16
CF-H-050	20	22	65	28	30	80	205	200	100	120	68	66	144	56	16	15	78	46	35	10	165	4-M16	4-M16
CF-H-090	20	22	65	28	30	80	215	200	100	120	68	66	144	56	16	15	78	46	35	10	165	4-M16	4-M16
CF-H-110	25	28	63	28	30	80	225	230	100	120	68	66	144	56	18	18	78	46	35	10	180	4-M18	4-M18
CF-H-160	30	32	85	30	32	95	270	260	125	140	84	80	177	59	19	20	97	48	37	13	215	4-M20	4-M20
CF-H-240	40	42	115	40	42	120	330	320	160	180	100	100	213	65	19	20	113	54	40	13	260	4-M20	4-M20

* Pilot bores are to be drilled into the part. Minimum values for d1 and d2 are given by the minimum bore diameter values in the MIKI PULLEY standard hole-drilling standards and maximum values from the maximum allowable drilled bore diameters.
* The TK dimension is the bolt mounting pitch diameter of the flange hub or paired mounting part.

How to Place an Order

CF-H-008-02 14H-14N

Size

Type
O0: Element and aluminum insert
OB: O0 and bolts
O1: OC and cylindrical hub
OP: O0 and spring pin
OC: OB and spring pin
O2: O1 and flange hub

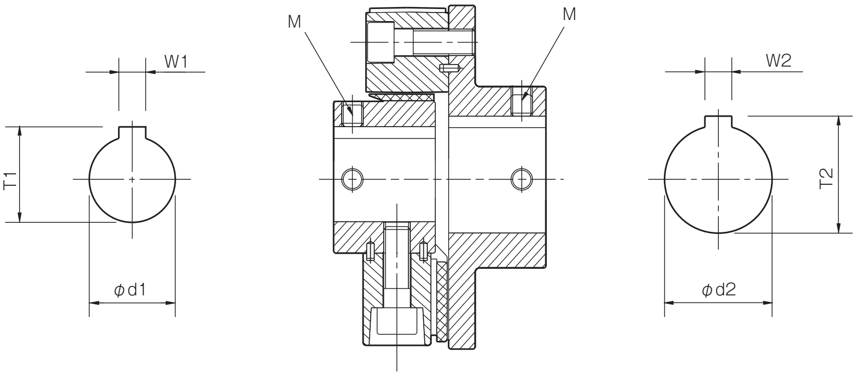
Bore diameter: d1 (Cylindrical hub) - d2 (Flange hub)
Blank: Pilot bore

Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
N: Compliant with the new motor standards

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Standard Hole-Drilling Standards

- Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular hub.
- Set screw positions are not on the same plane.
- The set screws are included with the product.
- The spline can also be processed. Contact Miki Pulley regarding such processing.



Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]
Tolerance	H7	E9	$^{+0.3}_{0}$	—	Tolerance	H7	H9	$^{+0.3}_{0}$	—	Tolerance	G7, F7	H9	$^{+0.3}_{0}$	—
14	$14^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	16.0	2-M4	14H	$14^{+0.018}_{0}$	$5^{+0.030}_{0}$	16.3	2-M4	14N	$14^{+0.024}_{+0.006}$	$5^{+0.030}_{0}$	16.3	2-M4
15	$15^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	17.0	2-M4	15H	$15^{+0.018}_{0}$	$5^{+0.030}_{0}$	17.3	2-M4	—	—	—	—	—
16	$16^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	18.0	2-M4	16H	$16^{+0.018}_{0}$	$5^{+0.030}_{0}$	18.3	2-M4	—	—	—	—	—
17	$17^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	19.0	2-M4	17H	$17^{+0.018}_{0}$	$5^{+0.030}_{0}$	19.3	2-M4	—	—	—	—	—
18	$18^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	20.0	2-M4	18H	$18^{+0.018}_{0}$	$6^{+0.030}_{0}$	20.8	2-M5	—	—	—	—	—
19	$19^{+0.021}_{0}$	$5^{+0.050}_{+0.020}$	21.0	2-M4	19H	$19^{+0.021}_{0}$	$6^{+0.030}_{0}$	21.8	2-M5	19N	$19^{+0.028}_{+0.007}$	$6^{+0.030}_{0}$	21.8	2-M5
20	$20^{+0.021}_{0}$	$5^{+0.050}_{+0.020}$	22.0	2-M4	20H	$20^{+0.021}_{0}$	$6^{+0.030}_{0}$	22.8	2-M5	—	—	—	—	—
22	$22^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	25.0	2-M6	22H	$22^{+0.021}_{0}$	$6^{+0.030}_{0}$	24.8	2-M5	—	—	—	—	—
24	$24^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	27.0	2-M6	24H	$24^{+0.021}_{0}$	$8^{+0.036}_{0}$	27.3	2-M6	24N	$24^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	27.3	2-M6
25	$25^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	28.0	2-M6	25H	$25^{+0.021}_{0}$	$8^{+0.036}_{0}$	28.3	2-M6	—	—	—	—	—
28	$28^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	31.0	2-M6	28H	$28^{+0.021}_{0}$	$8^{+0.036}_{0}$	31.3	2-M6	28N	$28^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	31.3	2-M6
30	$30^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	33.0	2-M6	30H	$30^{+0.021}_{0}$	$8^{+0.036}_{0}$	33.3	2-M6	—	—	—	—	—
32	$32^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	35.5	2-M8	32H	$32^{+0.025}_{0}$	$10^{+0.036}_{0}$	35.3	2-M8	—	—	—	—	—
35	$35^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	38.5	2-M8	35H	$35^{+0.025}_{0}$	$10^{+0.036}_{0}$	38.3	2-M8	—	—	—	—	—
38	$38^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	41.5	2-M8	38H	$38^{+0.025}_{0}$	$10^{+0.036}_{0}$	41.3	2-M8	38N	$38^{+0.050}_{+0.025}$	$10^{+0.036}_{0}$	41.3	2-M8
40	$40^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	43.5	2-M8	40H	$40^{+0.025}_{0}$	$12^{+0.043}_{0}$	43.3	2-M8	—	—	—	—	—
42	$42^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	45.5	2-M8	42H	$42^{+0.025}_{0}$	$12^{+0.043}_{0}$	45.3	2-M8	42N	$42^{+0.050}_{+0.025}$	$12^{+0.043}_{0}$	45.3	2-M8
45	$45^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	48.5	2-M8	45H	$45^{+0.025}_{0}$	$14^{+0.043}_{0}$	48.8	2-M10	—	—	—	—	—
48	$48^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	51.5	2-M8	48H	$48^{+0.025}_{0}$	$14^{+0.043}_{0}$	51.8	2-M10	48N	$48^{+0.050}_{+0.025}$	$14^{+0.043}_{0}$	51.8	2-M10
50	$50^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	53.5	2-M8	50H	$50^{+0.025}_{0}$	$14^{+0.043}_{0}$	53.8	2-M10	—	—	—	—	—
55	$55^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	60.0	2-M10	55H	$55^{+0.030}_{0}$	$16^{+0.043}_{0}$	59.3	2-M10	55N	$55^{+0.060}_{+0.030}$	$16^{+0.043}_{0}$	59.3	2-M10
56	$56^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	61.0	2-M10	56H	$56^{+0.030}_{0}$	$16^{+0.043}_{0}$	60.3	2-M10	—	—	—	—	—
60	$60^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	65.0	2-M10	60H	$60^{+0.030}_{0}$	$18^{+0.043}_{0}$	64.4	2-M10	60N	$60^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	64.4	2-M10
63	$63^{+0.030}_{0}$	$18^{+0.075}_{+0.032}$	69.0	2-M10	63H	$63^{+0.030}_{0}$	$18^{+0.043}_{0}$	67.4	2-M10	—	—	—	—	—
65	$65^{+0.030}_{0}$	$18^{+0.075}_{+0.032}$	71.0	2-M10	65H	$65^{+0.030}_{0}$	$18^{+0.043}_{0}$	69.4	2-M10	65N	$65^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	69.4	2-M10

Distance from Set Screw Edge (Cylindrical Hub)

Model	CF-H-008	CF-H-016	CF-H-030	CF-H-040	CF-H-050	CF-H-090	CF-H-110	CF-H-160	CF-H-240
Distance from set screw edge [mm]	7	10	11	10	11	11	11	15	15

Distance from Set Screw Edge (Flange Hub)

Model	CF-H-008	CF-H-016	CF-H-030	CF-H-040	CF-H-050	CF-H-090	CF-H-110	CF-H-160	CF-H-240
Distance from set screw edge [mm]	9	10	15	10	15	15	15	15	15

CF-H Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

CF-H models are delivered in component form. Pay close attention to the assembly methods shown below when mounting couplings.

(1) Couplings are designed for use within an operating temperature range of -40℃ to 120℃ .

(2) The elements have excellent oil resistance, but avoid using them submerged in oil or in oil mist atmospheres. Also, if the coupling will be stored rather than used immediately, store it in a cool location out of sunlight.

(3) Bolts for mounting (other than clamping screws) are given a microcapsule coating that takes effect after mounting to stop loosening. Screw fixatives or other adhesives are therefore unnecessary. Also, store the couplings in well ventilated locations away from moisture to preserve their efficacy and keep them out of contact with oils.

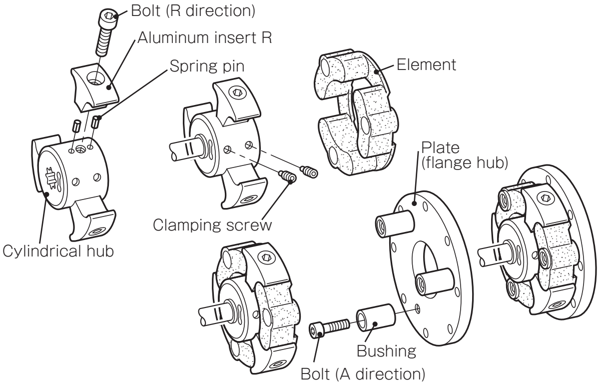
Assembly (When Using CENTA-LOCK)

(1) Press the spring pin into the cylindrical hub (except for coupling size 008), and then lock aluminum insert R into the cylindrical hub.

(2) Mount the cylindrical hub (clamping hub) onto the spline shaft, and then tighten the clamping screw to lock.

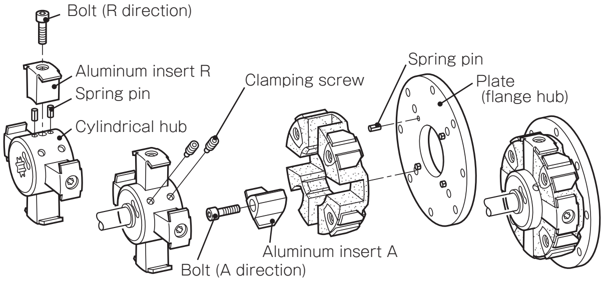
(3) **a. Coupling sizes 008 and 016**

Lock the bushing onto the flange hub (flywheel side).
Push the element into the cylindrical hub.



b. Coupling sizes 030, 040, 050, 090, 110, 160, and 240

Press the spring pin into the flange hub (flywheel side), add aluminum insert A to the element, and then lock it to the flange hub (flywheel side).



Bolt Specifications and Tightening Torques

The bolts are hex-socket-head bolts that conform to JIS B1176, are zinc plated, and have microcapsule coatings (to prevent loosening). The clamping screws are hex-socket-head screws (dog point) that conform to JIS B1177.

Tighten each of the bolts and clamping screws to the tightening torques given in the following tables, using a torque wrench or the like. To ensure secure fastening, apply an extremely small amount of grease to the seat surface of the bolt. (Be careful not to get grease on the threads of the bolt.)

■ Bolt specifications and tightening torques in directions R and A

Model	Strength classification	R direction/A direction Nominal bolt diameter	Tightening torque [N·m]
CF-H-008	8.8 or over	3-M10 × 30	49 ~ 54
CF-H-016	8.8 or over	3-M12 × 35	85 ~ 94
CF-H-030	8.8 or over	3-M16 × 50	210 ~ 230
CF-H-040	8.8 or over	4-M16 × 45	210 ~ 230
CF-H-050	8.8 or over	4-M16 × 50	210 ~ 230
CF-H-090	8.8 or over	4-M16 × 50	210 ~ 230
CF-H-110	10.9 or over	4-M18 × 55	310 ~ 330
CF-H-160	10.9 or over	4-M20 × 50	440 ~ 490
CF-H-240	10.9 or over	4-M20 × 65	440 ~ 490

* The nominal diameter of bolts are equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

* Contact Miki Pulley if you plan to use bolts with specifications other than those shown.

■ Clamping screw specifications and tightening torques

Model	Clamping screw nominal diameter	Tightening torque [N·m]
CF-H-008	2-M10	25 ~ 30
CF-H-016	2-M12	40 ~ 50
CF-H-030	2-M16	100 ~ 120
CF-H-040	2-M16	100 ~ 120
CF-H-050	2-M16	100 ~ 120
CF-H-090	2-M16	100 ~ 120
CF-H-110	2-M16	100 ~ 120
CF-H-160	2-M20	200 ~ 220
CF-H-240	2-M20	200 ~ 220

* The nominal diameter of clamping screws are equal to the quantity minus the nominal diameter of the screw threads.

Designing a Cylindrical or Flange Hub

Materials

When designing a new cylindrical hub, flange hub, flywheel mounting plate, or the like, use the following materials or materials that have at least the following tensile strength.

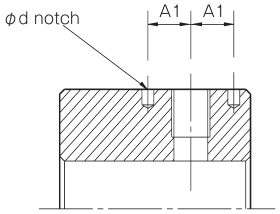
If the material is not strong enough on the flywheel side, it can be compensated for by changing the bolt length. Contact Miki Pulley for details.

Hub type	Material	Tensile strength
Cylindrical hub	S 45 C	569 N/mm² or higher
Flange hub	FCD 450	450N/mm² or higher

Spring pin bore dimensions

Consult the following table for spring pin bore dimensions for cylindrical or flange hubs (flywheel side). (Coupling size 016 or larger)

Cylindrical hub

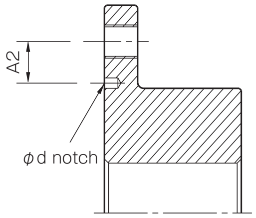


Unit [mm]

Model	A1 ± 0.1	d	Depth	Spring pin specification
CF-H-016	13.5	5	6.5	6- φ 5 × 10
CF-H-030	18.0	5	6.5	6- φ 5 × 10
CF-H-040	14.0	5	6.5	8- φ 5 × 10
CF-H-050	18.0	5	6.5	8- φ 5 × 10
CF-H-090	18.0	5	6.5	8- φ 5 × 10
CF-H-110	18.0	5	6.5	8- φ 5 × 10
CF-H-160	17.5	8	13.0	8- φ 8 × 16
CF-H-240	20.0	8	13.0	8- φ 8 × 16

* The nominal diameter of the spring pin is equal to the quantity minus the diameter times the length.

Flange hubs (flywheel side)



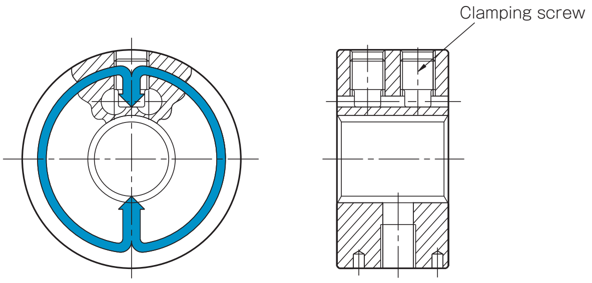
Unit [mm]

Model	A2 ± 0.1	d	Depth	Spring pin specification
CF-H-030	20	5	6.5	3- φ 5 × 10
CF-H-040	17	5	6.5	4- φ 5 × 10
CF-H-050	20	5	6.5	4- φ 5 × 10
CF-H-090	20	5	6.5	4- φ 5 × 10
CF-H-110	17.5	5	6.5	4- φ 5 × 10
CF-H-160	25	8	13.0	4- φ 8 × 16
CF-H-240	30	8	13.0	4- φ 8 × 16

* The nominal diameter of the spring pin is equal to the quantity minus the diameter times the length.
* Coupling size 016 does not require a spring pin bore on the flange hub side.

Coupling a pump shaft (spline shaft) to a cylindrical hub

We can design a clamping hub that completely locks a cylindrical hub to a spline shaft using CENTA-LOCK action. Contact Miki Pulley for details. Clamping hubs must be made to order.



CENTA-LOCK mechanism on the clamping hub

Recommended spline-shaft fit grades

Standards	Grade of fit
JIS D2001	Class b
SAE J498b	Class 2
ANSI B92.1	Class 5

CF-X 00/01/02 Types

Specifications

Model	Torque		Misalignment			Max. rotation speed [min⁻¹]	Static torsional stiffness [N·m/rad]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]		
CF-X-001	15	30	0.1	1	±0.5	10000	3.0×10^3
CF-X-002	30	60	0.1	1	±0.5	10000	6.0×10^3
CF-X-004	60	120	0.1	1	±0.5	8000	2.3×10^4
CF-X-008	120	250	0.1	1	±0.5	7000	5.8×10^4
CF-X-016	240	500	0.1	1	±0.5	6000	1.1×10^5
CF-X-025	370	800	0.1	1	±0.5	5000	1.7×10^5

Model	Moment of inertia [kg·m²]	Mass [kg]
CF-X-001-00	2.03×10^{-5}	0.04
CF-X-002-00	9.75×10^{-5}	0.1
CF-X-004-00	2.30×10^{-4}	0.2
CF-X-008-00	6.63×10^{-4}	0.3
CF-X-016-00	1.56×10^{-3}	0.5
CF-X-025-00	2.77×10^{-3}	0.6

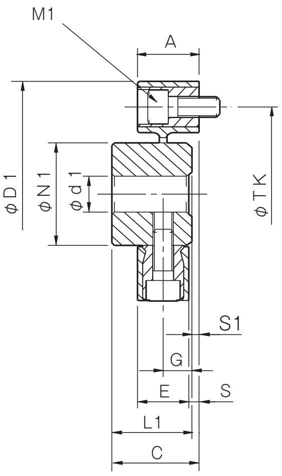
Model	Moment of inertia [kg·m²]	Mass [kg]
CF-X-001-01	5.25×10^{-5}	0.2
CF-X-002-01	2.20×10^{-4}	0.4
CF-X-004-01	4.83×10^{-4}	0.6
CF-X-008-01	1.49×10^{-3}	1.3
CF-X-016-01	3.49×10^{-3}	2.2
CF-X-025-01	7.07×10^{-3}	3.5

Model	Moment of inertia [kg·m²]	Mass [kg]
CF-X-001-02	1.22×10^{-4}	0.5
CF-X-002-02	5.74×10^{-4}	0.9
CF-X-004-02	1.19×10^{-3}	1.4
CF-X-008-02	3.49×10^{-3}	2.9
CF-X-016-02	9.20×10^{-3}	5.0
CF-X-025-02	1.83×10^{-2}	7.9

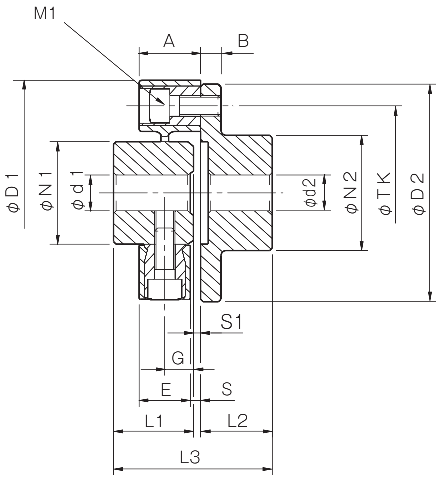
* Max. rotation speed does not take into account dynamic balance.
* Static torsional stiffness values given are from measurements taken at 20℃ .
* Values for moment of inertia and mass are those when the cylindrical hub and flange hub have pilot bores.

Dimensions

■ CF-X-01



■ CF-X-02



Unit [mm]

Model	d1			d2			D1	D2	N1	N2	L1	L2	L3	A	B	C	E	G	S	S1	M1	M2	TK
	Pilot bore	Min.	Max.	Pilot bore	Min.	Max.																	
CF-X-001	8	9	19	8	9	22	57	56	30	36	32	24	57	24	7	33	18	11	3	1	2-M6	2-M6	44
CF-X-002	10	11	26	9	10	30	88	85	40	45	30	28	62	24	8	34	20	10	4	4	2-M8	2-M8	68
CF-X-004	12	14	30	11	12	36	100	100	45	55	34	30	66.5	25	8	36.5	21	12	4	2.5	3-M8	3-M8	80
CF-X-008	12	14	38	15	16	46	125	120	60	70	40	42	85	30	10	43	26	14	4	3	3-M10	3-M10	100
CF-X-016	15	16	48	19	20	56	155	150	70	85	52	50	105	35	12	55	28	18	7	3	3-M12	3-M12	125
CF-X-025	15	16	55	19	20	65	175	170	85	100	58	56	117	40	14	61	34	20	6	3	3-M14	3-M14	140

* Pilot bores are to be drilled into the part. Minimum values for d1 and d2 are given by the minimum bore diameter values in the MIKI PULLEY standard hole-drilling standards and maximum values from the maximum allowable drilled bore diameters.
* The nominal diameters for bolts M1/M2 are equal to the quantity minus the nominal diameter of the screw threads.
* The TK dimension is the bolt mounting pitch diameter of the flange hub or paired mounting part.

How to Place an Order

CF-X-001-02 12H-14N

Size

Type
00: Element only
01: OB and cylindrical hub
OB: 00 and bolts
02: 01 and flange hub

Bore diameter: d1 (Cylindrical hub) - d2 (Flange hub)
Blank: Pilot bore

Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
N: Compliant with the new motor standards

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

CF-X OG Types

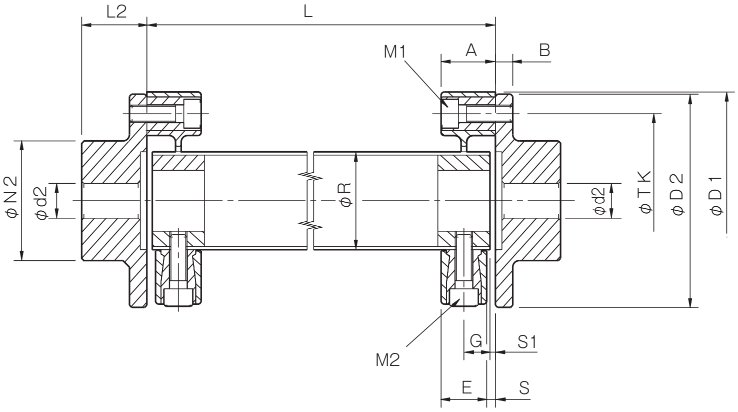
Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Static torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-X-001-OG	15	30	8.2	1	±0.5	2000	1.15×10^3	4.4×10^{-4}	1.2
CF-X-002-OG	30	60	8.2	1	±0.5	2000	2.40×10^3	1.6×10^{-3}	2.2
CF-X-004-OG	60	120	8.2	1	±0.5	2000	6.97×10^3	3.1×10^{-3}	3.1
CF-X-008-OG	120	250	8.1	1	±0.5	2000	1.75×10^4	8.6×10^{-3}	5.8
CF-X-016-OG	240	500	7.9	1	±0.5	2000	3.15×10^4	2.1×10^{-3}	9.6
CF-X-025-OG	370	800	7.8	1	±0.5	2000	5.76×10^4	4.2×10^{-2}	14.6

* Max. rotation speed does not take into account dynamic balance.
* Static torsional stiffness values given are from measurements taken at 20℃ .
* Values for moment of inertia and mass are those when the flange hubs have pilot bores and L = 500 mm.

Dimensions

■ CF-X-OG



Unit [mm]

Model	d2			D1	D2	N2	L2	A	B	E	G	S	S1	M1	M2	R	TK
	Pilot bore	Min.	Max.														
CF-X-001-OG	8	9	22	57	56	36	24	24	7	18	11	3	1	2-M6	2-M6	30	44
CF-X-002-OG	9	10	30	88	85	45	28	24	8	20	10	4	4	2-M8	2-M8	40	68
CF-X-004-OG	11	12	36	100	100	55	30	25	8	21	12	4	2.5	3-M8	3-M8	45	80
CF-X-008-OG	15	16	46	125	120	70	42	30	10	26	14	4	3	3-M10	3-M10	60	100
CF-X-016-OG	19	20	56	155	150	85	50	35	12	28	18	7	3	3-M12	3-M12	70	125
CF-X-025-OG	19	20	65	175	170	100	56	40	14	34	20	6	3	3-M14	3-M14	85	140

* Pilot bores are to be drilled into the part. Minimum values for d2 are given by the minimum bore diameter values in the MIKI PULLEY standard hole-drilling standards and maximum values from the maximum allowable drilled bore diameters.
* The nominal diameters for bolts M1/M2 are equal to the quantity minus the nominal diameter of the screw threads, where the quantity is for one side.
* The L dimension has a standard length of 1000 mm or less. Dimension L must at least allow enough space for an M1 bolt to be mounted.

How to Place an Order

CF-X-001-OG 12H-14N L=600

Size
Type
OG: Floating shaft type
Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore
Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
N: Compliant with the new motor standards
Floating shaft length *Use mm units for L dimensions.

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

CF-X 02-C Types

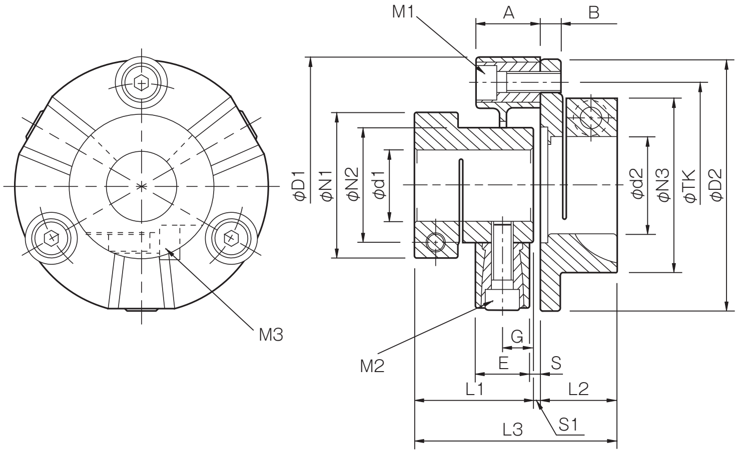
Made to order

Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Static torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-X-001-02-C	15	30	0.1	1	± 0.5	10000	3.0×10^3	7.14×10^{-5}	0.2
CF-X-002-02-C	30	60	0.1	1	± 0.5	10000	6.0×10^3	3.44×10^{-4}	0.5
CF-X-004-02-C	60	120	0.1	1	± 0.5	8000	2.3×10^4	7.22×10^{-4}	0.7

* Max. rotation speed does not take into account dynamic balance.
* Static torsional stiffness values given are from measurements taken at 20℃ .
* Values for moment of inertia and mass are those when the cylindrical hub and flange hub have the minimum bore diameters.

Dimensions



Unit [mm]

Model	d1		d2		D1	D2	N1	N2	N3	L1	L2	L3	A	B	E	G	S	S1	M1	M2	M3	TK
	Min.	Max.	Min.	Max.																		
CF-X-001-02-C	10	16	10	19	57	56	33	30	38	37	24	62	24	7	18	11	3	1	2-M6	2-M6	1-M5	44
CF-X-002-02-C	12	25	12	25	88	85	46	40	46	43	28	75	24	8	20	10	4	4	2-M8	2-M8	1-M6	68
CF-X-004-02-C	14	28	14	38	100	99	57	45	68	46.5	30	79	25	8	21	12	4	2.5	3-M8	3-M8	1-M8	80

* The nominal diameters for bolts M1, M2, and M3 are equal to the quantity minus the nominal diameter of the screw threads, where the quantity for clamping bolt M3 is for a hub on one side.
* The recommended processing tolerance for paired shafts is the h7 class.

Standard Bore Diameter

Model		Standard bore diameter [mm]																
		10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38
CF-X-001-02-C	**d1**	●	●	●	●	●	●											
	d2	●	●	●	●	●	●	●	●									
CF-X-002-02-C	**d1**			●	●	●	●	●	●	●	●	●	●					
	d2			●	●	●	●	●	●	●	●	●	●					
CF-X-004-02-C	**d1**				●	●	●	●	●	●	●	●	●	●				
	d2				●	●	●	●	●	●	●	●	●	●	●	●	●	●

How to Place an Order

CF-X-001-O2-C 10-19

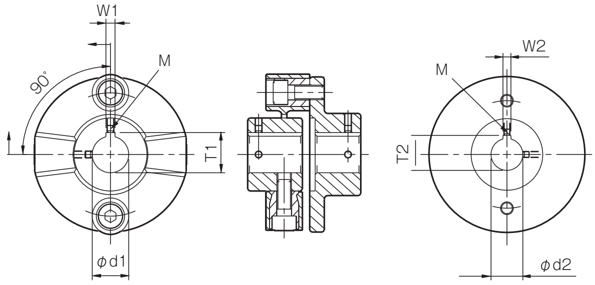
Bore diameter: d1 (Cylindrical hub) - d2 (Flange hub)
Clamp
Size
Type
O2: Element and bolt and cylindrical hub and flange hub

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

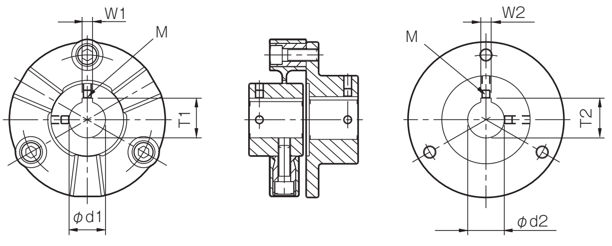
Standard Hole-Drilling Standards

- Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular hub.
- Set screw positions are not on the same plane.
- The set screws are included with the product.

■ CF-X-001, 002



■ CF-X-004 to 025



Unit [mm]

Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]
Tolerance	H7, H8	E9	$^{+0.3}_{0}$	—	Tolerance	H7	H9	$^{+0.3}_{0}$	—	Tolerance	G7, F7	H9	$^{+0.3}_{0}$	—
9	$9^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
10	$10^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
11	$11^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
12	$12^{+0.018}_{0}$	$4^{+0.050}_{+0.020}$	13.5	2-M4	12H	$12^{+0.018}_{0}$	$4^{+0.030}_{0}$	13.8	2-M4	—	—	—	—	—
14	$14^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	16.0	2-M4	14H	$14^{+0.018}_{0}$	$5^{+0.030}_{0}$	16.3	2-M4	14N	$14^{+0.024}_{+0.006}$	$5^{+0.030}_{0}$	16.3	2-M4
15	$15^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	17.0	2-M4	15H	$15^{+0.018}_{0}$	$5^{+0.030}_{0}$	17.3	2-M4	—	—	—	—	—
16	$16^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	18.0	2-M4	16H	$16^{+0.018}_{0}$	$5^{+0.030}_{0}$	18.3	2-M4	—	—	—	—	—
17	$17^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	19.0	2-M4	17H	$17^{+0.018}_{0}$	$5^{+0.030}_{0}$	19.3	2-M4	—	—	—	—	—
18	$18^{+0.018}_{0}$	$5^{+0.050}_{+0.020}$	20.0	2-M4	18H	$18^{+0.018}_{0}$	$6^{+0.030}_{0}$	20.8	2-M5	—	—	—	—	—
19	$19^{+0.021}_{0}$	$5^{+0.050}_{+0.020}$	21.0	2-M4	19H	$19^{+0.021}_{0}$	$6^{+0.030}_{0}$	21.8	2-M5	19N	$19^{+0.028}_{+0.007}$	$6^{+0.030}_{0}$	21.8	2-M5
20	$20^{+0.021}_{0}$	$5^{+0.050}_{+0.020}$	22.0	2-M4	20H	$20^{+0.021}_{0}$	$6^{+0.030}_{0}$	22.8	2-M5	—	—	—	—	—
22	$22^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	25.0	2-M6	22H	$22^{+0.021}_{0}$	$6^{+0.030}_{0}$	24.8	2-M5	—	—	—	—	—
24	$24^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	27.0	2-M6	24H	$24^{+0.021}_{0}$	$8^{+0.036}_{0}$	27.3	2-M6	24N	$24^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	27.3	2-M6
25	$25^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	28.0	2-M6	25H	$25^{+0.021}_{0}$	$8^{+0.036}_{0}$	28.3	2-M6	—	—	—	—	—
28	$28^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	31.0	2-M6	28H	$28^{+0.021}_{0}$	$8^{+0.036}_{0}$	31.3	2-M6	28N	$28^{+0.028}_{+0.007}$	$8^{+0.036}_{0}$	31.3	2-M6
30	$30^{+0.021}_{0}$	$7^{+0.061}_{+0.025}$	33.0	2-M6	30H	$30^{+0.021}_{0}$	$8^{+0.036}_{0}$	33.3	2-M6	—	—	—	—	—
32	$32^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	35.5	2-M8	32H	$32^{+0.025}_{0}$	$10^{+0.036}_{0}$	35.3	2-M8	—	—	—	—	—
35	$35^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	38.5	2-M8	35H	$35^{+0.025}_{0}$	$10^{+0.036}_{0}$	38.3	2-M8	—	—	—	—	—
38	$38^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	41.5	2-M8	38H	$38^{+0.025}_{0}$	$10^{+0.036}_{0}$	41.3	2-M8	38N	$38^{+0.050}_{+0.025}$	$10^{+0.036}_{0}$	41.3	2-M8
40	$40^{+0.025}_{0}$	$10^{+0.061}_{+0.025}$	43.5	2-M8	40H	$40^{+0.025}_{0}$	$12^{+0.043}_{0}$	43.3	2-M8	—	—	—	—	—
42	$42^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	45.5	2-M8	42H	$42^{+0.025}_{0}$	$12^{+0.043}_{0}$	45.3	2-M8	42N	$42^{+0.050}_{+0.025}$	$12^{+0.043}_{0}$	45.3	2-M8
45	$45^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	48.5	2-M8	45H	$45^{+0.025}_{0}$	$14^{+0.043}_{0}$	48.8	2-M10	—	—	—	—	—
48	$48^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	51.5	2-M8	48H	$48^{+0.025}_{0}$	$14^{+0.043}_{0}$	51.8	2-M10	48N	$48^{+0.050}_{+0.025}$	$14^{+0.043}_{0}$	51.8	2-M10
50	$50^{+0.025}_{0}$	$12^{+0.075}_{+0.032}$	53.5	2-M8	50H	$50^{+0.025}_{0}$	$14^{+0.043}_{0}$	53.8	2-M10	—	—	—	—	—
55	$55^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	60.0	2-M10	55H	$55^{+0.030}_{0}$	$16^{+0.043}_{0}$	59.3	2-M10	55N	$55^{+0.060}_{+0.030}$	$16^{+0.043}_{0}$	59.3	2-M10
56	$56^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	61.0	2-M10	56H	$56^{+0.030}_{0}$	$16^{+0.043}_{0}$	60.3	2-M10	—	—	—	—	—
60	$60^{+0.030}_{0}$	$15^{+0.075}_{+0.032}$	65.0	2-M10	60H	$60^{+0.030}_{0}$	$18^{+0.043}_{0}$	64.4	2-M10	60N	$60^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	64.4	2-M10
63	$63^{+0.030}_{0}$	$18^{+0.075}_{+0.032}$	69.0	2-M10	63H	$63^{+0.030}_{0}$	$18^{+0.043}_{0}$	67.4	2-M10	—	—	—	—	—
65	$65^{+0.030}_{0}$	$18^{+0.075}_{+0.032}$	71.0	2-M10	65H	$65^{+0.030}_{0}$	$18^{+0.043}_{0}$	69.4	2-M10	65N	$65^{+0.060}_{+0.030}$	$18^{+0.043}_{0}$	69.4	2-M10

* The ø11 or below requirement under the new JIS standards and ø11 requirement for the new motor standards are the same as the old JIS standards (class 2)

Distance from Set Screw Edge (Cylindrical Hub)

Model	CF-X-001	CF-X-002	CF-X-004	CF-X-008	CF-X-016	CF-X-025
Distance from set screw edge [mm]	6	6	6	7	10	10

Distance from Set Screw Edge (Flange Hub)

Model	CF-X-001	CF-X-002	CF-X-004	CF-X-008	CF-X-016	CF-X-025
Distance from set screw edge [mm]	6	7	7	9	10	10

CF-X Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

CF-X models are delivered in component form. Pay close attention to the misalignments for mounting and assembly methods shown below when mounting couplings.

(1) Couplings are designed for use within an operating temperature range of -30℃ to 90℃ .

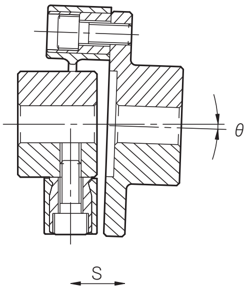
(2) Although elements are designed to be oilproof, do not subject them to excessive amounts of oil as this may cause deterioration. Use and storage in direct sunlight may shorten element service life, so cover elements appropriately.

(3) Bolts for mounting (other than CF-X(-C) type clamping bolts) are given a microcapsule coating that takes effect after mounting to stop loosening. Screw fixatives or other adhesives are therefore unnecessary. Also, store the couplings in well ventilated locations away from moisture to preserve their efficacy and keep them out of contact with oils.

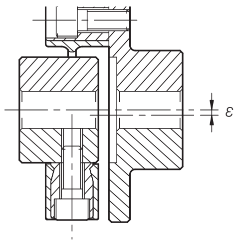
Mounting Misalignment

To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table. The coupling should be mounted, however, so that the difference between centers is 50% or less of that misalignment value if rotation speed exceeds 2000 min^{-1}.

■ Angular (θ)/Axial (S)

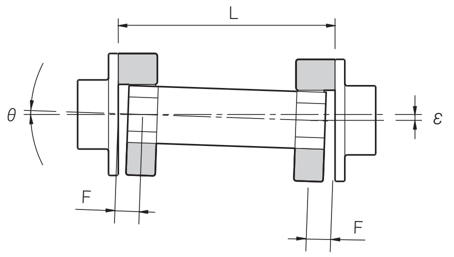


■ Parallel (ε)



The allowable values for parallel misalignment and angular deflection of the floating-shaft type OG types will vary with the floating length used. Calculate them using the equations below.

■ Calculating parallel misalignment and angular deflection for OG types



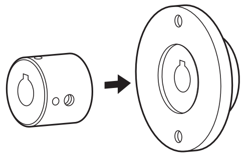
$\varepsilon = \tan\theta\ (L - 2F)$ From the dimensions table: $F = G + S1$

ε : Parallel misalignment of two shafts
θ : Angular deflection of coupling
L: Floating length

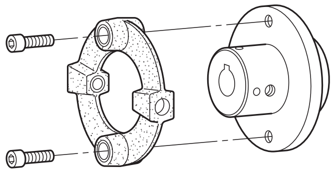
Assembly

When mounting elements onto cylindrical or flange hubs, wipe the oil on cylindrical hubs, flange hubs, and element mounting surfaces well, and then tighten with a torque wrench to the specified torque. To ensure secure fastening, apply an extremely small amount of grease to the seat surface of the bolt. (Be careful not to get grease on the threads of the bolt.)

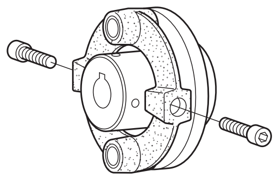
(1) To center the coupling, insert the cylindrical hub onto the centering part of the flange hub.



(2) With the cylindrical hub placed on the centering part of the flange hub, tighten the A direction bolt, and then mount the element onto the flange hub.

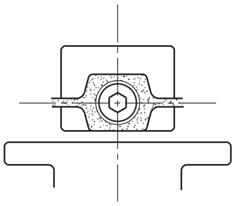


(3) Pull the cylindrical hub out a bit, tighten the R direction bolt, and then mount the element on the cylindrical hub.

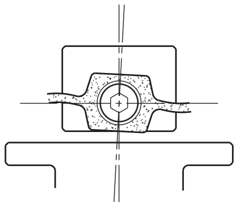


Once assembly is complete, recheck that the element is not mounted as shown in the figure below.

Good mountings



Bad mountings



Bolt Specifications and Tightening Torques

The R and A direction bolts are hex-socket-head bolts that conform to JIS B1176, are zinc plated, and have microcapsule coatings (to prevent loosening). CF-X(-C) types of bolts for clamping are also hex-socket-head bolts that conform to JIS B1176. They are surface treated with black oxide finishing to prevent loosening. Tighten each of the bolts to the tightening torques given in the following tables, using a torque wrench or the like.

■ Bolt specifications and tightening torques in directions R and A

Size	Direction R bolts	Direction A bolts	Tightening torque [N·m]
001	2-M6 × 25	2-M6 × 25	9 ～ 11
002	2-M8 × 20	2-M8 × 20	24 ～ 27
004	3-M8 × 25	3-M8 × 25	24 ～ 27
008	3-M10 × 30	3-M10 × 30	49 ～ 54
016	3-M12 × 35	3-M12 × 35	85 ～ 94
025	3-M14 × 40	3-M14 × 40	130 ～ 150

* The nominal diameters for bolts are equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

■ CF-X(-C) clamping bolt specifications and tightening torques

Size	Clamping bolt	Tightening torque [N·m]
001	2-M5 × 14	7
002	2-M6 × 15	11
004	2-M8 × 20	27

* The nominal diameters for bolts are equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

CF-B Models

Specifications

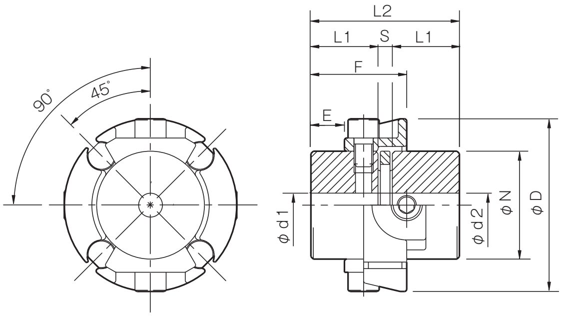
Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Static torsional stiffness [N·m/rad]	Moment of inertia [$\mathrm{kg \cdot m}^2$]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-B-070	30	60	0.5	1.0	±1	10000	1.30×10^{3}	2.80×10^{-4}	0.7
CF-B-080	60	120	0.5	1.0	±1	9000	1.53×10^{3}	3.39×10^{-4}	0.8
CF-B-100	120	240	0.5	1.0	±1	7500	3.51×10^{3}	1.34×10^{-3}	2.0
CF-B-120	250	500	0.5	1.0	±1	6000	7.90×10^{3}	3.34×10^{-3}	3.4
CF-B-140	400	800	0.5	1.0	±1	5000	1.34×10^{4}	7.02×10^{-3}	5.4
CF-B-165	600	1200	0.5	1.0	±1	4000	2.36×10^{4}	1.78×10^{-2}	8.7
CF-B-185	1000	2000	0.5	1.0	±1	3600	1.02×10^{5}	3.67×10^{-2}	13.8

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Static torsional stiffness [N·m/rad]	Moment of inertia [$\mathrm{kg \cdot m}^2$]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
CF-B-070-H	45	60	0.3	0.5	±1	10000	2.76×10^{3}	2.80×10^{-4}	0.7
CF-B-080-H	85	120	0.3	0.5	±1	9000	4.15×10^{3}	3.39×10^{-4}	0.8
CF-B-100-H	170	240	0.3	0.5	±1	7500	9.49×10^{3}	1.34×10^{-3}	2.0
CF-B-120-H	350	500	0.3	0.5	±1	6000	2.03×10^{4}	3.34×10^{-3}	3.4
CF-B-140-H	560	800	0.3	0.5	±1	5000	3.44×10^{4}	7.02×10^{-3}	5.4
CF-B-165-H	850	1200	0.3	0.5	±1	4000	5.24×10^{4}	1.78×10^{-2}	8.7
CF-B-185-H	1400	2000	0.3	0.5	±1	3600	2.53×10^{5}	3.67×10^{-2}	13.8

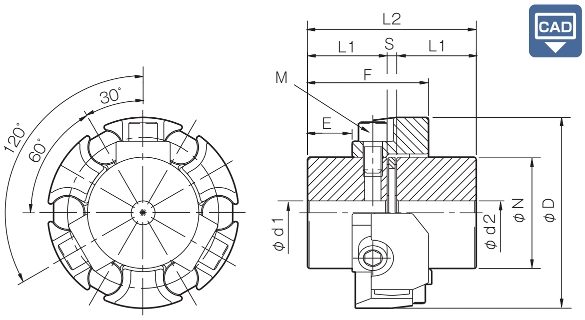
* Max. rotation speed does not take into account dynamic balance.
* Static torsional stiffness values given are from measurements taken at 20℃ .
* Values for moment of inertia and mass are those when the cylindrical hubs have pilot bores.

Dimensions

■ CF-B-070



■ CF-B-080 to 185



Model	d1・d2			D	N	L1	L2	S	E	F	M
	Pilot bore	Min.	Max.								
CF-B-070	9	10	30	72	45	28	62	6	14	40	4-M8
CF-B-080	12	14	30	76	45	30	66	6	16	42	6-M8
CF-B-100	12	14	38	98	60	42	90	6	24	64.5	6-M10
CF-B-120	15	16	48	120	70	50	106	6	28	76	6-M12
CF-B-140	15	16	55	138	85	55	116	6	30	83	6-M14
CF-B-165	19	20	60	165	100	65	138	8	36	99	6-M16
CF-B-185	29	30	80	187	115	80	170	10	45	123	6-M20

* Pilot bores are to be drilled into the part. Minimum values for d1 and d2 are given by the minimum bore diameter values in the MIKI PULLEY standard hole-drilling standards and maximum values from the maximum allowable drilled bore diameters.
* The nominal diameter for the bolt M is equal to the quantity minus the nominal diameter of the screw thread.

How to Place an Order

CF-B-070-H 12H-14N

Size

Element Material
Blank: Polyurethane resin (Green)
H: Polyester resin (Yellow)

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore

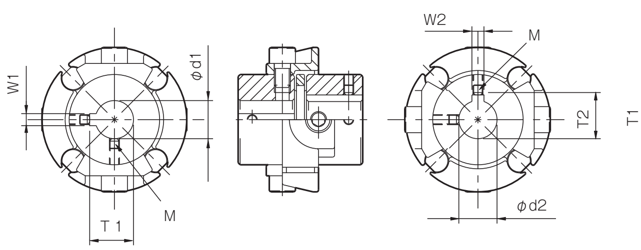
Bore specifications
Blank: Compliant with the old JIS standards (class 2) E9
H: Compliant with the new JIS standards H9
N: Compliant with the new motor standards

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

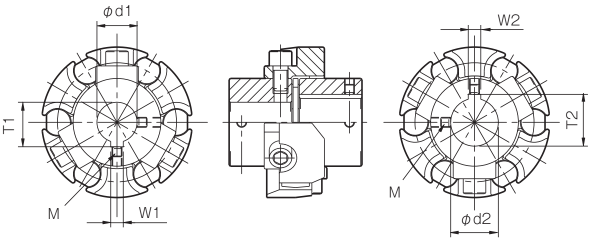
Standard Hole-Drilling Standards

- Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular hub.
- Set screw positions are not on the same plane.
- The set screws are included with the product.

■ CF-B-070



■ CF-B-080 to 185



Unit [mm]

Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1•W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1 • d2]	Keyway width [W1 • W2]	Keyway height [T1 • T2]	Set screw hole [M]
Tolerance	H7, H8	E9	$^{+0.3}_{0}$	—	Tolerance	H7	H9	$^{+0.3}_{0}$	—	Tolerance	G7, F7	H9	$^{+0.3}_{0}$	—
10	10 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
11	11 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
12	12 $^{+0.018}_{0}$	4 $^{+0.050}_{+0.020}$	13.5	2-M4	12H	12 $^{+0.018}_{0}$	4 $^{+0.030}_{0}$	13.8	2-M4	—	—	—	—	—
14	14 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	16.0	2-M4	14H	14 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	16.3	2-M4	14N	14 $^{+0.024}_{+0.006}$	5 $^{+0.030}_{0}$	16.3	2-M4
15	15 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	17.0	2-M4	15H	15 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	17.3	2-M4	—	—	—	—	—
16	16 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	18.0	2-M4	16H	16 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	18.3	2-M4	—	—	—	—	—
17	17 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	19.0	2-M4	17H	17 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	19.3	2-M4	—	—	—	—	—
18	18 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	20.0	2-M4	18H	18 $^{+0.018}_{0}$	6 $^{+0.030}_{0}$	20.8	2-M5	—	—	—	—	—
19	19 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	21.0	2-M4	19H	19 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	21.8	2-M5	19N	19 $^{+0.028}_{+0.007}$	6 $^{+0.030}_{0}$	21.8	2-M5
20	20 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	22.0	2-M4	20H	20 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	22.8	2-M5	—	—	—	—	—
22	22 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	25.0	2-M6	22H	22 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	24.8	2-M5	—	—	—	—	—
24	24 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	27.0	2-M6	24H	24 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	27.3	2-M6	24N	24 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	27.3	2-M6
25	25 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	28.0	2-M6	25H	25 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	28.3	2-M6	—	—	—	—	—
28	28 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	31.0	2-M6	28H	28 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	31.3	2-M6	28N	28 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	31.3	2-M6
30	30 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	33.0	2-M6	30H	30 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	33.3	2-M6	—	—	—	—	—
32	32 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	35.5	2-M8	32H	32 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	35.3	2-M8	—	—	—	—	—
35	35 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	38.5	2-M8	35H	35 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	38.3	2-M8	—	—	—	—	—
38	38 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	41.5	2-M8	38H	38 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	41.3	2-M8	38N	38 $^{+0.050}_{+0.025}$	10 $^{+0.036}_{0}$	41.3	2-M8
40	40 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	43.5	2-M8	40H	40 $^{+0.025}_{0}$	12 $^{+0.043}_{0}$	43.3	2-M8	—	—	—	—	—
42	42 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	45.5	2-M8	42H	42 $^{+0.025}_{0}$	12 $^{+0.043}_{0}$	45.3	2-M8	42N	42 $^{+0.050}_{+0.025}$	12 $^{+0.043}_{0}$	45.3	2-M8
45	45 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	48.5	2-M8	45H	45 $^{+0.025}_{0}$	14 $^{+0.043}_{0}$	48.8	2-M10	—	—	—	—	—
48	48 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	51.5	2-M8	48H	48 $^{+0.025}_{0}$	14 $^{+0.043}_{0}$	51.8	2-M10	48N	48 $^{+0.050}_{+0.025}$	14 $^{+0.043}_{0}$	51.8	2-M10
50	50 $^{+0.025}_{0}$	12 $^{+0.075}_{+0.032}$	53.5	2-M8	50H	50 $^{+0.025}_{0}$	14 $^{+0.043}_{0}$	53.8	2-M10	—	—	—	—	—
55	55 $^{+0.030}_{0}$	15 $^{+0.075}_{+0.032}$	60.0	2-M10	55H	55 $^{+0.030}_{0}$	16 $^{+0.043}_{0}$	59.3	2-M10	55N	55 $^{+0.060}_{+0.030}$	16 $^{+0.043}_{0}$	59.3	2-M10
56	56 $^{+0.030}_{0}$	15 $^{+0.075}_{+0.032}$	61.0	2-M10	56H	56 $^{+0.030}_{0}$	16 $^{+0.043}_{0}$	60.3	2-M10	—	—	—	—	—
60	60 $^{+0.030}_{0}$	15 $^{+0.075}_{+0.032}$	65.0	2-M10	60H	60 $^{+0.030}_{0}$	18 $^{+0.043}_{0}$	64.4	2-M10	60N	60 $^{+0.060}_{+0.030}$	18 $^{+0.043}_{0}$	64.4	2-M10
63	63 $^{+0.030}_{0}$	18 $^{+0.075}_{+0.032}$	69.0	2-M10	63H	63 $^{+0.030}_{0}$	18 $^{+0.043}_{0}$	67.4	2-M10	—	—	—	—	—
65	65 $^{+0.030}_{0}$	18 $^{+0.075}_{+0.032}$	71.0	2-M10	65H	65 $^{+0.030}_{0}$	18 $^{+0.043}_{0}$	69.4	2-M10	65N	65 $^{+0.060}_{+0.030}$	18 $^{+0.043}_{0}$	69.4	2-M10

* The ø11 or below requirement under the new JIS standards and ø11 requirement for the new motor standards are the same as the old JIS standards (class 2)

Distance from Set Screw Edge

Model	CF-B-070	CF-B-080	CF-B-100	CF-B-120	CF-B-140	CF-B-165	CF-B-185
Distance from set screw edge [mm]	7	8	10	10	10	15	15

CF-B Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

The CF-B model cylindrical hub and aluminum insert are locked together with bolts before shipment. To maintain assembly precision, be careful to not loosen the bolts. When finishing the inner diameters of products with pilot bores, be sure to add the cylindrical hub part before machining.

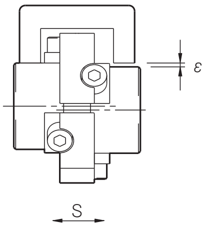
(1) The operating temperature range is -40℃ to 80℃ for polyurethane elements and -40℃ to 120℃ for polyester elements.

(2) Although elements are designed to be oilproof, do not subject them to excessive amounts of oil as this may cause deterioration. Use and storage in direct sunlight may shorten element service life, so cover elements appropriately.

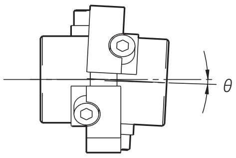
Mounting Misalignment

To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table. The coupling should be mounted, however, so that the difference between centers is 50% or less of that misalignment value if rotation speed exceeds 2000 min^{-1}. Check centering by holding a jig to the outer circumference of the cylindrical hub, using two points about 90° apart. Set the axial displacement S using the total length (L2) as a reference.

■ Parallel (ε)/Axial (S)



■ Angular (θ)



Bolt Specifications and Tightening Torques

The bolts are galvanized hex-socket-head bolts that conform to JIS B1176 and are microcapsule-coated (to prevent loosening).

Type	Nominal bolt diameter	Tightening torque [N·m]
CF-B-070	4-M8 × 12	25
CF-B-080	6-M8 × 12	25
CF-B-100	6-M10 × 18	50
CF-B-120	6-M12 × 20	90
CF-B-140	6-M14 × 25	140
CF-B-165	6-M16 × 30	220
CF-B-185	6-M20 × 32	470

* The nominal diameters for bolts are equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

Induction Motor Specifications and Easy Selection Table

Motor		50Hz: 3000min^{-1}/60Hz: 3600min^{-1}				50Hz: 1500min^{-1}/60Hz: 1800min^{-1}			
		Two-pole motor		CENTAFLEX		Four-pole motor		CENTAFLEX	
Output [kW]	Frequency [Hz]	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter	Shaft diameter [mm]	Torque [N·m]	Model	Nominal bore diameter
0.4	50	14	1.3	CF-B-070	14N	14	2.6	CF-B-070	14N
	60	14	1.1	CF-B-070	14N	14	2.2	CF-B-070	14N
0.75	50	19	2.4	CF-B-070	19N	19	4.9	CF-B-070	19N
	60	19	2	CF-B-070	19N	19	4.1	CF-B-070	19N
1.5	50	24	4.9	CF-B-070	24N	24	9.7	CF-B-070	24N
	60	24	4.1	CF-B-070	24N	24	8.1	CF-B-070	24N
2.2	50	24	7.1	CF-B-070	24N	28	14	CF-B-070	28N
	60	24	6	CF-B-070	24N	28	12	CF-B-070	28N
3.7	50	28	12	CF-B-070	28N	28	24	CF-B-080	28N
	60	28	10	CF-B-070	28N	28	20	CF-B-080	28N
5.5	50	38	18	CF-B-100	38N	38	36	CF-B-100	38N
	60	38	15	CF-B-100	38N	38	30	CF-B-100	38N
7.5	50	38	24	CF-B-100	38N	38	49	CF-B-100	38N
	60	38	20	CF-B-100	38N	38	41	CF-B-100	38N
11.0	50	42	36	CF-B-120	42N	42	71	CF-B-120	42N
	60	42	30	CF-B-120	42N	42	59	CF-B-120	42N
15.0	50	42	49	CF-B-120	42N	42	97	CF-B-120	42N
	60	42	41	CF-B-120	42N	42	81	CF-B-120	42N
18.5	50	42	60	CF-B-120	42N	48	120	CF-B-120	48N
	60	42	50	CF-B-120	42N	48	100	CF-B-120	48N
22.0	50	48	71	CF-B-120	48N	48	143	CF-B-120	48N
	60	48	59	CF-B-120	48N	48	119	CF-B-120	48N
30.0	50	55	97	CF-B-140	55N	55	195	CF-B-140	55N
	60	55	81	CF-B-140	55N	55	162	CF-B-140	55N
37.0	50	55	120	CF-B-140	55N	60	240	CF-B-165	60N
	60	55	100	CF-B-140	55N	60	200	CF-B-165	60N
45.0	50	55	146	CF-B-140	55N	60	292	CF-B-165	60N
	60	55	122	CF-B-140	55N	60	243	CF-B-165	60N

* The above table shows generally suitable sizes for use on an induction motor drive unit.
* Motor rotation speed and output torque are calculated (reference) values.

CM Models

Made to order

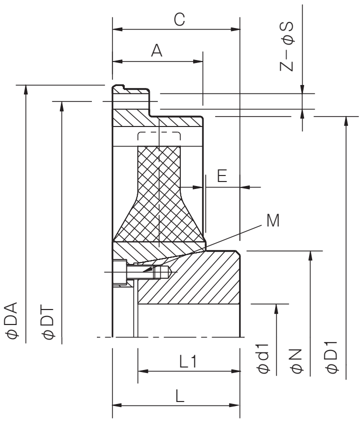
Specifications

Model	Shore hardness 50SH Torque			Shore hardness 50SH Dynamic torsional stiffness [N·m/rad]	Shore hardness 60SH Torque			Shore hardness 60SH Dynamic torsional stiffness [N·m/rad]	Misalignment		Max. rotation speed [min⁻¹]	Compatible flange size SAE J620
	Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]		Nominal [N·m]	Max. [N·m]	Continuous vibration torque [N·m/10 Hz]		Parallel [mm]	Angular [°]		
CM-800-S1	700	1400	280	2.80×10^{3}	850	1700	340	4.20×10^{3}	0.5	0.5	3600	10 • $11^{1}/_{2}$ • 14
CM-1200-S1	1000	2000	400	4.50×10^{3}	1200	2400	480	7.00×10^{3}	0.5	0.5	3500	$11^{1}/_{2}$ • 14
CM-2400-S1	2000	4000	800	1.00×10^{4}	2500	5000	1000	1.50×10^{4}	0.5	0.5	3000	14
CM-2800-S1	2800	6000	1120	2.50×10^{4}	3000	7500	1200	3.75×10^{4}	0.5	0.5	3000	14
CM-3000-S1	3000	6000	1200	1.00×10^{4}	3300	7000	1300	1.51×10^{4}	0.5	0.5	3000	14 • 18
CM-3500-S1	3200	6500	1280	1.60×10^{4}	3500	8000	1400	2.40×10^{4}	0.5	0.5	3000	14 • 18
CM-4000-S1	—	—	—	—	4500	11000	1800	5.00×10^{4}	0.5	0.5	3000	14 • 18
CM-5000-S1	4500	9000	1800	1.70×10^{4}	5000	10000	2000	2.70×10^{4}	0.5	0.5	3000	14 • 18
CM-7000-S1	6300	12600	2520	2.85×10^{4}	7000	14000	2800	4.50×10^{4}	0.5	0.5	2500	18
CM-8000-S1	—	—	—	—	9000	22000	3600	8.00×10^{4}	0.5	0.5	2500	18 • 21
CM-18000-S1	16000	32000	6400	1.15×10^{5}	18000	36000	7200	1.70×10^{5}	0.5	0.5	2300	21

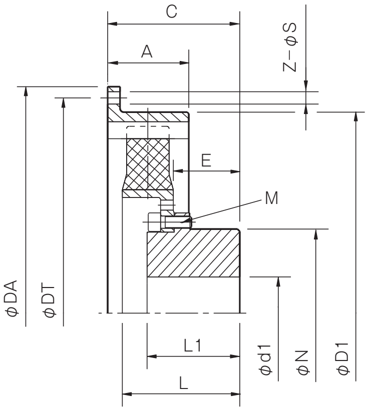
* Max. rotation speed is for the minimum flange size.
* This also does not take into account dynamic balance.

Dimensions

■ CM-800 ~ 2400-S1



■ CM-2800 ~ 18000-S1



Unit [mm]

Model	Adaptive flange size SAE J620	A	C	d1		D1	E	L	L1	N	M
				Pilot bore	Max.						
CM-800	10	50	82 ± 2	18	70	316	18	84	66	107	8-M10
	$11^{1}/_{2}$	39	71 ± 3	18	70	318	18	84	66	107	8-M10
	14	46	74 ± 6	18	70	318	18	84	66	107	8-M10
CM-1200	$11^{1}/_{2}$	39	65 ± 4	18	70	318	18	84	66	107	8-M10
	14	46	74 ± 1	18	70	318	18	84	66	107	8-M10
CM-2400	14	61	97 ± 6	28	105	417	26	106	85	150	8-M12
CM-2800	14	61	130 ± 4	33	110	417	76	126	100	162	8-M16
CM-3000	14 • 18	70	135 ± 8	19	65	465	53	135	105	100	12-M12
CM-3500	14 • 18	70	135 ± 6	33	110	465	59	139	100	162	8-M16
CM-4000	14 • 18	70	161 ± 6	48	140	465	94	159	125	218	12-M16
CM-5000	14 • 18	70	147 ± 2	35	110	465	64	159	105	162	12-M16
CM-7000	18	80	159 ± 9	48	140	570	76	161	125	218	12-M16
CM-8000	18	111	197 ± 5	68	180	600	110	195	150	248	12-M20
	21	90	197 ± 5	68	180	584	110	195	150	248	12-M20
CM-18000	21	156	310 ± 9	70	180	680	176	306	200	248	24-M20

Nominal adaptive flange size	10	11	14	18	21
Adaptive flange size SAE J620	10	$11^{1}/_{2}$	14	18	21
DA	314.3	352.4	466.7	571.5	673.1
DT	295.3	333.4	438.2	542.9	641.4
Z	8 × 45°	8 × 45°	8 × 45°	6 × 60°	12 × 30°
S	11	11	13	17	17

* The dimensions of the outer ring on the drive side are for mounting directly on an SAE J620 flywheel.

How to Place an Order

CM-1200-S1-50-14

Size

Type
00: Rubber body
S0: 00 and outer ring
SB: S0 and bolt
S1: SB and inner hub

Nominal optimal flange size
10: 10, 11: 11½, 14: 14
18: 18, 21: 21

Shore hardness (Rubber)
50: SH 50
60: SH 60

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, and angular misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

CM models are delivered in component form. Pay close attention to the misalignments for mounting shown below when mounting couplings.

(1) Couplings are designed for use within an operating temperature range of -30℃ to 90℃ .

(2) Rubber pieces are not sufficiently resistant to oil and grease, so avoid contact with these substances. Use and storage in direct sunlight may shorten service life of rubber bodies, so cover them appropriately.

(3) Be careful to never use liquid anaerobic screw fixatives on any of the mounting bolts to prevent loosening, as such fixatives have adverse effects on rubber bodies.

Mounting Misalignment

To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table. When rotation speed exceeds 1500 min^{-1}, however, we recommend keeping to 50% or less of allowable values.

Parallel [mm]	Angular [°]	Axial [mm]
0.5	0.5	Tolerance C from Dimensions Table

Bolt Specifications and Tightening Torques (for Locking Inner Hubs)

Bolts are hex-socket-head bolts that conform to JIS B1176.
Tighten each of the bolts to the tightening torques given in the following tables, using a torque wrench or the like. To ensure secure fastening, apply an extremely small amount or grease to the seat surface of the bolt.

Model	Strength classification	Nominal bolt diameter	Tightening torque [N·m]
CM-800	8.8 or over	8-M10 × 20	46
CM-1200	8.8 or over	8-M10 × 20	46
CM-2400	8.8 or over	8-M12 × 25	79
CM-2800	10.9 or over	8-M16 × 40	280
CM-3000	10.9 or over	12-M12 × 30	85
CM-3500	10.9 or over	8-M16 × 40	280
CM-4000	10.9 or over	12-M16 × 40	280
CM-5000	10.9 or over	12-M16 × 40	280
CM-7000	10.9 or over	12-M16 × 40	280
CM-8000	10.9 or over	12-M20 × 50	490
CM-18000	10.9 or over	24-M20 × 50	490

* The nominal diameters for bolts are equal to the quantity minus the nominal diameter of the screw threads times the nominal length.
* Contact Miki Pulley if you plan to use bolts with specifications other than those shown.

Bolt Specifications and Tightening Torques (for Locking Outer Rings)

The bolts for locking the outer ring are not supplied. The customer must supply these bolts. Be sure to supply bolts whose specifications conform to JIS B1176 hex-socket-head bolts.
Tighten to the tightening torques given in the following tables, using a torque wrench or the like. To ensure secure fastening, apply an extremely small amount of grease to the seat surface of the bolt.

Compatible flange size SAE J620	Strength classification	Nominal bolt diameter	Tightening torque [N·m]
10	8.8 or over	8-M10	46
$11^{1}/_{2}$	8.8 or over	8-M10	46
14	8.8 or over	8-M12	79
18	8.8 or over	6-M16	195
21	8.8 or over	12-M16	195

* The nominal diameters for bolts are equal to the quantity minus the nominal diameter of the screw threads.
* Contact Miki Pulley if you plan to use bolts with specifications other than those shown.
* Be sure to use the supplied flat washers.

Designing an Inner Hub

When designing a new inner hub, contact Miki Pulley regarding materials and dimensions for mounting on the rubber piece.

CF-A/H/X/B/CM Models

Selection

Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$\text{Ta [N·m]} = 9550 \times \frac{\text{P [kW]}}{\text{n(min}^{-1})}$$

(2) Determine the service factor κ from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$\text{Td [N·m]} = \text{Ta} \times \text{K1} \times \text{K2} \times \text{K3} \times \text{K4}$$

K1: Service factor based on load property
K2: Service factor based on operating time
K3: Service factor based on mounting misalignment
K4: Service factor based on operating temperature

(3) Set the size so that the nominal torque of the coupling, Tn, is at least equal to the corrected torque, Td.

$$\text{Tn} \geqq \text{Td}$$

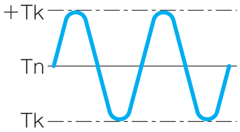
(4) Select a size that results in a maximum torque, Tm, for the coupling that is at least equal to the peak torque, Ts, generated by the driver, follower or both. Maximum torque refers to the maximum amount of torque that can be applied for a set amount of time considering eight hours of operation per day and up to around ten instances.

$$\text{Tm} \geqq \text{Ts}$$

(5) Find the corrected fluctuation torque, Tkw1, of the coupling using the following equation.
(For CF-A or CM)

$$\text{Tkw1} = \text{Tk} \times \text{Sf} \times \text{St}$$

Tk: Size of torque fluctuation
Sf: Period (fluctuation) coefficient
St: Temperature coefficient (=K4)
Tn is at or below the nominal torque.



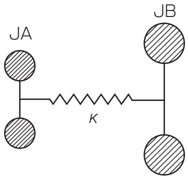
f [Hz]	≦ 10	>10
Sf	1	$\sqrt{\frac{f}{10}}$

Check that the corrected fluctuation torque, Tkw1, calculated from the above equation is within the rated fluctuation torque, Tkw, of the selected size.

(6) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling.
When the coupling is used in machinery prone to periodic violent load-torque fluctuations, torsional vibration must also be considered in addition to the above selection criteria. In other words, check that the vibration frequency of the torque fluctuation does not match the natural frequency of the shafting. The natural frequency is generally calculated by finding the natural frequency, fe, of one section, approximating the shafting as shown in the diagram below.

$$\text{fe} = \frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{\text{JA}}+\frac{1}{\text{JB}}\right)}\text{[Hz]}$$

κ : Dynamic torsional stiffness of coupling [N·m/rad]
JA: Moment of inertia of driving side [kg·m^2]
JB: Moment of inertia of driven side [kg·m^2]



Selection

Service Factors

■ Service factor based on load property: K1

● Winches	1.5
● Elevators	
Rope type	1.25
Hydraulic	2.0
● Agitators	1.0
● Metal molding machines	
Pultrusion/extrusion machines	2.0
Slitter machines	1.0
Wire drawers, rolling mills	1.75
Copper wire winders	1.5
● Cranes and hoists	
Hoist cranes	2.0
Skip hoists, hoists with trolleys	1.75
● Cooling towers	2.0
● Industrial washers	2.0
● Machine tools	
Auxiliary drives, transport devices	1.0
Bending and pressing machines	1.75
Main drive components	1.5
● Conveyors	
Belt, chain, roller	1.0
Screws, elevating (flat)	1.0
Elevating (bucket)	1.25
Vibrating screens	3.0
● Compressors	1.0
Centrifugal	
Rotary	1.25
Reciprocal	
2 cylinders or fewer	3.0
3 cylinders	2.0
4 cylinders or more	1.75
● Screens	
Air cleaners, water intake	1.0
Rotary coal and gravel screens	1.5
Vibrating types	2.5
● Ventilators	
Centrifugal	1.0
Impeller type	1.25
● Tumbling barrel	1.75
● Power meters	1.0
● Induction motors	
Constant load	1.0
Medium variable load (hoist)	1.5
Large variable load (welder)	2.0
● Hammer mills	2.0
● Feeders	
Aprons, belts, discs, screws	1.0
Reciprocal	2.5
● Pumps	
Centrifugal	1.0
Geared, rotary, vanes	1.25
Reciprocal	
1 cylinders	2.0
2 cylinders	1.75
3 cylinders or more	1.5
● Mixers	
Concrete	1.75
Pulverizing	1.5

* The values of the above table are generally recommended values.

* The values of the above table are suitable for electric motors, steam turbines, and internal combustion engines or four or more cylinders.

* For internal combustion engine drives with a single cylinder, add 0.7 to the above values.
For internal combustion engine drives with two or three cylinders, add 0.3 to the above values.

■ Service factor based on operating time: K2

Hrs./day	8 ≧	10	12	14	16	18	20	22	24
K2	1.0	1.1	1.2		1.3		1.4		1.5

■ Service factor based on mounting misalignment: K3 (=K ε × K θ)

(1) CENTAFLEX CF-A

- Sizes 001, 002, 004, 008, 012

Parallel [mm]	0.3	0.5	0.8	1.0
K ε	1.0	1.2	1.5	2.0

- Sizes 016, 022, 025, 028, 030, 050, 080, 090, 140, 200, 250, 400

Parallel [mm]	0.5	0.8	1.0	1.5
K ε	1.0	1.3	1.5	2.0

- Sizes 001, 002, 004, 008, 016, 025, 030, 090, 200

Angular [°]	0.5	1.0	1.5	2.0	2.5	3.0
K θ	1.0	1.1	1.3	1.5	1.8	2.0

- Sizes 012, 022, 028, 050, 080, 140, 250, 400

Angular [°]	0.5	1.0	1.5	2.0
K θ	1.0	1.2	1.5	2.0

(2) CENTAFLEX CF-H

Parallel [mm]	0.3	0.4
K ε	1.0	1.1

Angular [°]	0.5
K θ	1.0

(3) CENTAFLEX CF-X

Parallel [mm]	0.05	0.1
K ε	1.0	1.5

Angular [°]	0.5	1.0
K θ	1.0	1.5

(4) CENTAFLEX CF-B (polyurethane)

Parallel [mm]	0.2	0.3	0.5
K ε	1.0	1.1	1.2

Angular [°]	0.5	1.0
K θ	1.0	1.1

(5) CENTAFLEX CF-B-H (polyester)

Parallel [mm]	0.1	0.2	0.3
K ε	1.0	1.1	1.2

Angular [°]	0.25	0.5
K θ	1.0	1.1

(6) CENTAMAX CM

Parallel [mm]	0.5
K ε	1.0

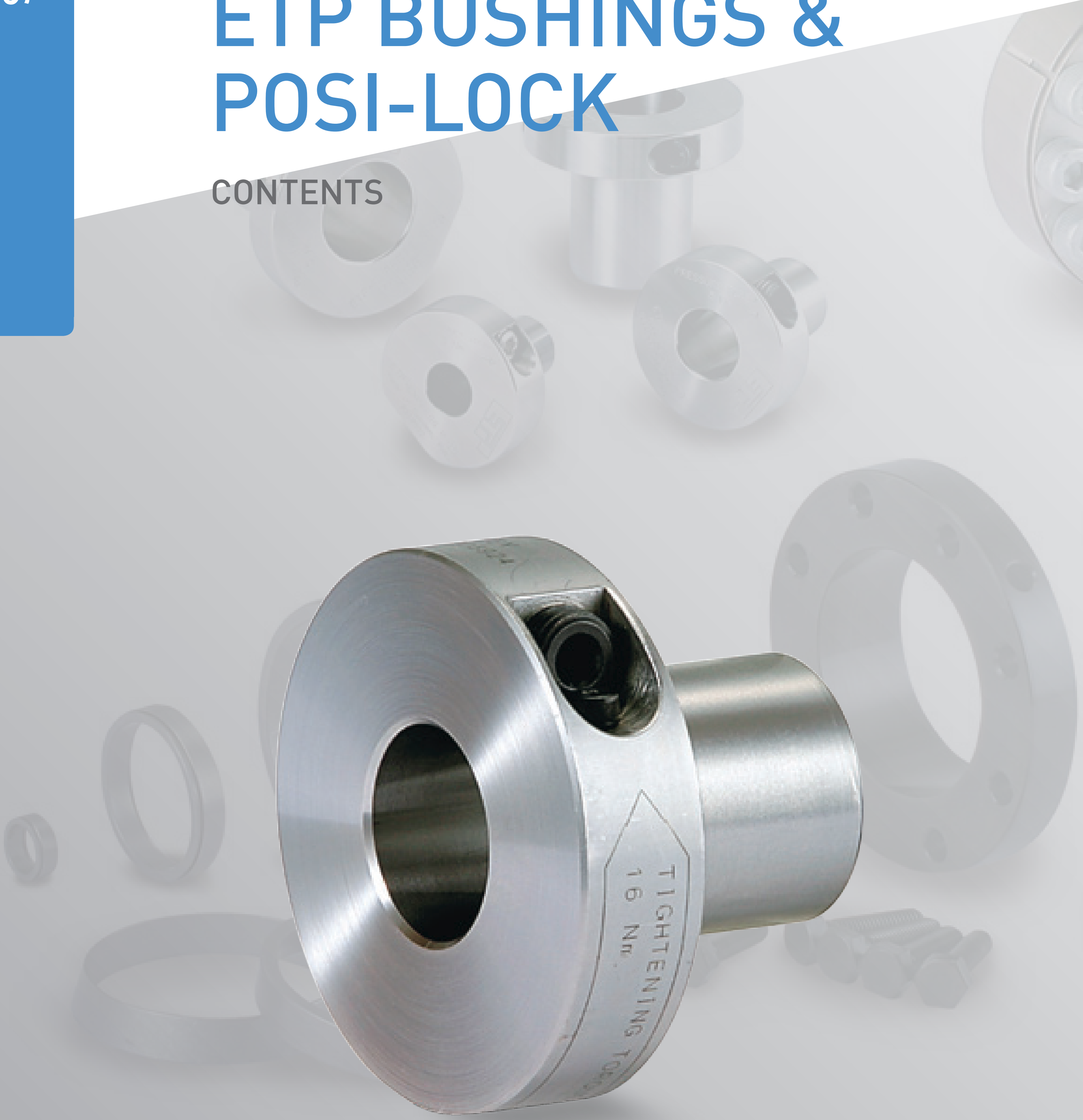
Angular [°]	0.5
K θ	1.0

■ Service factor based on operating temperature: K4 (=St)

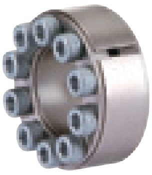
Temperature [℃]	− 20	− 10	0	10	20	30	40	50	60	70	80	90	100
CF-A	1.0								1.1	1.2	1.4	1.6	—
CF-H	1.0												
CF-X	1.3		1.2		1.0		1.2		1.5			1.8	—
CF-B	1.0							1.1		1.3		—	
CF-B-H	1.0									1.1			
CM	1.0								1.1	1.2	1.4	1.6	—

ETP BUSHINGS & POSI-LOCK

CONTENTS



ETP Bushing and POSI-LOCK Models

SERIES	ETP BUSHINGS (Hydraulic Method)		POSI-LOCK (Mechanical Method)	
MODELS	ETP-E Plus  » P.200	ETP-A  » P.212	PSL-K  » P.230	PSL-D  » P.236
	ETP-T  » P.206	ETP-H  » P.222	PSL-G  » P.234	

Selection Guide

1 Select a type

Select an ETP or a PSL model as appropriate, referring to the list of machines, select by characteristics (p. 191) and applications (p. 192) sections for details to assist with the selection. Select an ETP model when wishing to increase workability or when needing a high level of concentricity. Select a PSL model when using in applications with low incidences of product attachment/detachment.

2 Select a size

Select an appropriate size from the required torque and thrust. Select so that the combined load is less than the rated torque in cases where torque and thrust apply simultaneously.

3 Check the minimum external hub diameter

(When using a hallow shaft, check the max. diameter.)

Make sure that the selected diameter dimensions are appropriate for the chosen application and model by checking the list of hub's minimum external diameters. If using a hallow shaft, measure the inner diameter of the hollow shaft, and check to make sure that the diameter of the selected shaft is smaller than this value.

4 Overview

Once the model has been selected, check the rated torque, dimensions, and other settings again to confirm that they satisfy the usage conditions.

Select by Torque and Bore Diameter

Method and Type			Torque [N·m] 1 10 100 1000 10000 100000 1000000	Bore diameter range [mm]
Hydraulic method	General-purpose single-bolt type	Steel	**ETP-E N** [45-3300 N·m]	ϕ15～60
		Simple antirust	**ETP-E C** [34-2475 N·m]	ϕ15～60
	High-performance single-bolt type	Steel	**ETP-T** [40-18000 N·m]	ϕ15～100
		Simple antirust	**ETP-T C** [30-3000 N·m]	ϕ15～60
	Multi-bolt -variation type	Steel and hexagon head bolt	**ETP-A** [55-15500 N·m]	ϕ15～100
		Steel and hexagon bolt	**ETP-A B** [55-15500 N·m]	ϕ15～100
		Simple antirust	**ETP-A C** [41-1426 N·m]	ϕ15～50
		Short length specifications	**ETP-A S** [53-1000 N·m]	ϕ19～50
		Stainless steel	**ETP-A R** [45-1550 N·m]	ϕ15～50
	High-torque and high-thrust type		**ETP-H** [2600-273000 N·m]	ϕ50～220
Mechanical method	Flange type	Steel and hexagon head bolt	**PSL-K** [5.9-750 N·m]	ϕ6～42
		Steel and hexagon bolt	**PSL-K B** [5.9-750 N·m]	ϕ6～42
		Simple antirust	**PSL-K C** [5.9-750 N·m]	ϕ6～42
		Stainless steel	**PSL-K F** [4.7-504 N·m]	ϕ6～35
	Type compatible with models from other companies	Steel	**PSL-G** [289-13500 N·m]	ϕ19～120
		Simple antirust	**PSL-G C** [289-2810 N·m]	ϕ19～60
	Medium-load type	Steel	**PSL-D** [6-1760 N·m]	ϕ6～50
		Simple antirust	**PSL-D C** [67-1760 N·m]	ϕ16～50

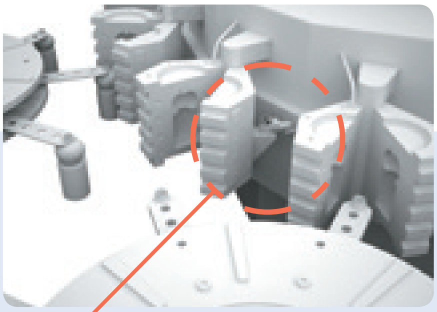
Select by Thrust and Bore Diameter

Method and Type			Thrust [N] 100 1000 10000 100000 1000000 100000000	Bore diameter range [mm]
Hydraulic method	General-purpose single-bolt type	Steel	**ETP-E N** [5100-90000 N]	ϕ15～60
		Simple antirust	**ETP-E C** [3800-67000 N]	ϕ15～60
	High-performance single-bolt type	Steel	**ETP-T** [5000-360000 N]	ϕ15～100
		Simple antirust	**ETP-T C** [3750-99750 N]	ϕ15～60
	Multi-bolt -variation type	Steel and hexagon head bolt	**ETP-A** [7300-310000 N]	ϕ15～100
		Steel and hexagon bolt	**ETP-A B** [7300-310000 N]	ϕ15～100
		Simple antirust	**ETP-A C** [5000-53000 N]	ϕ15～50
		Short length specifications	**ETP-A S** [5000-40000 N]	ϕ19～50
		Stainless steel	**ETP-A R** [6000-62000 N]	ϕ15～50
	High-torque and high-thrust type		**ETP-H** [70000-2485000 N]	ϕ50～220
Mechanical method	Flange type	Steel and hexagon head bolt	**PSL-K** [1950-35700 N]	ϕ6～42
		Steel and hexagon bolt	**PSL-K B** [1950-35700 N]	ϕ6～42
		Simple antirust	**PSL-K C** [1950-35700 N]	ϕ6～42
		Stainless steel	**PSL-K F** [1560-28800 N]	ϕ6～35
	Type compatible with models from other companies	Steel	**PSL-G** [30500-225000 N·m]	ϕ19～120
		Simple antirust	**PSL-G C** [30500-93600 N]	ϕ19～60
	Medium-load type	Steel	**PSL-D** [2100-70300 N]	ϕ6～50
		Simple antirust	**PSL-D C** [8400-70300 N]	ϕ16～50

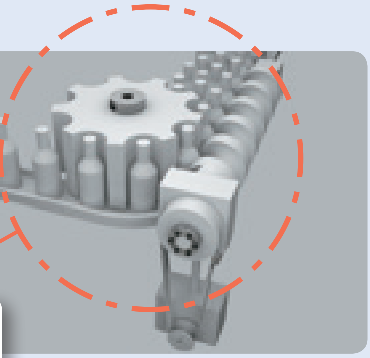
Applications

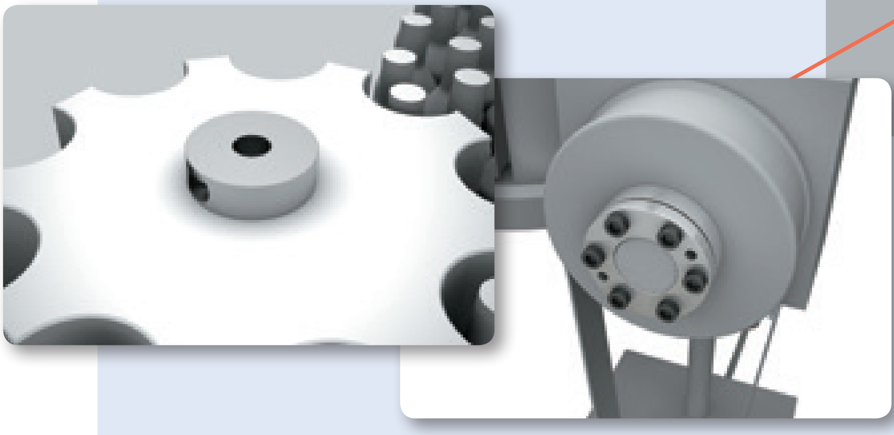
Product model ETP-E Plus

Employed device Plastic Bottle Molding Machine



ETP bushing is used to connect the mold fixing shaft and the shaft of the index feeding unit.
Connection with one bolt substantially reduces the adjustment time.

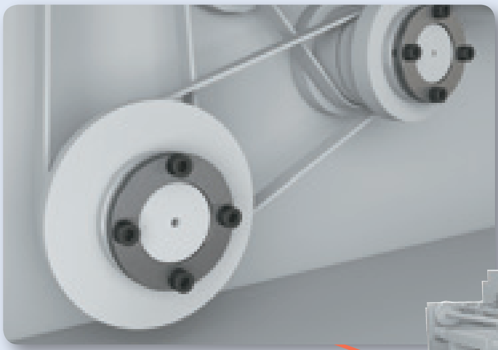




Product model ETP-T+PSL

Employed device Filling Machine

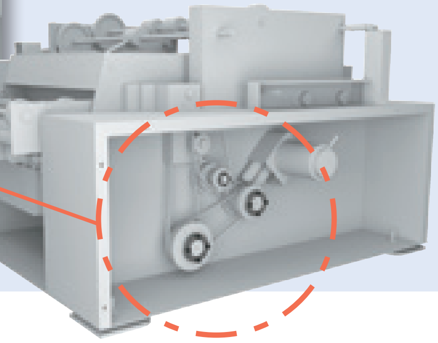
ETP bushing is used to match the phase of the alignment table with the phase of the alignment screw.

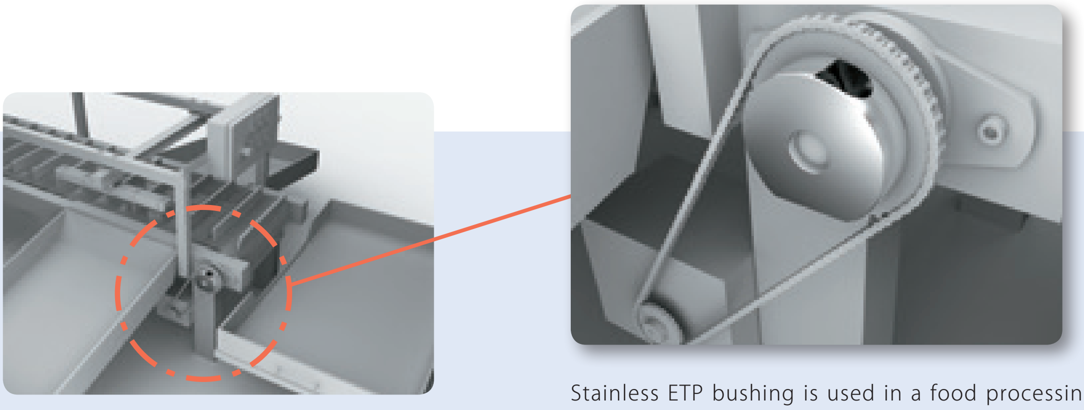


Product model ETP-A

Employed device Bookbinding Machine

ETP-A model is used to fix the timing pulley.

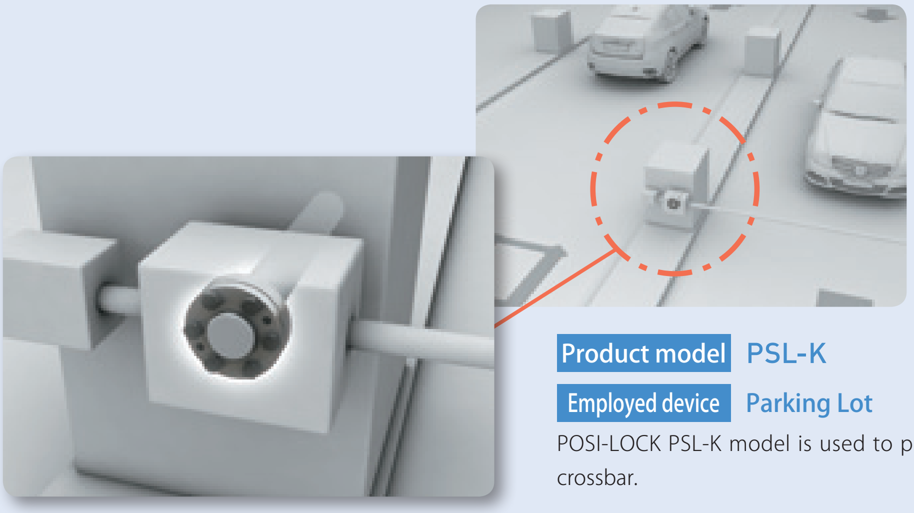




Product model ETP-E Plus

Employed device Food Processing Machine

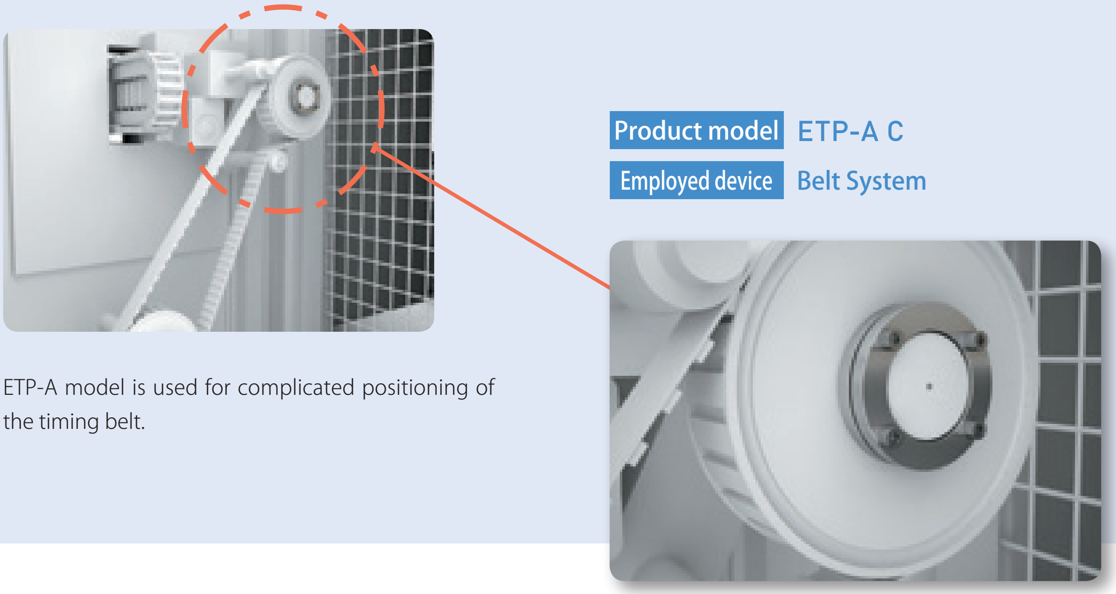
Stainless ETP bushing is used in a food processing machine.
It can be used in sections that need to be washed or are exposed to water.



Product model PSL-K

Employed device Parking Lot

POSI-LOCK PSL-K model is used to position and fix the crossbar.



Product model ETP-A C

Employed device Belt System

ETP-A model is used for complicated positioning of the timing belt.

Hydraulic Shaft Lock

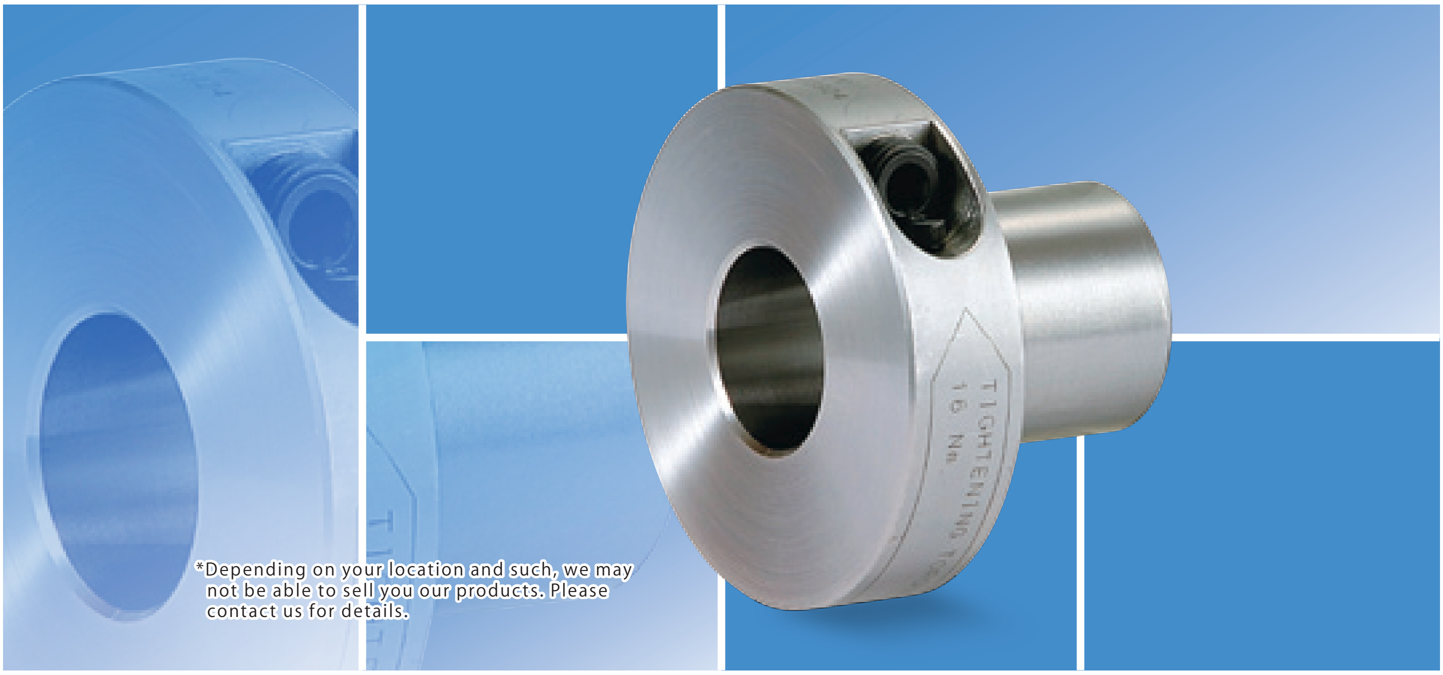
ETP BUSHINGS

Application	Machine tool, pump, molding machine, printing machine, palletizing robot, various jigs and tools

Easy and Precise Frictional Coupling Using the Pascal's Principle

A hydraulic method using the Pascal's principle is employed to connect the shaft and the hub to eliminate all the disadvantages and inconvenience of the key connection. The machining tolerance of the shaft and the hub is just the general fitting tolerance and no special specification is needed. Positioning can be performed freely both in the rotation and shaft directions. Furthermore, a 1-bolt tightening task unique to the hydraulic method significantly reduces man-hours.

RoHS
Some exceptions apply

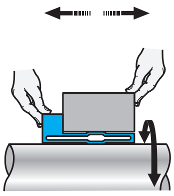


*Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Features

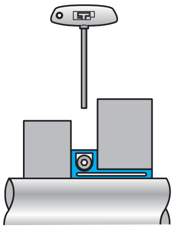
Easy and Precise Positioning

Positioning in the shaft and rotation directions can be performed arbitrarily, and it is easy to mount the device to equipment where accurate sync adjustment is required.



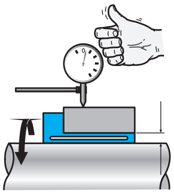
Saving Space

You can design so that the device is connected to the shaft from the radial direction to save space. The device contributes to a compact and lightweight low inertia design.



High Concentricity

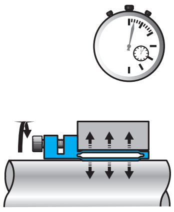
Since the contact pressure on the shaft and hub sides is uniform, high concentricity can be maintained even if the hub's external diameter is reduced. Accordingly, unbalance caused by a centrifugal force can be reduced in applications where the device is used at a high rotation speed.



Secure and Quick Mounting

Secure mounting can be performed by just tightening a couple of bolts to the specified torque.

* To firmly secure the device with the appropriate contact pressure to the shaft and hub, mount the device so that the shaft and the hub completely contact each other.



Available Models

Series	Tightening method	Specifications	Lineup
ETP BUSHINGS	1-bolt general-purpose type	Standard	ETP-E N
		Electroless nickel plating	ETP-E C
	1-bolt high-performance type	Standard	ETP-T
		Electroless nickel plating	ETP-T C
	Multiple-bolt type	Standard	ETP-A
		Hexagon bolt	ETP-A B
		Simple rustproof	ETP-A C
		Short	ETP-A S
		Stainless	ETP-A R
	Tapered piston/shim	High torque	ETP-H

Model Selection

Model/Type	Main body material	Surface finishing	Applied shaft diameter [mm]	Max. rated torque [N・m]	Max. rated thrust [N]	Operating temperature [℃]	Concentricity [mm]
ETP-E N	SCM435 or an equivalent	—	15 ～ 60	3300	90000	−30 ～ 85	0.02
ETP-E C	SCM435 or an equivalent	Electroless nickel plating	15 ～ 60	2475	67000	−30 ～ 85	0.02
ETP-T	SCM415 or an equivalent	—	15 ～ 100	18000	360000	−30 ～ 110	0.006
ETP-T C	SCM415 or an equivalent	Electroless nickel plating	15 ～ 60	3000	99750	−30 ～ 110	0.006
ETP-A	SCM415 or an equivalent	—	15 ～ 100	15500	310000	−30 ～ 85	0.05
ETP-A B	SCM415 or an equivalent	—	15 ～ 100	15500	310000	−30 ～ 85	0.05
ETP-A C	SCM415 or an equivalent	Electroless nickel plating	15 ～ 50	1426	53000	−30 ～ 85	0.05
ETP-A S	SCM415 or an equivalent	—	19 ～ 50	1000	40000	−30 ～ 85	0.05
ETP-A R	SUS630 or an equivalent	—	15 ～ 50	1550	62000	−30 ～ 85	0.05
ETP-H	SMn420 or an equivalent	—	50 ～ 220	273000	2485000	−40 ～ 150	0.02

Product Lineup

ETP-E Plus

ETP EXPRESS

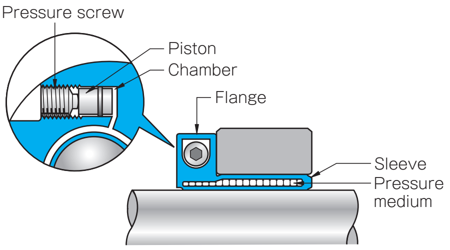
RoHS

The shaft and the hub can be connected easily and quickly with 1 bolt. Since the concentricity is as accurate as 0.02 mm, this model is most suitable for applications that require high accuracy and where the device is frequently attached and detached. It is structured to be tightened from the radial direction to save work space.

Max. rated torque	[N·m]	3300
Max. rated thrust	[N]	90000
Applied shaft diameter	[mm]	φ 15 ～ 60
Operating temperature	[℃]	－30 ～ 85
Backlash		Zero
Concentricity	[mm]	0.02

Operating Principles

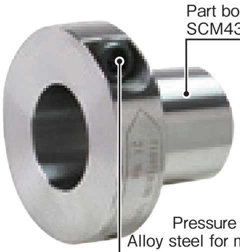
Tightening the pressure screw applies pressure to the pressure medium sealed in the chamber so the pressure medium moves into the sleeve. Applying pressure to the pressure medium applies pressure to the sleeve from the inside, so that the shaft side sleeve is shrunk and the hub side sleeve is expanded. Thus, the shaft and the hub are connected through the sleeve.



Variations and Materials

ETP-E N

Standard type of the ETP-E Plus model.

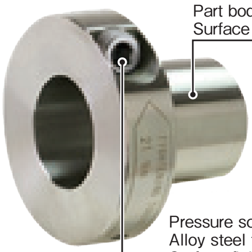


Part body material:
SCM435 or an equivalent

Pressure screw material:
Alloy steel for machine structural use
Surface finishing: Black coating

ETP-E C

The main body and pressure screw are electroless nickel coated (simple rustproof finishing).



Part body material: SCM435 or an equivalent
Surface finishing: Electroless nickel plating

Pressure screw material:
Alloy steel for machine structural use
Surface finishing: Electroless nickel plating

ETP-T

ETP TECHNO

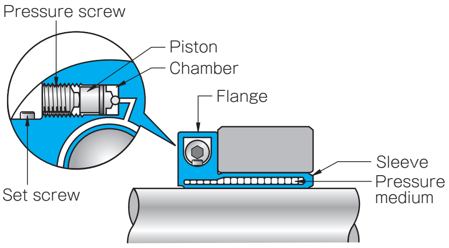
RoHS

The shaft and the hub can be connected easily and quickly with 1 bolt. Since the concentricity is as accurate as 0.006 mm, this model is most suitable for applications that require high accuracy and where the device is frequently attached and detached. It is structured to be tightened from the radial direction to save work space.

Max. rated torque	[N·m]	18000
Max. rated thrust	[N]	360000
Applied shaft diameter	[mm]	φ 15 ～ 100
Operating temperature	[℃]	－30 ～ 110
Backlash		Zero
Concentricity	[mm]	0.006

Operating Principles

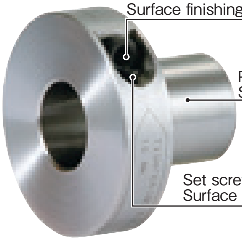
Tightening the pressure screw applies pressure to the pressure medium sealed in the chamber so the pressure medium moves into the sleeve. Applying pressure to the pressure medium applies pressure to the sleeve from the inside, so that the shaft side sleeve is shrunk and the hub side sleeve is expanded. Thus, the shaft and the hub are connected through the sleeve.



Variations and Materials

ETP-T

Standard type of the ETP-T model.



Pressure screw material: Alloy steel for machine structural use
Surface finishing: Black coating

Part body material:
SCM415 or an equivalent

Set screw: Alloy steel for machine structural use
Surface finishing: Black coating

ETP-T C

The main body and pressure screw are electroless nickel coated (simple rustproof finishing).

Pressure screw material: Alloy steel for machine structural use
Surface finishing: Electroless nickel plating

Part body material: SCM415 or an equivalent
Surface finishing: Electroless nickel plating

Set screw: Alloy steel for machine structural use
Surface finishing: Electroless nickel plating

ETP-A

ETP CLASSIC

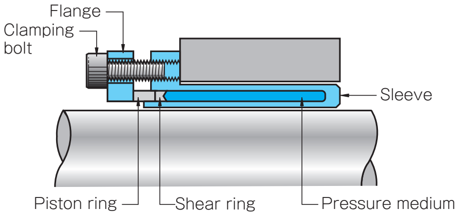
RoHS

Compared to the mechanical connecting element, the number of bolts can be reduced and attachment and detachment can be simplified. The concentricity is 0.05 mm so mounting can be performed with relatively high precision.

Max. rated torque	[N·m]	15500
Max. rated thrust	[N]	310000
Applied shaft diameter	[mm]	φ15～100
Operating temperature	[℃]	−30～85
Backlash		Zero
Concentricity	[mm]	0.05

Operating Principle

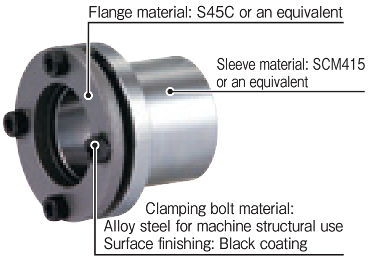
The pressure medium inserted in the sleeve is sealed by a sealing ring. Tightening the clamping bolt compresses the pressure medium mechanically through the flange, piston ring, and sealing ring. Applying pressure to the pressure medium applies pressure to the sleeve from the inside, so that the shaft side sleeve is shrunk and the hub side sleeve is expanded. Thus, the shaft and the hub are connected through the sleeve.



Variations and Materials

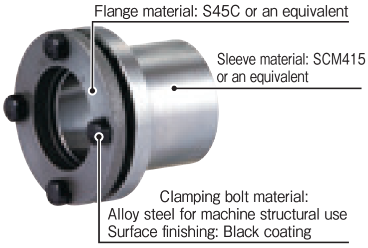
ETP-A

Standard type of the ETP-A model.



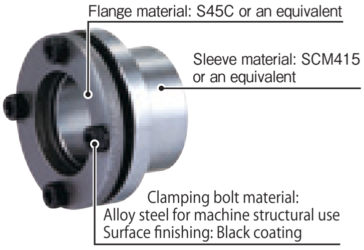
ETP-A B

A hexagon bolt is used for the clamping bolt so the device can be mounted even in tight space in the thrust direction.



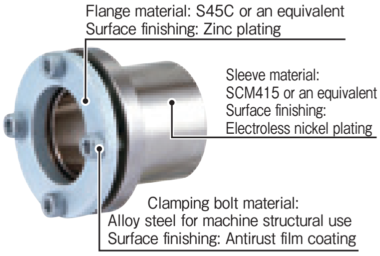
ETP-A S

A short-sleeve type, which can be mounted to the thin part of the hub.



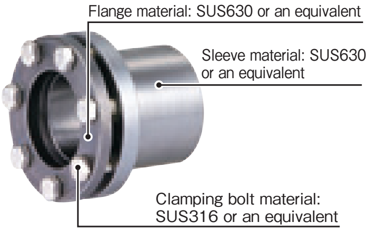
ETP-A C

The main body is electroless nickel coated (simple rustproof finishing).



ETP-A R

The main body is made of stainless material (rustproof coating).



ETP-H

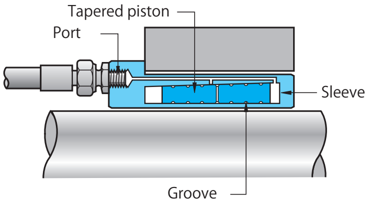
ETP HYLOC

The maximum rated torque is very large so this model is suitable for applications where a heavy radial load is applied.

Max. rated torque	[N·m]	273000
Max. rated thrust	[N]	2485000
Applied shaft diameter	[mm]	φ50～220
Operating temperature	[℃]	−40～150
Backlash		Zero
Concentricity	[mm]	0.02

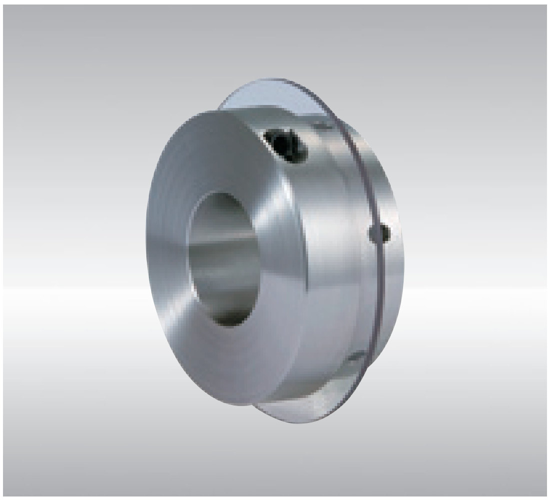
Operating Principle

A hydraulic pressure from the port moves the tapered piston inserted in the sleeve to the shaft direction. The movement of the tapered piston shrinks the shaft side sleeve and expands the hub side sleeve. Thus, the shaft and the hub are connected through the sleeve. The hydraulic pressure just moves the tapered piston and does not apply pressure after the connection. The connecting force is maintained by the wedge effect of the tapered piston.



Customization Examples

Case of an Application to a Slitter Knife Holder

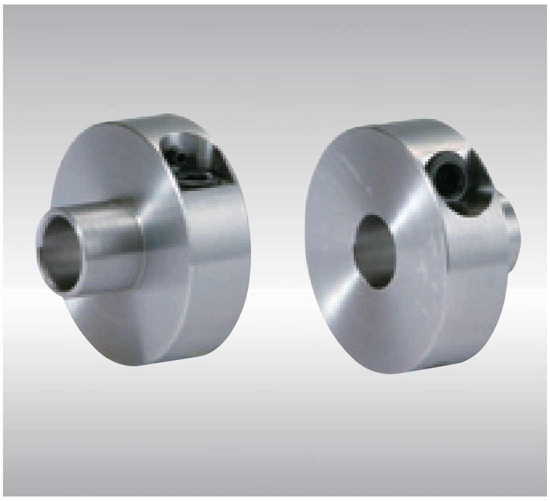


This is a hydraulic slitter knife holder. This holder is used to position the rotating knife to cut tin, iron, aluminum plates, or paper sheet in any position. Petitioning in the shaft direction can be performed arbitrarily with 1 bolt. For the angular deflection caused by detachment and attachment, a micron meter (μ m) level repeatable accuracy can be maintained.

Case of an Application to the Integration of a Gear

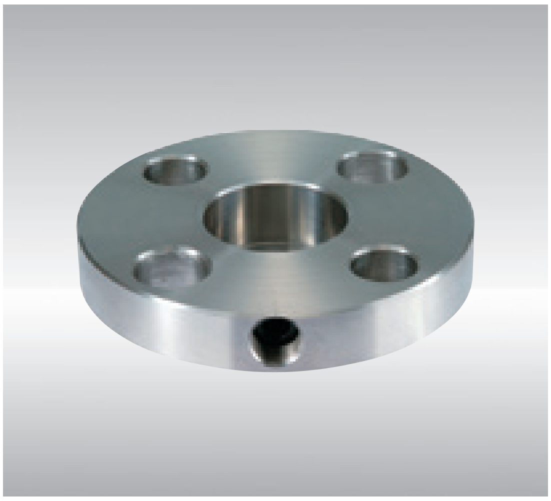
A very accurate concentricity can be maintained by integrating the gear into the device. Positioning in the shaft and fitting directions can be performed easily.

Customization of the Sleeve Length to Meet the Customer's Requirement



If the customer makes a request, the standard sleeve length can be customized (reduced) to enable it to be fitted to the thin part of the mating hub.

Case of an Application to a Holding Jig



This can be mounted to a work bench as a holder for assembly and machining to ensure stable work. Furthermore, work pieces can be held with an extremely high repeatable hold position accuracy.

For details, please visit our website.

For inquiries on customization

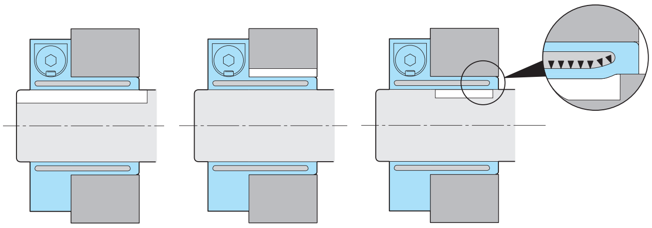
www.mikipulley.co.jp

Web code Z001

FAQ

Q1 Can I use the ETP bushings for the shaft and hub with keyways in them?

A You can use the ETP bushing by completely filling the keyway with epoxy putty for metals and then shaping it. If you use the device with keyways on the shaft and hub, the sleeve may be deformed and the device may become unable to be detached and attached again.



Q2 Can I use the ETP bushing when the shaft and hub do not overlap the entire sleeve length?

A Please select a short sleeve so that the shaft and the hub overlap the entire sleeve length, or please consult with us. If there is a part of the sleeve that does not contact the shaft and hub, the deformation of that part of the sleeve is not controlled and the amount of deformation increases, so the sleeve will be deformed and enough friction force will not be able to be obtained. As a result, the specified value cannot be met.

Q3 Can the rated torque be transmitted even if thrust load is applied?

A The specified rated torque and rated thrust are the maximum rated values when they are applied independently. If the torque and thrust are applied at the same time, obtain the combined load and check that it is less than the rated torque.

Q4 If an ETP bushing slips once, can it be reused?

A Whether or not it can be reused depends on the degree of slip. If the degree of slip is small, it can be reused. However, if you reuse it, you need to check it to make sure there is no scratch on the surface of the ETP bushing, shaft, and hub, and there is no deformation on the ETP bushing main body. And, if you reuse it, you need to remove the cause of the slip.

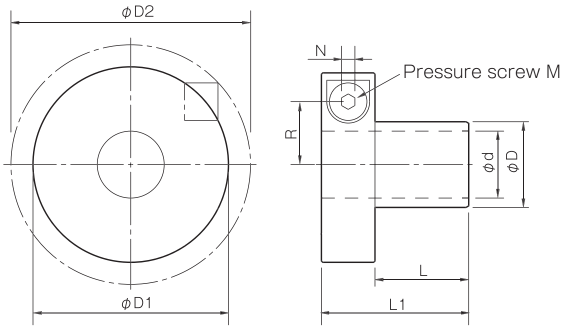
ETP-E N Types

Specifications

Model	Shaft tolerance		Rated torque [N·m]	Rated thrust [N]	Rated radial load [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
	h 7	k6								
ETP-E-015-N	●		46	5100	500	90	70	7	0.042×10^{-3}	0.16
ETP-E-019-N	●	○	85	7300	1000	90	70	7	0.063×10^{-3}	0.20
ETP-E-020-N	●		110	9100	1000	90	70	7	0.069×10^{-3}	0.21
ETP-E-022-N	●	○	130	9600	1200	90	70	7	0.095×10^{-3}	0.25
ETP-E-024-N	●	○	190	13000	1400	90	70	7	0.109×10^{-3}	0.26
ETP-E-025-N	●		230	15000	1500	90	70	7	0.114×10^{-3}	0.27
ETP-E-028-N	●	○	280	16000	1800	90	70	7	0.166×10^{-3}	0.33
ETP-E-030-N	●		380	21000	2000	90	70	7	0.185×10^{-3}	0.35
ETP-E-032-N	●	○	440	22000	2200	90	70	7	0.244×10^{-3}	0.41
ETP-E-035-N	●		640	30000	2500	90	70	7	0.317×10^{-3}	0.47
ETP-E-038-N	●	○	890	38000	2800	90	70	24	0.756×10^{-3}	0.83
ETP-E-040-N	●		1100	45000	3000	90	70	24	0.836×10^{-3}	0.88
ETP-E-042-N	●	○	1100	43000	3200	90	70	24	0.959×10^{-3}	0.95
ETP-E-045-N	●		1400	51000	3500	90	70	24	1.152×10^{-3}	1.03
ETP-E-048-N	●	○	1700	57000	4000	90	70	24	1.430×10^{-3}	1.09
ETP-E-050-N	●		1900	63000	4500	90	70	24	1.497×10^{-3}	1.18
ETP-E-055-N	●	○	2400	71000	5000	90	70	24	2.130×10^{-3}	1.46
ETP-E-060-N	●		3300	90000	5300	90	70	24	3.089×10^{-3}	1.79

* Sizes for shaft tolerance h7 are marked with ●. Also note that sizes for k6 are optional and only for sizes marked with ○.
* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Dimensions



How to Place an Order

ETP-E-□-N□

Size

Type N: Standard specifications

Supported shaft tolerance
H: h7(g6, h6) shaft
K: k6 shaft (option)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Model	d [mm]	D [mm]	D1 [mm]	D2 [mm]	L [mm]	L1 [mm]	R [mm]	N [mm]	M Qty - Nominal dia.
ETP-E-015-N	15	18	46	50	23	37	15.1	5	1-M10
ETP-E-019-N	19	23	50.5	55	25	39	17.4	5	1-M10
ETP-E-020-N	20	24	51.5	56	27	41	18	5	1-M10
ETP-E-022-N	22	27	55.5	61	29	43	19.3	5	1-M10
ETP-E-024-N	24	29	57.5	63	30	44	20.3	5	1-M10
ETP-E-025-N	25	30	58	63	32	46	20.8	5	1-M10
ETP-E-028-N	28	34	63	70	34	48	22.6	5	1-M10
ETP-E-030-N	30	36	64.5	71	36	50	23.6	5	1-M10
ETP-E-032-N	32	39	68.5	78	38	52	24.8	5	1-M10
ETP-E-035-N	35	42	73	86	41	55	26.4	5	1-M10
ETP-E-038-N	38	46	84.5	92.5	47	67	31	8	1-M16
ETP-E-040-N	40	48	86.5	94	50	70	32	8	1-M16
ETP-E-042-N	42	51	89	96.5	50	70	33.2	8	1-M16
ETP-E-045-N	45	54	93	101	52	72	34.8	8	1-M16
ETP-E-048-N	48	59	97	104	53	73	36.8	8	1-M16
ETP-E-050-N	50	60	98.5	106	54	74	37.5	8	1-M16
ETP-E-055-N	55	67	106	116	59	79	40.5	8	1-M16
ETP-E-060-N	60	73	115.5	123.5	63	83	43.3	8	1-M16

* Dimension φ D2 is that before tightening the ETP-E Plus.
* The nominal diameter of the pressure screw M is equal to the quantity minus the nominal diameter of the screw threads.

ETP-E C Types Simple Antirust Specifications

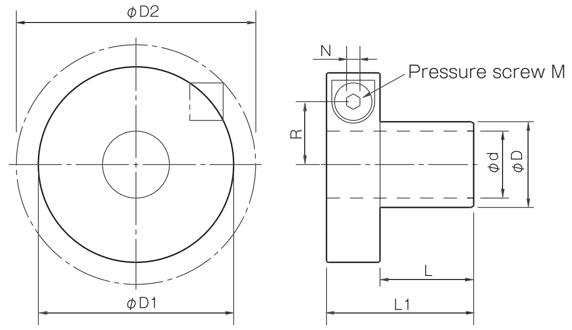
Made to order

Specifications

Model	Shaft tolerance		Rated torque [N·m]	Rated thrust [N]	Rated radial load [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
	h 7	k6								
ETP-E-015-C	●		34	3800	500	90	70	7	0.042×10^{-3}	0.16
ETP-E-019-C	●	○	63	5400	1000	90	70	7	0.063×10^{-3}	0.20
ETP-E-020-C	●		82	6800	1000	90	70	7	0.069×10^{-3}	0.21
ETP-E-022-C	●	○	97	7200	1200	90	70	7	0.095×10^{-3}	0.25
ETP-E-024-C	●	○	142	9700	1400	90	70	7	0.109×10^{-3}	0.26
ETP-E-025-C	●		172	11200	1500	90	70	7	0.114×10^{-3}	0.27
ETP-E-028-C	●	○	210	12000	1800	90	70	7	0.166×10^{-3}	0.33
ETP-E-030-C	●		285	15000	2000	90	70	7	0.185×10^{-3}	0.35
ETP-E-032-C	●	○	330	16000	2200	90	70	7	0.244×10^{-3}	0.41
ETP-E-035-C	●		480	22000	2500	90	70	7	0.317×10^{-3}	0.47
ETP-E-038-C	●	○	667	28000	2800	90	70	24	0.756×10^{-3}	0.83
ETP-E-040-C	●		825	33000	3000	90	70	24	0.836×10^{-3}	0.88
ETP-E-042-C	●	○	825	32000	3200	90	70	24	0.959×10^{-3}	0.95
ETP-E-045-C	●		1050	38000	3500	90	70	24	1.152×10^{-3}	1.03
ETP-E-048-C	●	○	1275	42000	4000	90	70	24	1.430×10^{-3}	1.09
ETP-E-050-C	●		1425	47000	4500	90	70	24	1.497×10^{-3}	1.18
ETP-E-055-C	●	○	1800	53000	5000	90	70	24	2.130×10^{-3}	1.46
ETP-E-060-C	●		2475	67000	5300	90	70	24	3.089×10^{-3}	1.79

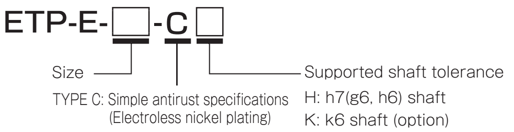
* Sizes for shaft tolerance h7 are marked with ●. Also note that sizes for k6 are optional and only for sizes marked with ○.
* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Dimensions



CAD

How to Place an Order



* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Model	d [mm]	D [mm]	D1 [mm]	D2 [mm]	L [mm]	L1 [mm]	R [mm]	N [mm]	M Qty - Nominal dia.
ETP-E-015-C	15	18	46	50	23	37	15.1	5	1-M10
ETP-E-019-C	19	23	50.5	55	25	39	17.4	5	1-M10
ETP-E-020-C	20	24	51.5	56	27	41	18	5	1-M10
ETP-E-022-C	22	27	55.5	61	29	43	19.3	5	1-M10
ETP-E-024-C	24	29	57.5	63	30	44	20.3	5	1-M10
ETP-E-025-C	25	30	58	63	32	46	20.8	5	1-M10
ETP-E-028-C	28	34	63	70	34	48	22.6	5	1-M10
ETP-E-030-C	30	36	64.5	71	36	50	23.6	5	1-M10
ETP-E-032-C	32	39	68.5	78	38	52	24.8	5	1-M10
ETP-E-035-C	35	42	73	86	41	55	26.4	5	1-M10
ETP-E-038-C	38	46	84.5	92.5	47	67	31	8	1-M16
ETP-E-040-C	40	48	86.5	94	50	70	32	8	1-M16
ETP-E-042-C	42	51	89	96.5	50	70	33.2	8	1-M16
ETP-E-045-C	45	54	93	101	52	72	34.8	8	1-M16
ETP-E-048-C	48	59	97	104	53	73	36.8	8	1-M16
ETP-E-050-C	50	60	98.5	106	54	74	37.5	8	1-M16
ETP-E-055-C	55	67	106	116	59	79	40.5	8	1-M16
ETP-E-060-C	60	73	115.5	123.5	63	83	43.3	8	1-M16

* Dimension φ D2 is that before tightening the ETP-E Plus.
* The nominal diameter of the pressure screw M is equal to the quantity minus the nominal diameter of the screw threads.

ETP-E Plus

Items Checked for Design Purposes

Selection Procedure

(1) Selection is determined by the used shaft diameter. In general, find the torque, Ta, applied to the connecting element using the output capacity, P, of the driver and usage rotation speed, n. Next, obtain the thrust, Fa, applied to the connecting element.

$$Ta\ [N\cdot m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

Ta: Torque applied to the connecting element [N·m]　P: Driver's output [kW]

n : Connecting element's rotation speed [min^{-1}]　Fa: Thrust applied to the connecting element [N]

(2) Determine the service factor, K1, based on the load property and obtain the corrected torque, Td, and corrected thrust, Fd, applied to the connecting element.

$$Td = Ta \times K1 \times K2$$

$$Fd = Fa \times K1 \times K2$$

Td: Corrected torque applied to the connecting element [N·m]

Fd: Corrected thrust applied to the connecting element [N]

K1: Service factor based on the load property

K2: Service factor based on repeated load

(3) Correct the values according to the load property.

1. For the torque alone

Compare the connecting element's rated torque, T, based on the used diameter with the calculated corrected torque, Td.

$$T \geqq Td$$

T: Connecting element's rated torque [N·m]

2. For the thrust alone

Compare the connecting element's rated thrust, F, based on the used diameter with the calculated corrected thrust, Fd.

$$F \geqq Fd$$

F: Connecting element's rated thrust [N]

3. If torque and thrust are applied at the same time

Calculate the combined load, Mr, and compare the result with the rated torque, T.

$$T \geqq Mr$$

$$Mr = \sqrt{Td^2 + \left(Fd \times \frac{d}{2}\right)^2}$$

Mr: Combined load applied to the connecting element [N·m]

d: Shaft diameter [m]

(4) Obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter.

1. How to obtain the hub's minimum external diameter

Obtain the hub's minimum external diameter based on the used hub material's strength.

$$DO \geqq D\sqrt{\frac{\delta_{0.2N} + P_2 \times C}{\delta_{0.2N} + P_2 \times C}}$$

When $B = L: C = 1$

When $L < B < 2L: C = 0.8$

When $B \geqq 2L: C = 0.6$

DO: Hub's minimum external diameter [mm]

D: Hub's internal diameter [mm]

$\delta_{0.2N}$: Hub material's yield stress [N/mm^2]

P_2: Hub contact pressure [N/mm^2]

C: Coefficient

B: Hub length [mm]

L: Effective contact length [mm]

If the hub material's yield stress value is large, make sure the ratio of the hub's minimum external diameter to the hub's internal diameter is more than about 1.3 times to prevent the hub's deformation.

2. How to obtain the hollow shaft's maximum internal diameter

Obtain the hollow shaft's maximum internal diameter based on the used hollow shaft material's strength.

$$di \leqq d\sqrt{\frac{\delta_{0.2N} - 2P_1 \times C}{\delta_{0.2N}}}$$

When **using a single one: C = 0.6**

When **using multiple ones: C = 0.8**

di: Hollow shaft's maximum internal diameter [mm]

d: Shaft diameter [mm]

$\delta_{0.2N}$: Hollow shaft material's yield stress [N/mm^2]

P_1: Shaft contact pressure [N/mm^2]

C: Coefficient

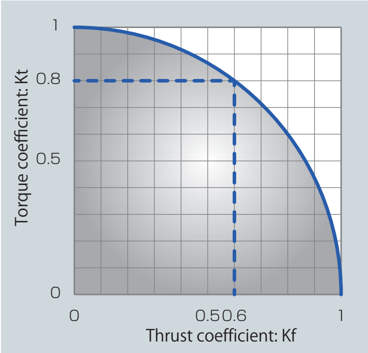
The shaft contact pressure and hub contact pressure vary depending on the operating temperature. You need to correct these values based on the operating temperature. Note that the contact pressure values were those measured at 20℃ . If the operating temperature exceeds 20℃ , obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter with the following formulas.

P1, P2 = contact pressure at 20° C × service factor based on the operating temperature (K3)

The operating temperature range is from -30℃ to 85℃ .

Torque and Thrust Coefficients

If torque and thrust are applied to the ETP-E Plus at the same time, the rated values of both decrease. These values can be obtained based on the coefficients in the figure below.



Calculation example: When using the ETP-E-35-NH at 20℃ .

Maximum rated torque (T) and thrust (F) at 20℃ , T = 640 [N·m] and F = 30000 [N]. The maximum rated torque, Tmax, when the maximum thrust (Fmax = 18000 [N]) is applied can be obtained as follows.

$$\text{Thrust coefficient }(Kf) = Fmax / F \times \text{service factor }(K3) = 18000/30000 \times 1.0 = 0.6$$

The torque coefficient, Kt, when Kf = 0.6 is about 0.8 based on the above figure. Accordingly, the maximum rated torque, Tmax, in this case is as follows.

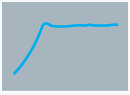
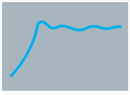
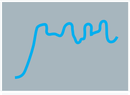
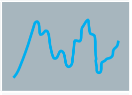
$$Tmax = T \times K3 \times Kt = 640 \times 1.0 \times 0.8 = 512\ [N\cdot m]$$

The relationship between Kt and Kf can be obtained from the following formula.

$$\sqrt{(Kt)^2 + (Kf)^2} = 1$$

Service Factor

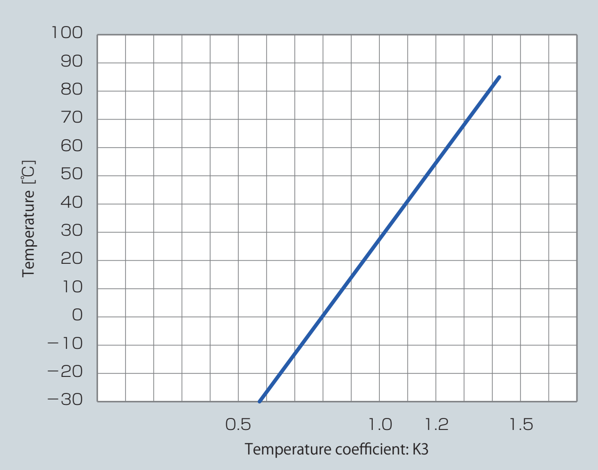
■ Service factor based on the load property: K1

	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
Load property				
K1	1.0	1.25	1.75	2.25

■ Service factor based on repeated load (K2)

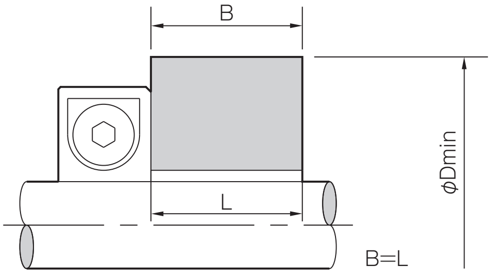
Load property	Constant	Repeated	Reversed
K2	1.0	1.35	2.0

■ Service factor based on the operating temperature: K3



Selection Procedure

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.



ϕ Dmin unit [mm]

ETP-E Plus size	Hub contact pressure [N/mm^2]	Material's yield stress $\delta_{0.2}$ [N /mm^2]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300	FC350		FCD400		FCD450	FCD500	FCD600	FCD700
			SS330	SS400		SS490					
			SC360	SC410	SC450	SC480					
			FCMB310	FCMB360	S10C	S20C	S30C	S35C	S45C	S55C	
					SF440	SF490	SF540	SF590			
				SUS304			SUS201		SUS410	SUS403	SUS420
015	70	30	28	26	25	24	24	24	24	24	24
019	70	39	35	33	32	31	30	30	30	30	30
020	70	40	37	34	33	32	32	32	32	32	32
022	70	45	41	39	37	36	36	36	36	36	36
024	70	49	44	42	40	39	38	38	38	38	38
025	70	50	46	43	42	40	39	39	39	39	39
028	70	57	52	49	47	46	45	45	45	45	45
030	70	60	55	51	50	48	47	47	47	47	47
032	70	65	59	56	54	52	51	51	51	51	51
035	70	70	64	60	58	56	55	55	55	55	55
038	70	77	70	66	63	62	60	60	60	60	60
040	70	80	73	68	66	64	63	63	63	63	63
042	70	85	77	73	70	68	67	67	67	67	67
045	70	90	82	77	74	72	71	71	71	71	71
048	70	98	89	84	81	79	77	77	77	77	77
050	70	100	91	85	83	80	78	78	78	78	78
055	70	112	102	95	92	90	88	88	88	88	88
060	70	122	111	104	100	98	95	95	95	95	95

* Hub contact pressure at an operating temperature of 20℃ . The contact pressure increases as the temperature rises.
* If the operating temperature exceeds 20℃ , you need to obtain the hub's minimum external diameter according to the selection procedure on P.202.
* The hub's minimum external diameter shows a value calculated based on C=1 in the selection procedure on P.202.
* The above SUS values are proof stress values (N/mm^2) after quenching and tempering.

ETP-E Plus

Items Checked for Design Purposes

Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-E-□-NH・CH	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-E-□-NK・CK	k6		

Operating Temperature Range

Model	Operating temperature range [℃]
ETP-E-□-N	−30～85
ETP-E-□-C	

Concentricity and Balance

Model	Concentricity [mm]	Balance [g・mm/kg]
ETP-E-□-N	0.02	−30～85
ETP-E-□-C		

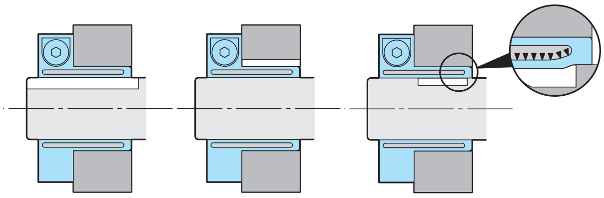
Number of Attachments and Detachments

The number of attachments/detachments only applies if you prevent foreign particles from adhering to the pressure screw and make sure oil or grease containing molybdenum-, silicon-, or fluorine-based antifriction material always remains on the pressure screw's surface.
In addition, be sure to use a torque wrench and do not use an impact wrench that has large torque fluctuation.

Model	Number of attachments/detachments
ETP-E-015-N～035-N	3000
ETP-E-038-N～060-N	2000
ETP-E-015-C～035-C	1500
ETP-E-038-C～060-C	1000

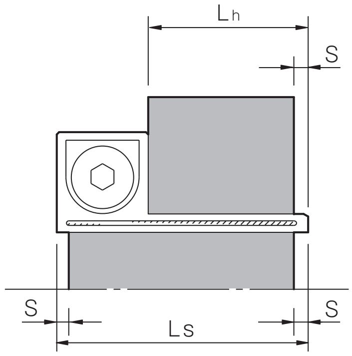
Keyway Shape where the ETP-E Plus Cannot Be Detached due to a Deformation of the Sleeve

The ETP-E Plus cannot be used if the shaft and hub have a keyway as shown in the figure below. Note that you can use the ETP-E Plus for the shaft and hub with a keyway if you completely fill the keyway with epoxy putty for metals and then shape it.



Allowable Range of Edge

The performance of the ETP-E Plus is based on the case where the shaft and the hub have the effect for the entire standard shaft length, Ls, and the entire standard hub length, Lh, respectively. Accordingly, make sure in the design phase that the shaft and the hub have the effect for the respective entire standard length. If the length of the shaft and hub is limited due to design reasons, make sure it is less than the dimension S in the figure below. If it exceeds the dimension S, stress concentrates on the sleeve edge and the sleeve is deformed, so there is the possibility that the ETP-E Plus cannot be detached.



ETP-E Plus size	S [mm]
015	2
019	2
020	2
022	3
024	3
025	3
028	4
030	4
032	4
035	4
038	5
040	5
042	5
045	5
048	5
050	5
055	5
060	5

Mounting

(1) Remove the rust, dust, oil, etc. off from the inner surface of the shaft and hub. Similarly, if any anti-rust oil, soiling, etc. remains on the surface of the ETP-E Plus, wipe it off with a cloth, etc.
In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Attach the ETP-E Plus to the hub and mount them to the shaft. If accurate positioning of the shaft and hub is needed, adjust the position of both before tightening the pressure screw.
Never tighten the pressure screw before mounting the ETP-E Plus to the shaft and hub.

(3) Tighten the pressure screw to the specified torque using a torque.

Removal

(1) Before starting work, ensure safety by making sure no torque and thrust are applied to the ETP-E Plus and there is no risk of a fall due to the self-weight of the shaft and hub.
The ETP-E Plus does not have a self-locking mechanism. The connecting force is instantaneously released by loosening the pressure screw.

(2) Loosen the pressure screw until the connecting force is released. The pressure screw should only be loosened. Do not remove it.

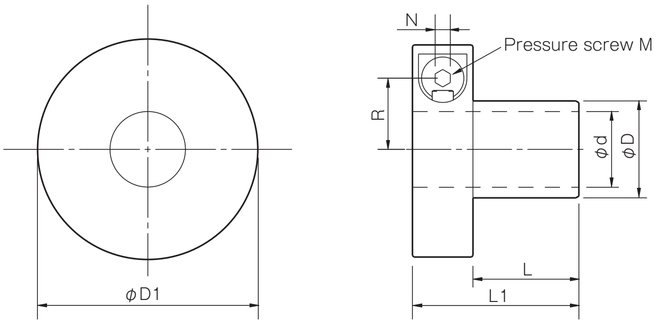
ETP-T Models

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Rated radial load [N]	Shaft contact pressure [N/mm^2]	Hub contact pressure [N/mm^2]	Tightening torque [N·m]	Moment of inertia [kg·m^2]	Mass [kg]
ETP-T-15	40	5000	1000	90	70	12	0.09×10^{-3}	0.25
ETP-T-19	90	9000	1000	90	70	12	0.14×10^{-3}	0.31
ETP-T-20	120	12000	2000	90	70	12	0.15×10^{-3}	0.32
ETP-T-24	220	18000	2000	90	70	16	0.40×10^{-3}	0.57
ETP-T-25	290	23000	3000	90	70	16	0.44×10^{-3}	0.60
ETP-T-30	500	33000	4000	90	70	16	0.60×10^{-3}	0.70
ETP-T-35	800	45000	5000	90	70	16	1.00×10^{-3}	1.00
ETP-T-40	1200	60000	6000	90	70	24	1.70×10^{-3}	1.30
ETP-T-50	2000	94000	9000	90	70	24	2.70×10^{-3}	1.70
ETP-T-60	4000	133000	12000	90	70	40	5.00×10^{-3}	2.50
ETP-T-70	6500	186000	13000	90	70	40	8.80×10^{-3}	3.60
ETP-T-75	7800	208000	14000	90	70	40	11.60×10^{-3}	4.20
ETP-T-80	9000	225000	15000	90	70	40	14.37×10^{-3}	4.77
ETP-T-90	13000	288000	17000	90	70	60	24.07×10^{-3}	6.48
ETP-T-100	18000	360000	19000	90	70	80	37.02×10^{-3}	8.41

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20℃ .
* ETP-T-70, 75, 80, 90, and 100 are made to order.

Dimensions



How to Place an Order

ETP-T-□

Size

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	R	N	M
ETP-T-15	15	19	52	25	41	14.5	6	1-M12
ETP-T-19	19	24	58	28	44	18	6	1-M12
ETP-T-20	20	25	59	30	46	19	6	1-M12
ETP-T-24	24	30	71	33	53	23	6	1-M14
ETP-T-25	25	32	73	35	55	23.5	6	1-M14
ETP-T-30	30	38	78	40	60	26.5	6	1-M14
ETP-T-35	35	44	88	45	65	30	6	1-M14
ETP-T-40	40	52	100	55	75	34	8	1-M16
ETP-T-50	50	65	110	60	80	40	8	1-M16
ETP-T-60	60	75	122	70	95	46.5	10	1-M20
ETP-T-70	70	90	138	85	110	52	10	1-M20
ETP-T-75	75	95	146	90	115	56	10	1-M20
ETP-T-80	80	100	154	95	120	58	10	1-M20
ETP-T-90	90	112	170	105	133	64.5	10	1-M22
ETP-T-100	100	125	184	115	145	72	12	1-M24

* The nominal diameter of the pressure screw M is equal to the quantity minus the nominal diameter of the screw threads.

ETP-T C Types

Made to order

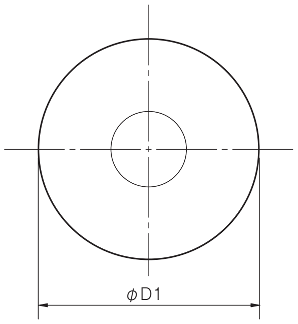
Specifications

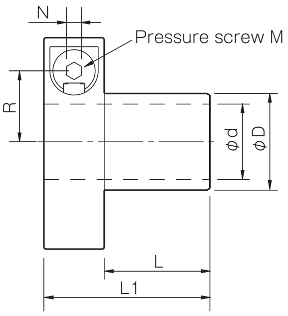
Model	Rated torque [N·m]	Rated thrust [N]	Rated radial load [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
ETP-T-15-C	30	3750	1000	90	70	12	0.09×10^{-3}	0.25
ETP-T-19-C	67	6750	1000	90	70	12	0.14×10^{-3}	0.31
ETP-T-20-C	90	9000	2000	90	70	12	0.15×10^{-3}	0.32
ETP-T-24-C	165	13500	2000	90	70	16	0.40×10^{-3}	0.57
ETP-T-25-C	217	17250	3000	90	70	16	0.44×10^{-3}	0.60
ETP-T-30-C	375	24750	4000	90	70	16	0.60×10^{-3}	0.70
ETP-T-35-C	600	33750	5000	90	70	16	1.00×10^{-3}	1.00
ETP-T-40-C	900	45000	6000	90	70	24	1.70×10^{-3}	1.30
ETP-T-50-C	1500	70500	9000	90	70	24	2.70×10^{-3}	1.70
ETP-T-60-C	3000	99750	12000	90	70	40	5.00×10^{-3}	2.50

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Sizes





CAD

How to Place an Order

ETP-T-□-C

Size

Type (C: Simple antirust specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	R	N	M
ETP-T-15-C	15	19	52	25	41	14.5	6	1-M12
ETP-T-19-C	19	24	58	28	44	18	6	1-M12
ETP-T-20-C	20	25	59	30	46	19	6	1-M12
ETP-T-24-C	24	30	71	33	53	23	6	1-M14
ETP-T-25-C	25	32	73	35	55	23.5	6	1-M14
ETP-T-30-C	30	38	78	40	60	26.5	6	1-M14
ETP-T-35-C	35	44	88	45	65	30	6	1-M14
ETP-T-40-C	40	52	100	55	75	34	8	1-M16
ETP-T-50-C	50	65	110	60	80	40	8	1-M16
ETP-T-60-C	60	75	122	70	95	46.5	10	1-M20

* The nominal diameter of the pressure screw M is equal to the quantity minus the nominal diameter of the screw threads.

ETP-T Models

Items Checked for Design Purposes

Selection Procedure

(1) Selection is determined by the used shaft diameter. In general, find the torque, Ta, applied to the connecting element using the output capacity, P, of the driver and usage rotation speed, n. Next, obtain the thrust, Fa, applied to the connecting element.

$$Ta\ [N{\cdot}m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

Ta: Torque applied to the connecting element [N·m] P: Driver's output [kW]

n : Connecting element's rotation speed [min⁻¹] Fa: Thrust applied to the connecting element [N]

(2) Determine the service factor, K1, based on the load property and obtain the corrected torque, Td, and corrected thrust, Fd, applied to the connecting element.

$$Td = Ta \times K1$$

$$Fd = Fa \times K1$$

Td: Corrected torque applied to the connecting element [N・m]

Fd: Corrected thrust applied to the connecting element [N]

K1: Service factor based on the load property

(3) Correct the values according to the load property.

1. For the torque alone

Compare the connecting element's rated torque, T, based on the used diameter with the calculated corrected torque, Td.

$$T \geqq Td$$

T: Connecting element's rated torque [N・m]

2. For the thrust alone

Compare the connecting element's rated thrust, F, based on the used diameter with the calculated corrected thrust, Fd.

$$F \geqq Fd$$

F: Connecting element's rated thrust [N]

3. If torque and thrust are applied at the same time

Calculate the combined load, Mr, and compare the result with the rated torque, T.

$$T \geqq Mr \qquad Mr = \sqrt{Td^2 + (Fd \times \frac{d}{2})^2}$$

Mr: Combined load applied to the connecting element [N・m] d: Shaft diameter [m]

(4) Obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter.

1. Obtain the hub's minimum external diameter based on the used hub material's strength.

$$DO \geqq D\sqrt{\frac{\delta_{0.2N} + CP_2}{\delta_{0.2N} - CP_2}}$$

$C = 1 \quad B = L$

$C = 0.8 \quad L < B < 2L$

$C = 0.6 \quad B \geqq 2L$

DO: Hub's minimum external diameter [mm]

D: Hub's internal diameter [mm]

P_2: Hub contact pressure [N/mm²]

$\delta_{0.2N}$: Hub material's yield stress [N/mm²]

B: Hub length [mm]

L: Effective contact length [mm]

C: Coefficient

If the hub material's yield stress value is large, make sure the ratio of the hub's minimum external diameter to the hub's internal diameter is more than about 1.3 times to prevent the hub's deformation.

2.Obtain the hollow shaft's maximum internal diameter based on the used hollow shaft material's strength.

$$di \leqq d\sqrt{\frac{\delta_{0.2N} - 2P_1C}{\delta_{0.2N}}}$$

C = 0.6 when using a single one

C = 0.8 when using multiple ones

di: Hollow shaft's maximum internal diameter [mm]

$\delta_{0.2N}$: Hollow shaft material's yield stress [N/mm²]

P_1: Shaft contact pressure [N/mm²]

d: Shaft diameter [mm]

C: Coefficient

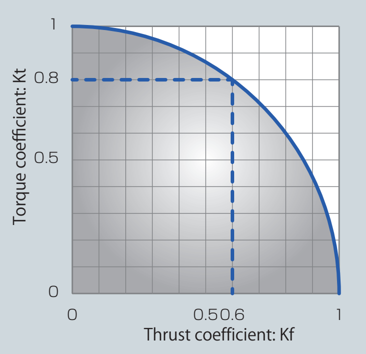
The shaft contact pressure and hub contact pressure vary depending on the operating temperature. You need to correct these values based on the operating temperature. Note that the contact pressure values were those measured at 20℃ . If the operating temperature exceeds 20℃ , obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter with the following formulas.

$$P_1 \cdot P_2 = \text{contact pressure at 20℃} \times \text{temperature coefficient (K 2)}$$

The operating temperature range is from -30℃ to 110℃ .

Torque and Thrust Coefficients

If torque and thrust are applied to ETP-TECHNO at the same time, the rated values of both decrease. These values can be obtained based on the coefficients in the figure on the right.



Calculation example: When using the ETP-T-30 at 20℃ .

Maximum rated torque at 20℃ [T] and thrust (F): T=500 [N・m]and F = 33000 [N]

The maximum rated torque, Tmax, when the maximum thrust (Fmax = 20000 [N]) is applied can be obtained as follows.

$$\text{Thrust coefficient (Kf)} = \text{Fmax / F} \times \text{temperature coefficient (K2)}$$
$$= 20000/33000 \times 1.0 = 0.61$$

The torque coefficient, Kt, when Kf = 0.61 is about 0.8 based on the figure above. Accordingly, the maximum rated torque, Tmax, in this case is as follows.

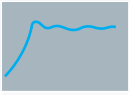
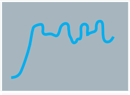
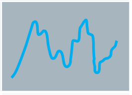
$$Tmax = T \times K2 \times Kt = 500 \times 1.0 \times 0.8 = 400\ [N{\cdot}m]$$

The relationship between Kt and Kf can be obtained from the following formula.

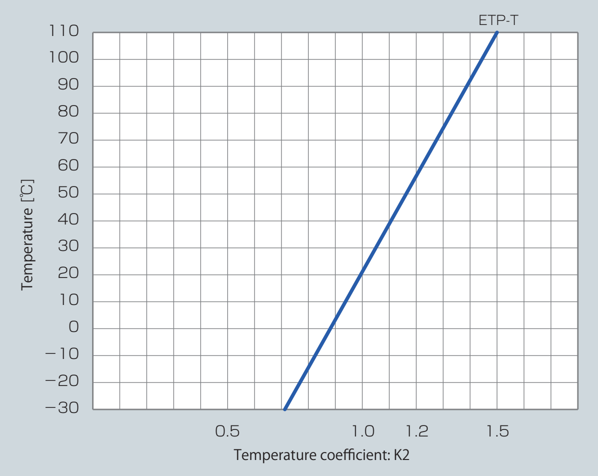
$$\sqrt{(Kt)^2 + (Kf)^2} = 1$$

Service Factor

■ Service factor based on the load property: K1

	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
Load property				
K1	1.0	1.25	1.75	2.25

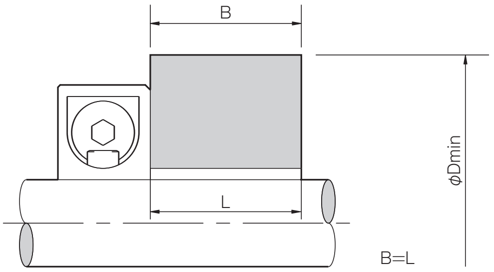
■ Service factor based on the operating temperature: K2



Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ ETP-TECHNO



ϕ Dmin unit [mm]

ETP-TECHNO size	Hub contact pressure [N/mm^2]	Material's yield stress δ 0.2 [N /mm^2]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300	FC350		FCD400		FCD450	FCD500	FCD600	FCD700
			SS330	SS400		SS490					
			SC360	SC410	SC450	SC480					
			FCMB310	FCMB360	S15C	S20C	S30C	S35C	S45C	S55C	
					SF440	SF490	SF540	SF590			
				SUS304			SUS201		SUS410	SUS403	SUS420
15	70	32	29	27	27	26	25	25	25	25	25
19	70	40	37	35	33	33	32	32	32	32	32
20	70	42	38	36	35	34	33	33	33	33	33
24	70	50	46	43	42	41	39	39	39	39	39
25	70	54	49	46	44	43	42	42	42	42	42
30	70	64	58	54	53	51	50	50	50	50	50
35	70	74	67	63	61	59	58	58	58	58	58
40	70	87	79	74	72	70	68	68	68	68	68
50	70	108	99	93	90	88	85	85	85	85	85
60	70	125	114	107	103	101	98	98	98	98	98
70	70	150	136	128	124	121	117	117	117	117	117
75	70	158	144	135	131	128	124	124	124	124	124
80	70	166	151	142	137	134	130	130	130	130	130
90	70	186	170	160	154	151	146	146	146	146	146
100	70	208	189	178	172	168	163	163	163	163	163

* Hub contact pressure at an operating temperature of 20℃ . The contact pressure increases as the temperature rises.
* If the operating temperature exceeds 20℃ , you need to obtain the hub's minimum external diameter according to the selection procedure on P.208.
* The hub's minimum external diameter shows a value calculated based on C=1 in the selection procedure on P.208.
* The above SUS values are proof stress values (N/mm^2) after quenching and tempering.

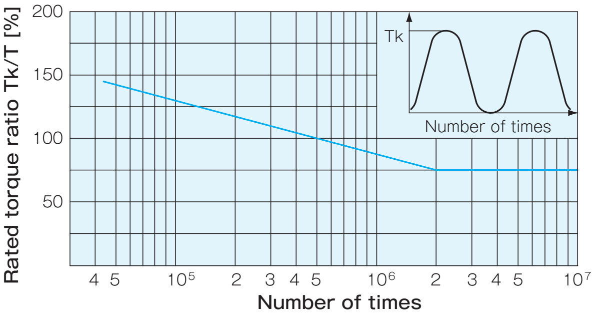
ETP-T Models

Items Checked for Design Purposes

Fatigue Caused by Periodically Applied Varying Torque

The following figure shows the fatigue state when a varying static torque, Tk, is applied periodically to the ETP-TECHNO. The vertical axis shows the percentage of the rated torque, T, and the horizontal axis shows the number of periodically applied varying static torque events.

If the rated torque, T, is periodically applied to the ETP-TECHNO, it can withstand about 500,000 events in terms of fatigue life. If 75% of the rated torque, T, is applied, it can withstand an unlimited number of events in terms of fatigue life.



Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-T	h8	H7	25S (center line's average roughness 6.3a) or less
ETP-T C			

Operating Temperature Range

Model	Operating temperature range [° C]
ETP-T	− 30 ～ 110
ETP-T C	

Concentricity and Balance

Model	Concentricity [mm]	Balance [g·mm/kg]
ETP-T	0.006	50
ETP-T C		

Number of Attachments and Detachments

The number of attachments/detachments only applies if you prevent foreign particles from adhering to the pressure screw and make sure oil or grease containing molybdenum-, silicon-, or fluorine-based antifriction material always remains on the pressure screw's surface.

In addition, be sure to use a torque wrench and do not use an impact wrench that has large torque fluctuation.

■ ETP-T

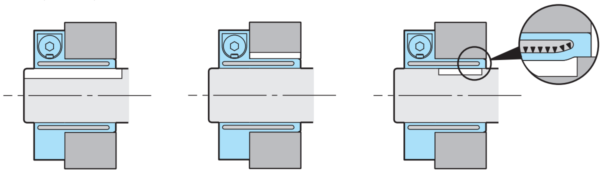
Model	No. of attachments/detachments
ETP-T-15 ～ 50	5000
ETP-T-60 ～ 80	3000
ETP-T-90・100	500

■ ETP-T C

Model	No. of attachments/detachments
ETP-T-15 ～ 50 C	5000
ETP-T-60 C	3000

Keyway Shape where the ETP-TECHNO Cannot Be Detached due to a Deformation of the Sleeve

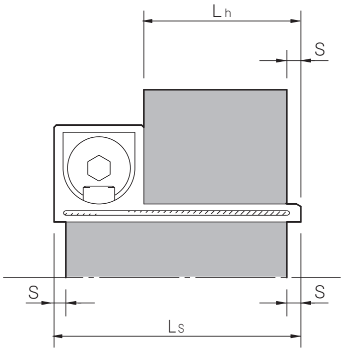
The ETP-TECHNO cannot be used if the shaft and hub have a keyway as shown in the figure below. Note that you can use the ETP-TECHNO for the shaft and hub with a keyway if you completely fill the keyway with epoxy putty for metals and then shape it.



Allowable Range of Edge

The performance of the ETP-TECHNO is based on the case where the shaft and the hub have the effect for the entire standard shaft length, Ls, and the entire standard hub length, Lh, respectively. Accordingly, make sure in the design phase that the shaft and the hub have the effect for the respective entire standard length. If the length of the shaft and hub is limited due to design reasons, make sure it is less than the dimension S in the figure below. If it exceeds the dimension S, stress concentrates on the sleeve edge and the sleeve is deformed, so there is the possibility that the ETP-TECHNO cannot be detached.

■ ETP-TECHNO



ETP-TECHNO size	S [mm]
15	5
19	5
20	5
24	5
25	6
30	6
35	6
40	7
50	8
60	9
70	10
75	10
80	10
90	10
100	10

Mounting

(1) Remove the rust, dust, oil, etc. off from the inner surface of the shaft and hub. Similarly, if any anti-rust oil, soiling, etc. remains on the surface of the ETP-TECHNO, wipe it off with a cloth, etc.
In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Attach the ETP-TECHNO to the hub and mount them to the shaft. If accurate positioning of the shaft and hub is needed, adjust the position of both before tightening the pressure screw.
Never tighten the pressure screw before mounting the ETP-TECHNO to the shaft and hub.

(3) Tighten the pressure screw to the specified torque using a torque wrench.

Removal

(1) Before starting work, ensure safety by making sure no torque and thrust are applied to the ETP-TECHNO and there is no risk of a fall due to the self-weight of the shaft and hub.
The ETP-TECHNO does not have a self-locking mechanism. The connecting force is instantaneously released by loosening the pressure screw.

(2) Loosen the pressure screw until it comes into contact with the set screw. Also, do not remove the pressure screw by removing the set screw.

ETP-A Models

Specifications

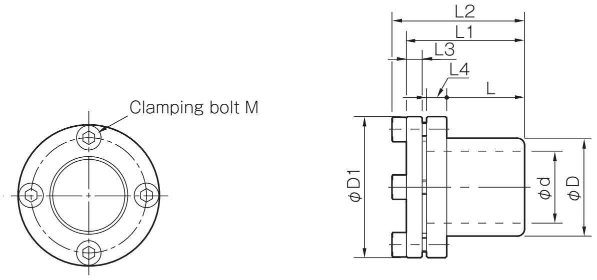
Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure $[N/mm^2]$	Hub contact pressure $[N/mm^2]$	Tightening torque [N·m]	Moment of inertia $[kg \cdot m^2]$	Mass [kg]
ETP-A-15	55	7300	90	80	6	0.018×10^{-3}	0.10
ETP-A-19	100	10600	90	80	8	0.046×10^{-3}	0.17
ETP-A-20	125	12500	90	80	8	0.046×10^{-3}	0.16
ETP-A-22	135	12300	90	80	8	0.065×10^{-3}	0.19
ETP-A-24	200	16700	90	80	8	0.067×10^{-3}	0.20
ETP-A-25	250	20000	90	80	8	0.071×10^{-3}	0.19
ETP-A-28	300	21400	90	80	8	0.12×10^{-3}	0.26
ETP-A-30	420	28000	90	80	8	0.14×10^{-3}	0.29
ETP-A-32	420	26300	90	80	8	0.20×10^{-3}	0.35
ETP-A-35	650	37100	90	80	8	0.25×10^{-3}	0.40
ETP-A-38	750	39500	90	80	8	0.31×10^{-3}	0.43
ETP-A-40	940	47000	90	80	8	0.44×10^{-3}	0.55
ETP-A-42	940	44800	90	80	8	0.47×10^{-3}	0.55
ETP-A-45	1290	57300	90	80	13	0.69×10^{-3}	0.71
ETP-A-48	1570	65400	90	80	13	0.83×10^{-3}	0.78
ETP-A-50	1900	76000	90	80	13	1.05×10^{-3}	0.86
ETP-A-55	2500	90900	90	80	13	1.43×10^{-3}	1.06
ETP-A-60	3400	113000	90	80	13	2.15×10^{-3}	1.37
ETP-A-65	3500	108000	90	80	13	3.10×10^{-3}	1.67
ETP-A-70	5200	149000	90	80	32	4.08×10^{-3}	2.04
ETP-A-75	6300	168000	90	80	32	5.50×10^{-3}	2.42
ETP-A-80	8800	220000	90	80	32	8.10×10^{-3}	2.64
ETP-A-90	11000	244000	90	80	32	12.2×10^{-3}	3.54
ETP-A-100	15500	310000	90	80	32	19.9×10^{-3}	4.80

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

* ETP-A-75, 80, 90, and 100 are made to order.

Dimensions



How to Place an Order

ETP-A-□

Size

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-15	15	23	37.5	17	28	33	5	5.4	3-M5 × 10
ETP-A-19	19	28	45	21	34	39	5.5	6.9	3-M5 × 12
ETP-A-20	20	28	45	22	35	40	5.5	6.4	3-M5 × 12
ETP-A-22	22	32	49	22	35	40	5.5	6.4	4-M5 × 12
ETP-A-24	24	34	49	25	38	43	5.5	6.4	4-M5 × 12
ETP-A-25	25	34	49	27	41	46	5.5	6.9	4-M5 × 12
ETP-A-28	28	39	55	29	43	48	5.5	6.9	4-M5 × 12
ETP-A-30	30	41	57	32	46	51	5.5	6.9	4-M5 × 12
ETP-A-32	32	43	60	34	50	55	7	7.4	4-M5 × 14
ETP-A-35	35	47	62.5	37	53	58	7	7.4	6-M5 × 14
ETP-A-38	38	50	65	41	57	62	7	7.4	6-M5 × 14
ETP-A-40	40	53	70	43	60	65	7.5	8.4	6-M5 × 16
ETP-A-42	42	55	70	45	62	67	7.5	8.4	6-M5 × 16
ETP-A-45	45	59	77	49	66	72	8	8.4	6-M6 × 16
ETP-A-48	48	62	80	52	70	76	8	8.4	6-M6 × 16
ETP-A-50	50	65	83	53	72	78	8.5	9.4	6-M6 × 18
ETP-A-55	55	71	88	58	77	83	9	9.4	8-M6 × 18
ETP-A-60	60	77	95	64	85	91	10	10.4	8-M6 × 20
ETP-A-65	65	84	102	68	90	96	9.5	10.9	8-M6 × 20
ETP-A-70	70	90	113	72	94	102	9.5	10.9	6-M8 × 20
ETP-A-75	75	95	118	85	108	116	11	11	6-M8 × 22
ETP-A-80	80	100	123	90	114	122	11	11	6-M8 × 22
ETP-A-90	90	112	135	100	127	135	12.5	12.5	8-M8 × 25
ETP-A-100	100	125	148	110	139	147	13.5	13	8-M8 × 25

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.

* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

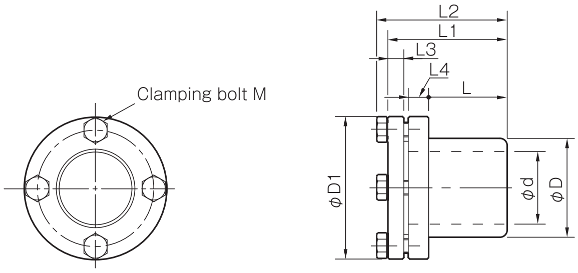
ETP-A B Types

Specifications

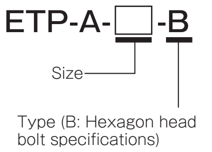
Model	Rated torque [N・m]	Rated thrust [N]	Shaft contact pressure [N/mm^2]	Hub contact pressure [N/mm^2]	Tightening torque [N・m]	Moment of inertia [kg・m^2]	Mass [kg]
ETP-A-15-B	55	7300	90	80	6	0.018×10^{-3}	0.10
ETP-A-19-B	100	10600	90	80	8	0.046×10^{-3}	0.17
ETP-A-20-B	125	12500	90	80	8	0.046×10^{-3}	0.16
ETP-A-22-B	135	12300	90	80	8	0.065×10^{-3}	0.19
ETP-A-24-B	200	16700	90	80	8	0.067×10^{-3}	0.20
ETP-A-25-B	250	20000	90	80	8	0.071×10^{-3}	0.19
ETP-A-28-B	300	21400	90	80	8	0.12×10^{-3}	0.26
ETP-A-30-B	420	28000	90	80	8	0.14×10^{-3}	0.29
ETP-A-32-B	420	26300	90	80	8	0.20×10^{-3}	0.35
ETP-A-35-B	650	37100	90	80	8	0.25×10^{-3}	0.40
ETP-A-38-B	750	39500	90	80	8	0.31×10^{-3}	0.43
ETP-A-40-B	940	47000	90	80	8	0.44×10^{-3}	0.55
ETP-A-42-B	940	44800	90	80	8	0.47×10^{-3}	0.55
ETP-A-45-B	1290	57300	90	80	13	0.69×10^{-3}	0.71
ETP-A-48-B	1570	65400	90	80	13	0.83×10^{-3}	0.78
ETP-A-50-B	1900	76000	90	80	13	1.05×10^{-3}	0.86
ETP-A-55-B	2500	90900	90	80	13	1.43×10^{-3}	1.06
ETP-A-60-B	3400	113000	90	80	13	2.15×10^{-3}	1.37
ETP-A-65-B	3500	108000	90	80	13	3.10×10^{-3}	1.67
ETP-A-70-B	5200	149000	90	80	32	4.08×10^{-3}	2.04
ETP-A-75-B	6300	168000	90	80	32	5.50×10^{-3}	2.42
ETP-A-80-B	8800	220000	90	80	32	8.10×10^{-3}	2.64
ETP-A-90-B	11000	244000	90	80	32	12.2×10^{-3}	3.54
ETP-A-100-B	15500	310000	90	80	32	19.9×10^{-3}	4.80

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.
* ETP-A-75, 80, 90, and 100-B are made to order.

Dimensions



How to Place an Order



* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-15-B	15	23	37.5	17	28	32.5	5	5.4	3-M5 × 10
ETP-A-19-B	19	28	45	21	34	38.5	5.5	6.9	3-M5 × 12
ETP-A-20-B	20	28	45	22	35	39.5	5.5	6.4	3-M5 × 12
ETP-A-22-B	22	32	49	22	35	39.5	5.5	6.4	4-M5 × 12
ETP-A-24-B	24	34	49	25	38	42.5	5.5	6.4	4-M5 × 12
ETP-A-25-B	25	34	49	27	41	45.5	5.5	6.9	4-M5 × 12
ETP-A-28-B	28	39	55	29	43	47.5	5.5	6.9	4-M5 × 12
ETP-A-30-B	30	41	57	32	46	50.5	5.5	6.9	4-M5 × 12
ETP-A-32-B	32	43	60	34	50	54.5	7	7.4	4-M5 × 14
ETP-A-35-B	35	47	62.5	37	53	57.5	7	7.4	6-M5 × 14
ETP-A-38-B	38	50	65	41	57	61.5	7	7.4	6-M5 × 14
ETP-A-40-B	40	53	70	43	60	64.5	7.5	8.4	6-M5 × 16
ETP-A-42-B	42	55	70	45	62	66.5	7.5	8.4	6-M5 × 16
ETP-A-45-B	45	59	77	49	66	71	8	8.4	6-M6 × 16
ETP-A-48-B	48	62	80	52	70	75	8	8.4	6-M6 × 16
ETP-A-50-B	50	65	83	53	72	77	8.5	9.4	6-M6 × 18
ETP-A-55-B	55	71	88	58	77	82	9	9.4	8-M6 × 18
ETP-A-60-B	60	77	95	64	85	90	10	10.4	8-M6 × 20
ETP-A-65-B	65	84	102	68	90	95	9.5	10.9	8-M6 × 20
ETP-A-70-B	70	90	113	72	94	99.5	9.5	10.9	6-M8 × 20
ETP-A-75-B	75	95	118	85	108	113.5	11	11	6-M8 × 22
ETP-A-80-B	80	100	123	90	114	119.5	11	11	6-M8 × 22
ETP-A-90-B	90	112	135	100	127	132.5	12.5	12.5	8-M8 × 25
ETP-A-100-B	100	125	148	110	139	144.5	13.5	13	8-M8 × 25

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.
* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

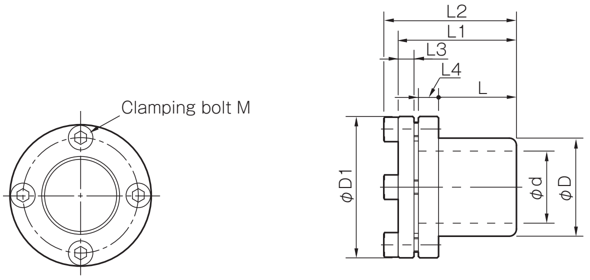
ETP-A C Types

Specifications

Model	Rated torque [N・m]	Rated thrust [N]	Shaft contact pressure [N/mm^2]	Hub contact pressure [N/mm^2]	Tightening torque [N・m]	Momentof inertia [kg・m^2]	Mass [kg]
ETP-A-15-C	41	5000	90	80	6	0.018×10^{-3}	0.10
ETP-A-19-C	75	7400	90	80	8	0.046×10^{-3}	0.17
ETP-A-20-C	94	8700	90	80	8	0.046×10^{-3}	0.16
ETP-A-25-C	188	14000	90	80	8	0.071×10^{-3}	0.19
ETP-A-30-C	315	19000	90	80	8	0.14×10^{-3}	0.29
ETP-A-35-C	488	26000	90	80	8	0.25×10^{-3}	0.40
ETP-A-40-C	705	33000	90	80	8	0.44×10^{-3}	0.55
ETP-A-45-C	968	40000	90	80	13	0.69×10^{-3}	0.71
ETP-A-50-C	1426	53000	90	80	13	1.05×10^{-3}	0.86

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Dimensions



CAD

How to Place an Order

ETP-A-□-C

Size

Type (C: Simple antirust specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-15-C	15	23	37.5	17	28	33	5	5.4	3-M5 × 10
ETP-A-19-C	19	28	45	21	34	39	5.5	6.9	3-M5 × 12
ETP-A-20-C	20	28	45	22	35	40	5.5	6.4	3-M5 × 12
ETP-A-25-C	25	34	49	27	41	46	5.5	6.9	4-M5 × 12
ETP-A-30-C	30	41	57	32	46	51	5.5	6.9	4-M5 × 12
ETP-A-35-C	35	47	62.5	37	53	58	7	7.4	6-M5 × 14
ETP-A-40-C	40	53	70	43	60	65	7.5	8.4	6-M5 × 16
ETP-A-45-C	45	59	77	49	66	72	8	8.4	6-M6 × 16
ETP-A-50-C	50	65	83	53	72	78	8.5	9.4	6-M6 × 18

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.
* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

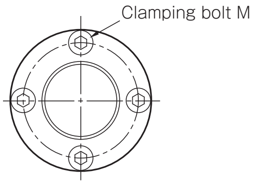
ETP-A S Types

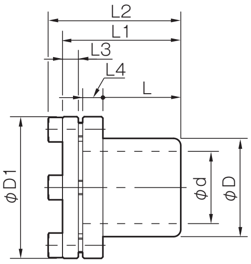
Specifications

Model	Rated torque [N・m]	Rated thrust [N]	Shaft contact pressure [N/mm^2]	Hub contact pressure [N/mm^2]	Tightening torque [N・m]	Momentof inertia [kg・m^2]	Mass [kg]
ETP-A-19-S	53	5000	90	80	8	0.044×10^{-3}	0.15
ETP-A-20-S	75	6000	90	80	8	0.042×10^{-3}	0.14
ETP-A-25-S	120	10000	90	80	8	0.065×10^{-3}	0.17
ETP-A-30-S	210	14000	90	80	8	0.12×10^{-3}	0.24
ETP-A-35-S	330	19000	90	80	8	0.22×10^{-3}	0.32
ETP-A-40-S	500	26000	90	80	8	0.37×10^{-3}	0.46
ETP-A-45-S	700	31000	90	80	13	0.56×10^{-3}	0.57
ETP-A-50-S	1000	40000	90	80	13	0.85×10^{-3}	0.72

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Dimensions





How to Place an Order

ETP-A-□-S

Size

Type (S: Short length specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-19-S	19	28	45	13	26	31	5.5	6.9	3-M5 × 12
ETP-A-20-S	20	28	45	15	28	33	5.5	6.4	3-M5 × 12
ETP-A-25-S	25	34	49	15	29	34	5.5	6.9	4-M5 × 12
ETP-A-30-S	30	41	57	20	34	39	5.5	6.9	4-M5 × 12
ETP-A-35-S	35	47	62.5	22	38	43	7	7.4	6-M5 × 14
ETP-A-40-S	40	53	70	25	42	47	7.5	8.4	6-M5 × 16
ETP-A-45-S	45	59	77	28	45	51	8	8.4	6-M6 × 16
ETP-A-50-S	50	65	83	26	45	51	8.5	9.4	6-M6 × 18

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.
* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

ETP-A R Types

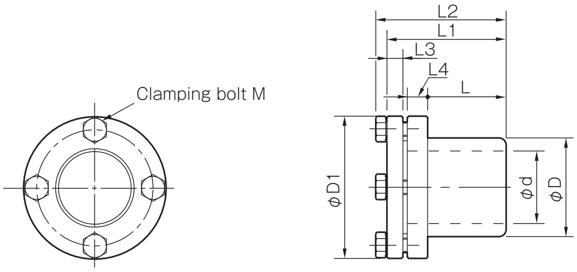
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure $[N/mm^2]$	Hub contact pressure $[N/mm^2]$	Tightening torque [N·m]	Moment of inertia $[kg·m^2]$	Mass [kg]
ETP-A-15-R	45	6000	90	70	4.5	0.018×10^{-3}	0.10
ETP-A-20-R	100	10000	90	70	4.5	0.046×10^{-3}	0.16
ETP-A-25-R	210	16800	90	70	4.5	0.071×10^{-3}	0.19
ETP-A-30-R	350	23300	90	70	4.5	0.142×10^{-3}	0.29
ETP-A-35-R	500	28500	90	70	4.5	0.250×10^{-3}	0.40
ETP-A-40-R	750	37500	90	70	4.5	0.441×10^{-3}	0.55
ETP-A-45-R	1100	48800	90	70	7.8	0.686×10^{-3}	0.71
ETP-A-50-R	1550	62000	90	70	7.8	1.045×10^{-3}	0.86

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Dimensions



CAD

How to Place an Order

ETP-A-□-R

Size

Type (R: Stainless steel specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-15-R	15	23	37.5	17	28	32	5	5.4	4-M5 × 10
ETP-A-20-R	20	28	45	22	36	40	5.5	6.4	5-M5 × 12
ETP-A-25-R	25	34	49	27	41	45	5.5	6.9	7-M5 × 12
ETP-A-30-R	30	41	57	32	46	50	5.3	6.9	7-M5 × 12
ETP-A-35-R	35	47	62.5	37	53	57	7	7.4	9-M5 × 14
ETP-A-40-R	40	53	70	43	60	64	8	8.4	9-M5 × 16
ETP-A-45-R	45	59	77	49	66	70	8	8.4	9-M6 × 16
ETP-A-50-R	50	65	83	53	72	76	8.5	9.4	9-M6 × 18

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.

* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

Items Checked for Design Purposes

Selection Procedure

(1) Selection is determined by the used shaft diameter. In general, find the torque, Ta, applied to the connecting element using the output capacity, P, of the driver and usage rotation speed, n. Next, obtain the thrust, Fa, applied to the connecting element.

$$\mathrm{Ta\ [N{\cdot}m]} = 9550 \times \frac{\mathrm{P\ [kW]}}{\mathrm{n\ [min^{-1}]}}$$

Ta: Torque applied to the connecting element [N･m]
P: Driver's output [kW]
n: Connecting element's rotation speed [min－1]
Fa: Thrust applied to the connecting element [N]

(2) Determine the service factor, K1, based on the load property and obtain the corrected torque, Td, and corrected thrust, Fd, applied to the connecting element.

$$\mathrm{Td} = \mathrm{Ta} \times \mathrm{K1}$$
$$\mathrm{Fd} = \mathrm{Fa} \times \mathrm{K1}$$

Td: Corrected torque applied to the connecting element [N･m]
Fd: Corrected thrust applied to the connecting element [N]
K1: Service factor based on the load property

(3) Correct the values according to the load property.

1. For the torque alone

Compare the connecting element's rated torque, T, based on the used diameter with the calculated corrected torque, Td.

$$\mathrm{T} \geqq \mathrm{Td}$$

T: Connecting element's rated torque [N･m]

2. For the thrust alone

Compare the connecting element's rated thrust, F, based on the used diameter with the calculated corrected thrust, Fd.

$$\mathrm{F} \geqq \mathrm{Fd}$$

F: Connecting element's rated thrust [N]

3. If torque and thrust are applied at the same time

Calculate the combined load, Mr, and compare the result with the rated torque, T.

$$\mathrm{T} \geqq \mathrm{Mr} \qquad \mathrm{Mr} = \sqrt{\mathrm{Td}^2 + \left(\mathrm{Fd} \times \frac{\mathrm{d}}{2}\right)^2}$$

Mr: Combined load applied to the connecting element [N･m] d: Shaft diameter [m]

(4) Obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter.

1. Obtain the hub's minimum external diameter based on the used hub material's strength.

$$\mathrm{DO} \geqq \mathrm{D}\sqrt{\frac{\delta_{0.2N} + \mathrm{CP_2}}{\delta_{0.2N} - \mathrm{CP_2}}}$$

$\mathrm{C} = 1 \quad \mathrm{B} = \mathrm{L}$
$\mathrm{C} = 0.8 \quad \mathrm{L} < \mathrm{B} < 2\mathrm{L}$
$\mathrm{C} = 0.6 \quad \mathrm{B} \geqq 2\mathrm{L}$

DO: Hub's minimum external diameter [mm]
D: Hub's internal diameter [mm]
P_2: Hub contact pressure [N/mm²]
$\delta_{0.2N}$: Hub material's yield stress [N/mm²]
B: Hub length [mm]
L: Effective contact length [mm]
C: Coefficient

If the hub material's yield stress value is large, make sure the ratio of the hub's minimum external diameter to the hub's internal diameter is more than about 1.3 times to prevent the hub's deformation.

2. Obtain the hollow shaft's maximum internal diameter based on the used hollow shaft material's strength.

$$\mathrm{di} \leqq \mathrm{d}\sqrt{\frac{\delta_{0.2N} - 2\mathrm{P_1C}}{\delta_{0.2N}}}$$

C = 0.6 when using a single one
C = 0.8 when using multiple ones

di: Hollow shaft's maximum internal diameter [mm]
$\delta_{0.2N}$: Hollow shaft material's yield stress [N/mm²]
P_1 : Shaft contact pressure [N/mm²]
d: Shaft diameter [mm]
C: Coefficient

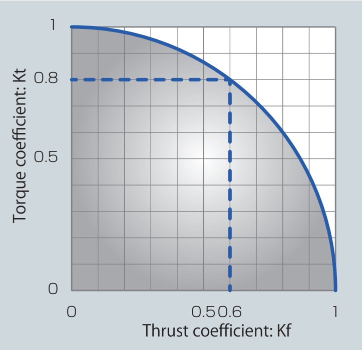
The shaft contact pressure and hub contact pressure vary depending on the operating temperature. You need to correct these values based on the operating temperature. Note that the contact pressure values were those measured at 20℃ . If the operating temperature exceeds 20℃ , obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter with the following formulas.

$$\mathrm{P_1 \cdot P_2} = \text{contact pressure at 20℃} \times \text{temperature coefficient (K2)}$$

The operating temperature range is from -30℃ to 85℃ .

Torque and Thrust Coefficients

If torque and thrust are applied to the ETP-CLASSIC at the same time, the rated values of both decrease. These values can be obtained based on the coefficients in the figure below.



Calculation example:
When using the ETP-A-30 at 20℃ .

Maximum rated torque (T) and thrust (F) at 20℃ ,
T = 340 [N･m] and
F = 23100 [N]. The maximum rated torque, Tmax, when the maximum thrust (Fmax = 14000 [N]) is applied can be obtained as follows.

$$\text{Thrust coefficient (Kf)} = \text{Fmax / F} \times \text{temperature coefficient (K2)}$$
$$= 14000/23100 \times 1.0 = 0.61$$

The torque coefficient, Kt, when Kf = 0.61 is about 0.8 based on the above figure. Accordingly, the maximum rated torque, Tmax, in this case is as follows.

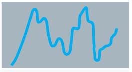
$$\mathrm{Tmax} = \mathrm{T} \times \mathrm{K2} \times \mathrm{Kt} = 340 \times 1.0 \times 0.8 = 272\ \mathrm{[N{\cdot}m]}$$

The relationship between Kt and Kf can be obtained from the following formula.

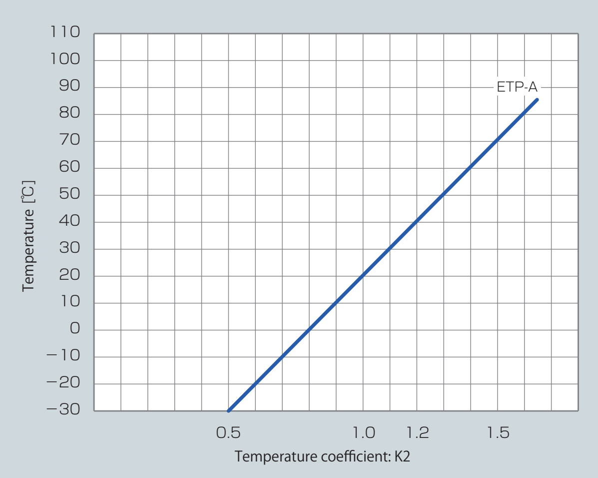
$$\sqrt{(\mathrm{Kt})^2 + (\mathrm{Kf})^2} = 1$$

Service Factor

■ Service factor based on the load property: K1

Load property	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K1	1.0	1.25	1.75	2.25

■ Service factor based on the operating temperature: K2



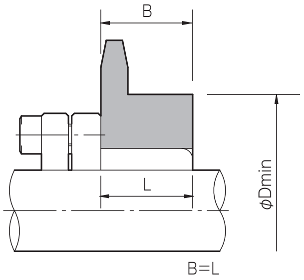
ETP-A Models

Items Checked for Design Purposes

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ ETP-A, ETP-A B, ETP-A C, ETP-A S



ø Dmin, unit [mm]

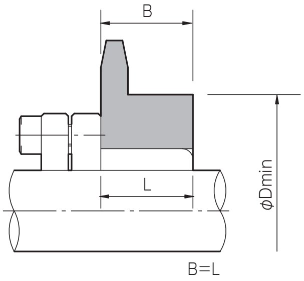
ETP-A ETP-A B ETP-A C ETP-A S size	Hub contact pressure [N/mm^2]	Material's yield stress $\delta_{0.2}$ [N /mm^2]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
15	80	42	37	35	33	32	31	31	30	30	30
19	80	51	46	42	41	39	38	37	37	37	37
20	80	51	46	42	41	39	38	37	37	37	37
22	80	58	52	48	46	45	43	42	42	42	42
24	80	62	55	51	49	48	46	45	45	45	45
25	80	62	55	51	49	48	46	45	45	45	45
28	80	71	63	59	56	55	53	52	51	51	51
30	80	75	67	62	59	58	55	54	54	54	54
32	80	78	70	65	62	60	58	57	56	56	56
35	80	86	76	71	68	66	63	62	62	62	62
38	80	91	81	75	72	70	67	66	65	65	65
40	80	96	86	80	77	74	72	70	69	69	69
42	80	100	89	83	79	77	74	73	72	72	72
45	80	107	96	89	85	83	80	78	77	77	77
48	80	113	100	93	90	87	84	82	81	81	81
50	80	118	105	97	94	91	88	86	85	85	85
55	80	129	115	106	102	99	96	94	93	93	93
60	80	140	125	115	111	108	104	102	101	101	101
65	80	153	136	126	121	117	113	111	110	110	110
70	80	164	146	135	130	126	121	119	117	117	117
75	80	173	154	142	137	133	128	125	124	124	124
80	80	182	162	150	144	140	135	132	130	130	130
90	80	203	181	168	161	156	151	148	146	146	146
100	80	227	202	187	180	175	168	165	163	163	163

* Hub contact pressure at an operating temperature of 20℃ . The contact pressure increases as the temperature rises.
* If the operating temperature exceeds 20℃ , you need to obtain the hub's minimum external diameter according to the selection procedure on P.217.
* The hub's minimum external diameter shows a value calculated based on C=1 in the selection procedure on P.217.
* The above SUS values are proof stress values (N/mm^2) after quenching and tempering.

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ ETP-A R



ø Dmin, unit [mm]

ETP-A R size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
15	70	39	35	33	32	31	30	30	30	30	30
20	70	47	43	40	39	38	37	37	37	37	37
25	70	57	52	49	47	46	45	45	45	45	45
30	70	68	62	58	57	55	54	54	54	54	54
35	70	78	71	67	65	63	62	62	62	62	62
40	70	88	80	75	73	71	69	69	69	69	69
45	70	98	89	84	81	79	77	77	77	77	77
50	70	108	98	92	90	87	85	85	85	85	85

* Hub contact pressure at an operating temperature of 20℃ . The contact pressure increases as the temperature rises.
* If the operating temperature exceeds 20℃ , you need to obtain the hub's minimum external diameter according to the selection procedure on P.217.
* The hub's minimum external diameter shows a value calculated based on C=1 in the selection procedure on P.217.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.

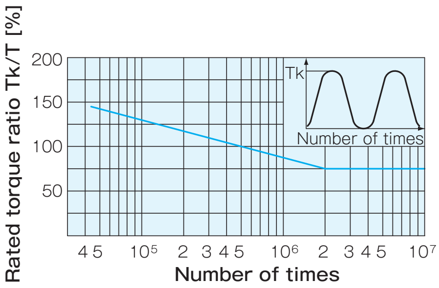
ETP-A Models

Items Checked for Design Purposes

Fatigue Caused by Periodically Applied Varying Torque

The following figure shows the fatigue state when a static varying torque, Tk, is applied periodically to the ETP-CLASSIC. The vertical axis shows the percentage of the rated torque, T, and the horizontal axis shows the number of periodically applied static varying torque events.

If the rated torque, T, is periodically applied to the ETP-CLASSIC, it can withstand about 500,000 events in terms of fatigue life. If 75% of the rated torque, T, is applied, it can withstand an unlimited number of events in terms of fatigue life.



Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

■ ETP-A

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-A-15	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-A-19 ～ 100	h8 ～ k6		

■ ETP-A B, C

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-A-15-B・C	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-A-19-B・C ～ 100-B・C	h8 ～ k6		

■ ETP-A S

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-A-19-S ～ 50-S	h8 ～ k6	H7	25S (center line's average roughness 6.3a) or less

■ ETP-A R

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-A-15-R	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-A-20-R ～ 50-R	h8		

Operating Temperature Range

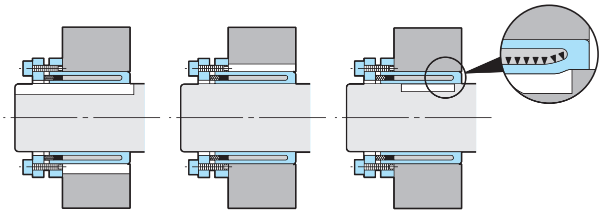
Model	Operating temperature range [° C]
ETP-A	− 30 ～ 85
ETP-A B	
ETP-A C	
ETP-A S	
ETP-A R	

Concentricity and Balance

Model	Concentricity [mm]	Balance [g-mm/kg]
ETP-A	0.05	100
ETP-A B		
ETP-A C		
ETP-A S		
ETP-A R		

Keyway Shape where the ETP-CLASSIC Cannot Be Detached due to a Deformation of the Sleeve

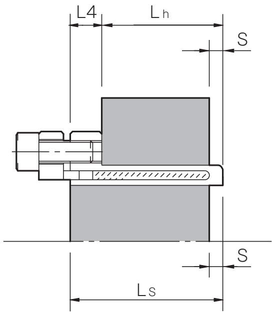
The ETP-CLASSIC cannot be used if the shaft and hub have a keyway as shown in the figure below. Note that you can use the ETP-CLASSIC for the shaft and hub with a keyway if you completely fill the keyway with epoxy putty for metals and then shape it.



Allowable Range of Edge

The performance of the ETP-CLASSIC is based on the case where the shaft and the hub have the effect for the entire standard shaft length, Ls, and the entire standard hub length, Lh, respectively. Accordingly, make sure in the design phase that the shaft and the hub have the effect for the respective entire standard length. If the length of the shaft and hub is limited due to design reasons, make sure it is less than the dimension S in the figure below. If it exceeds the dimension S, stress concentrates on the sleeve edge and the sleeve is deformed, so there is the possibility that the ETP-CLASSIC cannot be detached.

■ ETP-CLASSIC



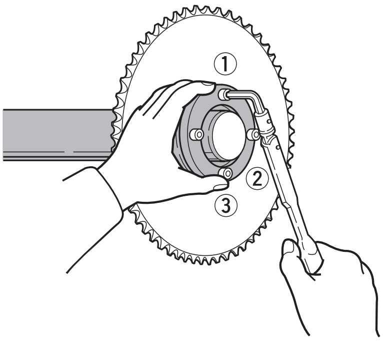
ETP-CLASSIC size	S [mm]
15	3
19	3.5
20	3.5
22	4
24	4
25	3.6
28	4.5
30	5
32	5
35	5.5
38	5.5
40	6
42	6
45	6.5
48	7
50	7
55	7.5
60	8
65	9
70	9.5
75	9.5
80	9.5
90	10.5
100	12.5

Mounting

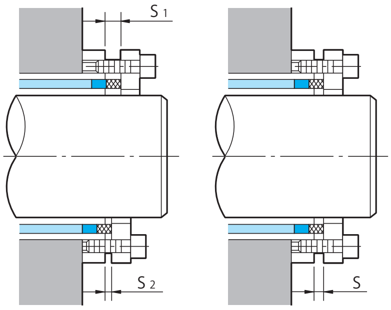
(1) Remove the rust, dust, oil, etc. off from the inner surface of the shaft and hub. Similarly, if any anti-rust oil, soiling, etc. remains on the surface of the ETP-CLASSIC, wipe it off with a cloth, etc.
In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.

(2) Attach the ETP-CLASSIC to the hub and mount them to the shaft. If accurate positioning of the shaft and hub is needed, adjust the position of both before tightening the clamping bolts.
Never tighten the clamping bolts before mounting the ETP-CLASSIC to the shaft and hub.

(3) Gently put a hand on the ETP-CLASSIC and tighten the clamping bolts one by one by a half turn in order of (1), (2), and (3) as shown in the figure. Tighten the clamping bolts for the ETP-CLASSIC to the specified torque using a torque wrench. Do not tighten the clamping bolt to a torque greater than the specified torque and then loosen the clamping bolt to the specified tightening torque. The clamping bolts of the ETP-A-R are made of stainless steel. Stainless steel can gall easily. Slowly tighten the stainless steel bolts to prevent galling.



(4) When the mounting is finished, check to make sure the spacing between the flange and sleeve is uniform. If the flange and the sleeve are in close contact with each other, the ETP-CLASSIC may not be able to achieve its full performance. In this case, re-check the shaft and hub tolerances and the material.

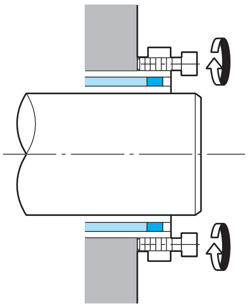


$| S1 - S2 | \leqq 0.3$　　$S > 0$

Removal

(1) Before starting work, ensure safety by making sure no torque and thrust are applied to the ETP-CLASSIC and there is no risk of a fall due to the self-weight of the shaft and hub. The ETP-CLASSIC does not have a self-locking mechanism. The connecting force is instantaneously released by loosening the clamping bolts.

(2) The clamping bolts should only be loosened until the connecting force is released. Do not remove them. If for any reason the ETP-CLASSIC cannot be removed, remove all the clamping bolts, flange, and piston ring, and then remove the ETP-CLASSIC using the sleeve's tapped holes as removal screw holes.



ETP-H Models

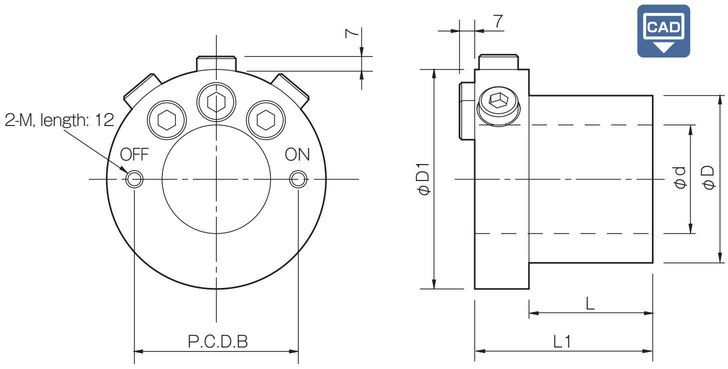
Made to order

Specifications

Model	Rated torque [N·m]						Rated thrust [N]						Moment of inertia [kg・m²]	Mass [kg]
	Oil pressure: 60 MPa		Oil pressure: 80 MPa		Oil pressure: 100 MPa		Oil pressure: 60 MPa		Oil pressure: 80 MPa		Oil pressure: 100 MPa			
	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8		
ETP-H-50	800	800	1600	1400	2600	2400	30000	30000	55000	55000	70000	70000	3.2×10^{-3}	2.4
ETP-H-60	1100	1100	3300	3000	4600	4300	60000	60000	100000	100000	130000	130000	5.4×10^{-3}	3.1
ETP-H-70	2400	2400	5800	5300	7900	7400	100000	95000	150000	150000	210000	200000	8.7×10^{-3}	4.1
ETP-H-80	5600	5300	9000	8400	12100	11500	150000	135000	220000	210000	290000	280000	14×10^{-3}	5.4
ETP-H-90	8300	7400	12700	11800	17100	16200	185000	165000	285000	265000	380000	360000	23×10^{-3}	7
ETP-H-100	12100	11000	18200	17100	24200	23100	245000	220000	365000	340000	485000	460000	34×10^{-3}	8.6
ETP-H-110	16800	15400	24800	23500	32900	31500	305000	280000	450000	430000	595000	570000	51×10^{-3}	11
ETP-H-120	22300	20600	32700	31100	43200	41600	370000	345000	545000	520000	720000	690000	76×10^{-3}	14
ETP-H-130	27200	24900	40500	38100	53800	51400	420000	385000	620000	590000	825000	790000	110×10^{-3}	17
ETP-H-140	35600	32900	52300	49600	68900	66200	510000	470000	750000	710000	985000	945000	150×10^{-3}	21
ETP-H-150	44500	41400	65000	61900	85400	82300	595000	550000	870000	825000	1135000	1095000	210×10^{-3}	25
ETP-H-160	54800	51200	79500	76000	104000	100000	685000	640000	995000	950000	1305000	1260000	290×10^{-3}	30
ETP-H-180	80000	75000	115000	110000	150000	146000	890000	835000	1280000	1220000	1675000	1625000	500×10^{-3}	42
ETP-H-200	109000	103000	157000	151000	206000	200000	1090000	1030000	1570000	1510000	2060000	2000000	830×10^{-3}	56
ETP-H-220	144000	137000	209000	201000	273000	266000	1310000	1245000	1900000	1830000	2485000	2415000	1300×10^{-3}	73

* The maximum rated torque values are those when the thrust is zero and the maximum rated thrust values are those when the torque is zero.

Dimensions



How to Place an Order

ETP-H-□

Size

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	P.C.D.B	M
ETP-H-50	50	77	101	57	82	75	M8
ETP-H-60	60	89	113	65	90	86	M8
ETP-H-70	70	102	122	75	100	96	M8
ETP-H-80	80	115	135	85	110	107	M8
ETP-H-90	90	128	148	95	120	124	M12
ETP-H-100	100	140	160	105	130	140	M12
ETP-H-110	110	154	173	115	140	150	M12
ETP-H-120	120	168	186	125	150	160	M12
ETP-H-130	130	182	200	135	160	175	M16
ETP-H-140	140	196	213	145	170	185	M16
ETP-H-150	150	210	227	155	180	195	M16
ETP-H-160	160	224	240	165	190	205	M16
ETP-H-180	180	252	267	185	210	223	M16
ETP-H-200	200	280	293	205	230	247	M16
ETP-H-220	220	308	320	225	250	280	M16

* The port (for connecting the radial thrust hose) is G1/8.

Items Checked for Design Purposes

Torque and Thrust Coefficients

If torque and thrust are applied to the ETP-HYLOC at the same time, the rated values of both decrease. These values can be obtained based on the coefficients in the figure below.

Calculation example: When using the ETP-H-100.

Maximum rated torque, T, and thrust, F, at 20℃ ,
T = 24200 [N･m] and F = 485000 [N]
The maximum rated torque, Tmax, when the maximum thrust (Fmax = 290000 [N]) is applied can be obtained as follows.

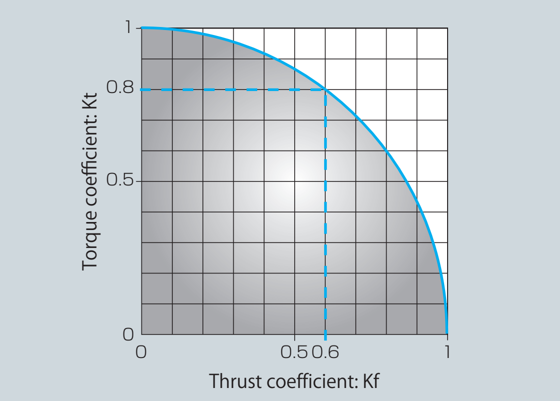
$$\text{Thrust coefficient: } Kf = Fmax / F$$
$$= 290000/485000 ≒ 0.6$$

The torque coefficient, Kt, when Kf ≒ 0.6 is about 0.8 based on the figure below. Accordingly, the maximum rated torque, Tmax, in this case is as follows.

$$Tmax = T \times Kt = 24200 \times 0.8 = 19360 \text{ [N·m]}$$

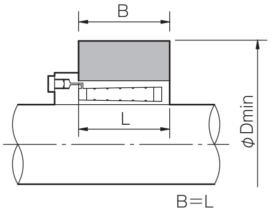
The relationship between Kt and Kf can be obtained with the following formula.

$$\sqrt{(Kt)^2 + (Kf)^2} = 1$$



Hub's Minimum External Diameters

If the stress applied to the hub is large, the hub may be deformed. Select the appropriate external diameter size from the hub's external diameters in the table below in the design phase.



ø Dmin, unit [mm]

Model	Material's yield stress [N/mm²]						
	Oil pressure: 60 MPa			Oil pressure: 80 MPa		Oil pressure: 100 MPa	
	> 200	> 300	> 400	> 300	> 400	> 300	> 400
ETP-H-50	90	90	90	95	90	110	105
ETP-H-60	115	105	95	120	110	140	125
ETP-H-70	135	120	110	140	125	170	145
ETP-H-80	155	140	130	165	140	200	160
ETP-H-90	180	160	145	185	160	235	180
ETP-H-100	200	170	160	210	180	270	200
ETP-H-110	220	195	180	235	195	295	220
ETP-H-120	240	215	195	255	215	320	240
ETP-H-130	260	230	210	275	230	350	260
ETP-H-140	285	250	225	295	250	375	280
ETP-H-150	300	265	240	315	265	400	300
ETP-H-160	320	285	260	335	285	425	320
ETP-H-180	360	320	290	375	320	480	360
ETP-H-200	400	355	320	420	355	535	400
ETP-H-220	440	390	355	460	390	585	435

ETP-H Model

Items Checked for Design Purposes

Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-H	h7 or h8	H7	25S (center line's average roughness 6.3a) or less

* Note that the maximum rated torque and the maximum rated thrust vary depending on the mounting shaft tolerance.

Operating Temperature Range

Model	Operating temperature range [° C]
ETP-H	− 40 ～ 150

Number of Attachments and Detachments

Model	No. of attachments/detachments
ETP-H	2000

Concentricity and Balance

Model	Concentricity [mm]	Balance [g·mm/kg]
ETP-H	0.02	75

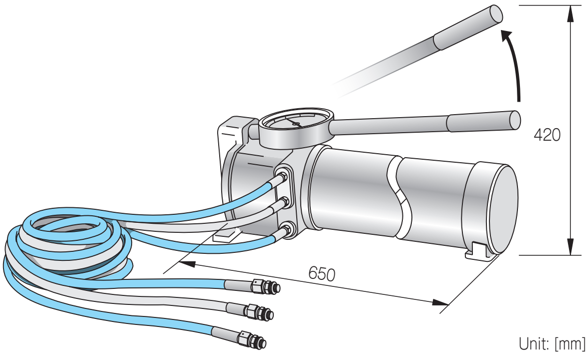
* If a steel plug is attached in the radial direction, the unbalance amount increases for size 100 or more.

Recommended Hydraulic Pump

To attach and detach the ETP-HYLOC, you need a pump capable of applying pressure of up to about 150 MPa and a hose that can withstand that pressure. Hand Pump (H-11) that meets these requirements is available (made to order). The Hand Pump (H-11) includes a 3 m-long hose that can be mounted directly.

In addition, Quick Connection (Type 02) is also available for applications where the hose is attached and detached frequently.

■ Hand Pump (H-11)



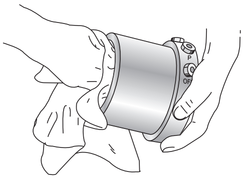
Unit: [mm]

■ Quick Connection (Type 02)

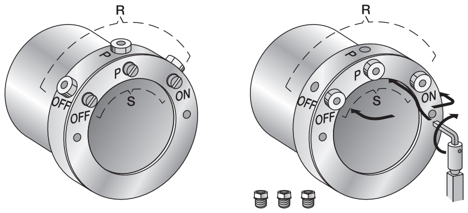
Mounting

(1) Remove the rust, dust, oil, etc. off from the inner surface of the shaft and hub. Similarly, if any anti-rust oil, soiling, etc. remains on the surface of the ETP-HYLOC, wipe it off with a cloth, etc.

In particular, never allow oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based), which would dramatically affect the friction coefficient, to contact the surface.



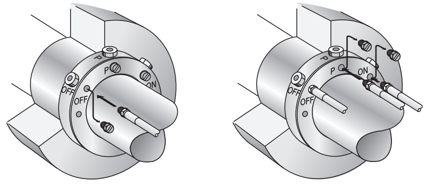
(2) The ETP-HYLOC is delivered with a plastic plug attached to it in the thrust direction (S). If you use it in the radial direction (R), remove 3 steel plugs and cover the thrust (S) port with a steel plug. (The width across the flat of the steel plug is 5 mm.)



Then, mount the ETP-HYLOC to the shaft and hub.

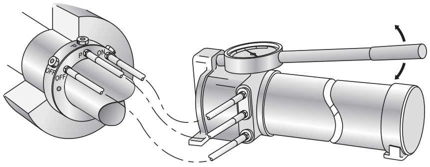
(3) Remove the plastic plug from the OFF port and connect the pump's return hose (black).

Remove the plastic plug from the ON/P port and connect the pump's pressure hose (blue).



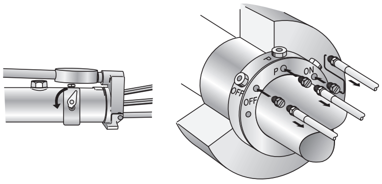
Never apply pressure before the ETP-HYLOC is mounted to the shaft and hub.

(4) Before applying pressure, check to make sure unused ports are covered by steel plugs. When the specified pressure is reached, keep the state for about 5 to 10 seconds. The specified pressure is 100 MPa.



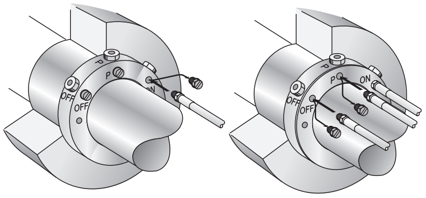
(5) Remove the hose from the ETP-HYLOC. Before removing it, open the pump's valve to relieve pressure from the pump.

After removing the hose, attach the plastic plug to prevent dust from entering inside the ETP-HYLOC.



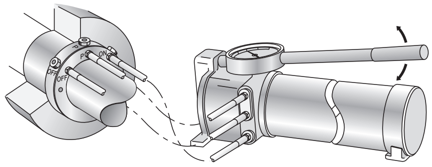
Removal

(1) Remove the plastic plug from the ON port and connect the pump's return hose (black).
Remove the plastic plug from the OFF/P port and connect the pump's pressure hose (blue).

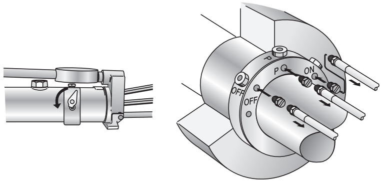


If the return hose is not connected to the ON port, the oil inside may spew out.

(2) Before applying pressure, check to make sure that unused ports are covered by steel plugs. When the specified pressure is reached, keep the state for about 10 seconds. (Check the pressure gage.) When the tapered piston moves, the pressure begins to decrease. Apply pressure slowly with the pump until the pressure begins to start to increase again. At this point, the ETP-HYLOC is completely released. The allowable pressure for removal is 120 MPa.



(3) Remove the hose from the ETP-HYLOC. Before removing it, open the pump's valve to relieve pressure from the pump.
After removing the hose, attach the plastic plug to prevent dust from entering inside the ETP-HYLOC.



Mechanical Shaft Lock

POSI-LOCK

Application	Machine tool, pump, molding machine, printing machine, palletizing robot, various jigs and tools

Connects the Shaft and Hub with the Wedging Action of the Tapered Surface

The shaft and hub are connected with the wedging action of the tapered surface. The machining tolerance of the shaft and hub is just the general fitting tolerance and no special finishing is needed. Compared to the key connection, high precision machining such as keyway machining is not needed, and the shaft and hub can be connected with high concentricity.

Available Models

Series	Models	Specification	Lineup
POSI-LOCK	Flange model	Standard	PSL-K
		Hexagon bolt	PSL-K B
		Simple rustproof	PSL-K C
		Stainless steel	PSL-K F
	Third party compatible model	Standard	PSL-G
		Simple rustproof	PSL-G C
	Medium load model	Standard	PSL-D
		Simple rustproof	PSL-D C

Model Selection

Model/Type	Main body material	Surface finishing	Applied shaft diameter [mm]	Max. rated torque [N • m]	Max. rated thrust [N]	Operating temperature [℃]
PSL-K	S45C refined or equivalent	—	6 ～ 42	750	36000	−40 ～ 150
PSL-K B	S45C refined or equivalent	—	6 ～ 42	750	36000	−40 ～ 150
PSL-K C	S45C refined or equivalent	Electroless nickel plating	6 ～ 42	750	36000	−40 ～ 150
PSL-K F	SUS304 or an equivalent	—	6 ～ 35	504	28800	−40 ～ 150
PSL-G	S45C refined or equivalent	—	19 ～ 120	13500	225000	−40 ～ 150
PSL-G C	S45C refined or equivalent	Electroless nickel plating	19 ～ 60	2810	93600	−40 ～ 150
PSL-D	S45C refined or equivalent	—	6 ～ 50	1760	70300	−40 ～ 150
PSL-D C	S45C refined or equivalent	Electroless nickel plating	16 ～ 50	1760	70300	−40 ～ 150

Product Lineup

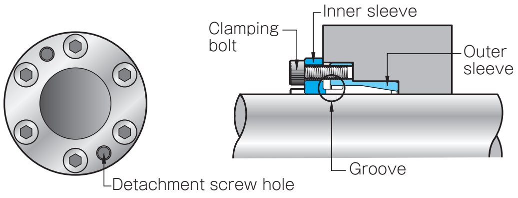
PSL-K

The sleeve's internal/external diameter ratio is small. The mounting part's diameter as well as the moment of inertia can be reduced. The mechanism is simple and high concentricity can be maintained.

Max. rated torque	[N·m]	750
Max. rated thrust	[N]	36000
Applied shaft diameter	[mm]	6～42
Operating temperature	[℃]	−40～150

Operating Principle

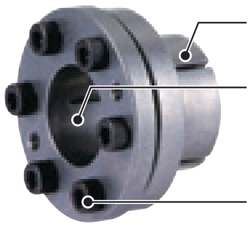
Tightening the clamping bolt moves the outer sleeve in the shaft direction. At this point, the wedge action of the tapered surface with the inner sleeve generates a force to press the inner surface of the shaft and hub and this force connects the shaft and hub completely. The groove of the inner sleeve increases the wedge effect so a high transmission torque can be obtained.



Variations and Materials

PSL-K

Standard type of the PSL-K model.



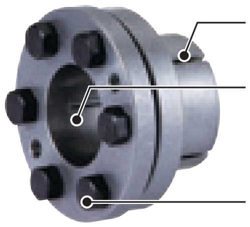
Outer sleeve material:
S45C tempered or an equivalent

Inner sleeve material:
S45C tempered or an equivalent

Clamping bolt material:
Alloy steel for machine structural use
Surface finishing: Black coating

PSL-K B

A hexagon bolt is used for the clamping bolt so the device can be mounted even in tight space in the thrust direction.



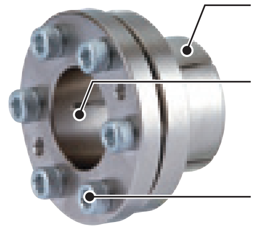
Outer sleeve material:
S45C tempered or an equivalent

Inner sleeve material:
S45C tempered or an equivalent

Clamping bolt material:
Alloy steel for machine structural use
Surface finishing: Black coating

PSL-K C

The main body is electroless nickel coated (simple rustproof finishing).



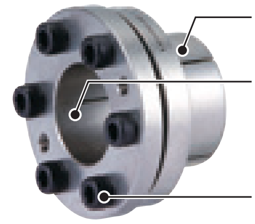
Outer sleeve material:
S45C tempered or an equivalent
Surface finishing: Electroless nickel plating

Inner sleeve material:
S45C tempered or an equivalent
Surface finishing: Electroless nickel plating

Clamping bolt material:
Alloy steel for machine structural use
Surface finishing: Antirust film coating

PSL-K F

The main body is made of stainless material (rustproof coating).



Outer sleeve material:
SUS304 or an equivalent

Inner sleeve material:
SUS304 or an equivalent

Clamping bolt material:
SUH660 or an equivalent
Surface finishing: Solid film lubricant coating

*A special coating is applied to the clamping bolt to stabilize the shaft force.

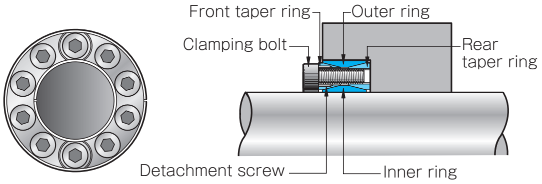
PSL-G

A simple structure and rigid parts provide uniform transmission and can withstand heavy load. A short shaft direction length saves space.

Max. rated torque	[N·m]	13500
Max. rated thrust	[N]	225000
Applied shaft diameter	[mm]	19 ～ 120
Operating temperature	[℃]	－40 ～ 150

Operating Principle

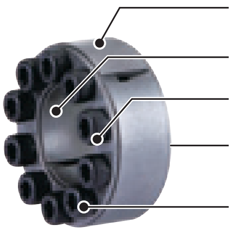
Tightening the clamping bolt moves the 2 tapered rings in the shaft direction. At this point, the outer ring and the inner ring independently generate a force to press the inner surface of the shaft and hub due to the wedge action of the tapered surface and this force connects the shaft and hub completely.



Variations and Materials

PSL-G

Standard type of the PLS-G model.



Outer ring material:
S45C tempered or an equivalent

Inner ring material:
S45C tempered or an equivalent

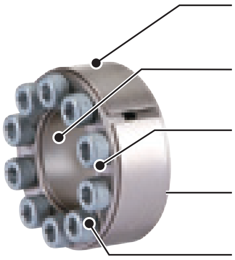
Front taper ring material:
S45C tempered or an equivalent

Rear taper ring material:
S45C tempered or an equivalent

Clamping bolt material:
Alloy steel for machine structural use
Surface finishing: Black coating

PSL-G C

The main body is electroless nickel coated (simple rustproof finishing).



Outer ring material:
S45C tempered or an equivalent
Surface finishing: Electroless nickel plating

Inner ring material:
S45C tempered or an equivalent
Surface finishing: Electroless nickel plating

Front taper ring material:
S45C tempered or an equivalent
Surface finishing: Electroless nickel plating

Rear taper ring material:
S45C tempered or an equivalent
Surface finishing: Electroless nickel plating

Clamping bolt material:
Alloy steel for machine structural use
Surface finishing: Antirust film coating

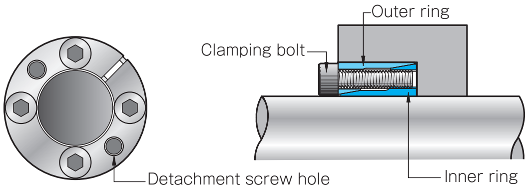
PSL-D

This is designed for a medium load. The contact pressure is small and the mounting diameter and mass can be reduced. A short shaft direction length saves space.

Max. rated torque	[N·m]	1760
Max. rated thrust	[N]	70300
Applied shaft diameter	[mm]	6 ～ 50
Operating temperature	[℃]	－40 ～ 150

Operating Principle

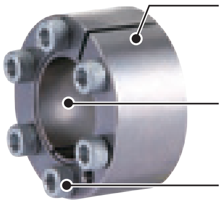
Tightening the clamping bolt moves the outer ring in the shaft direction. At this point, the wedge action of the tapered surface with the inner sleeve generates a force to press the inner surface of the shaft and hub and this force connects the shaft and hub completely.



Variations and Materials

PSL-D

Standard type of the PSL-D model.



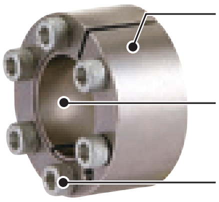
Outer ring material:
S45C tempered or an equivalent

Inner ring material:
S45C tempered or an equivalent

Clamping bolt material:
Alloy steel for machine structural use
Surface finishing:
Antirust film coating Black coating (Size 6 to 15)

PSL-D C

The main body is electroless nickel coated (simple rustproof finishing).



Outer ring material:
S45C tempered or an equivalent
Surface finishing: Electroless nickel plating

Inner ring material:
S45C tempered or an equivalent
Surface finishing: Electroless nickel plating

Clamping bolt material:
Alloy steel for machine structural use
Surface finishing: Antirust film coating

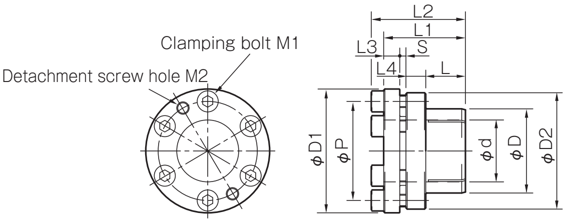
PSL-K Models

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm^2]	Hub contact pressure [N/mm^2]	Tightening torque [N·m]	Moment of inertia [kg·m^2]	Mass [kg]
PSL-K-6	5.9	1950	160	80	2	2.5×10^{-6}	0.037
PSL-K-6.35	6.2	1950	150	80	2	2.5×10^{-6}	0.036
PSL-K-7	6.8	1950	130	80	2	2.5×10^{-6}	0.035
PSL-K-8	23	5900	290	160	4	5.0×10^{-6}	0.056
PSL-K-9	26	5900	260	160	4	5.0×10^{-6}	0.053
PSL-K-9.525	28	5900	250	130	4	7.8×10^{-6}	0.069
PSL-K-10	29	5900	230	130	4	7.7×10^{-6}	0.068
PSL-K-11	32	5900	210	130	4	7.6×10^{-6}	0.065
PSL-K-12	47	7800	260	160	4	10×10^{-6}	0.076
PSL-K-12.7	50	7800	250	140	4	10×10^{-6}	0.073
PSL-K-14	55	7800	220	140	4	13×10^{-6}	0.083
PSL-K-15	95	12700	290	190	8	24×10^{-6}	0.125
PSL-K-16	100	12700	270	180	8	27×10^{-6}	0.130
PSL-K-17	110	12700	260	170	8	33×10^{-6}	0.145
PSL-K-18	110	12700	240	170	8	32×10^{-6}	0.140
PSL-K-19	120	12700	230	160	8	40×10^{-6}	0.155
PSL-K-20	130	12700	220	160	8	39×10^{-6}	0.150
PSL-K-22	210	19000	250	170	8	65×10^{-6}	0.210
PSL-K-24	230	19000	230	160	8	76×10^{-6}	0.220
PSL-K-25	240	19000	220	160	8	75×10^{-6}	0.210
PSL-K-28	380	27000	220	160	14	203×10^{-6}	0.390
PSL-K-30	400	27000	210	150	14	230×10^{-6}	0.400
PSL-K-32	430	27000	190	140	14	260×10^{-6}	0.425
PSL-K-35	630	36000	210	150	14	366×10^{-6}	0.525
PSL-K-38	680	35700	210	160	14	426×10^{-6}	0.580
PSL-K-40	720	36000	160	120	14	511×10^{-6}	0.599
PSL-K-42	750	35700	170	130	14	561×10^{-6}	0.657

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



How to Place an Order

PSL-K-□

Size

Old model ETP - K - □

Unit [mm]

Model	d	D	D1	D2	P	L	L1	L2	L3	L4	S	M1	M2
PSL-K-6	6	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-6.35	6.35	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-7	7	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-8	8	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9	9	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9.525	9.525	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-10	10	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-11	11	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-12	12	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-12.7	12.7	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-14	14	22	35	33	27	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-15	15	23	39	36	29	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-16	16	24	40	37	30	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-17	17	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-18	18	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-19	19	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-20	20	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-22	22	32	48	45	38	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-24	24	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-25	25	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-28	28	39	62	59	47	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-30	30	41	64	61	49	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-32	32	43	66	63	51	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-35	35	47	70	67	55	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-38	38	50	73	70	58	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-40	40	53	76	73	61	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-42	42	55	78	75	63	22	43	49	8	10	3	8-M6 × 18	2-M6

* L1, L2, and S are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

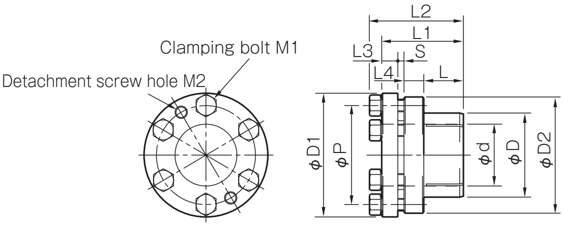
PSL-K B Types

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-K-6-B	5.9	1950	160	80	2	2.5×10^{-6}	0.037
PSL-K-6.35-B	6.2	1950	150	80	2	2.5×10^{-6}	0.036
PSL-K-7-B	6.8	1950	130	80	2	2.5×10^{-6}	0.035
PSL-K-8-B	23	5900	290	160	4	5.0×10^{-6}	0.056
PSL-K-9-B	26	5900	260	160	4	5.0×10^{-6}	0.053
PSL-K-9.525-B	28	5900	250	130	4	7.8×10^{-6}	0.069
PSL-K-10-B	29	5900	230	130	4	7.7×10^{-6}	0.068
PSL-K-11-B	32	5900	210	130	4	7.6×10^{-6}	0.065
PSL-K-12-B	47	7800	260	160	4	10×10^{-6}	0.076
PSL-K-12.7-B	50	7800	250	140	4	10×10^{-6}	0.073
PSL-K-14-B	55	7800	220	140	4	13×10^{-6}	0.083
PSL-K-15-B	95	12700	290	190	8	24×10^{-6}	0.125
PSL-K-16-B	100	12700	270	180	8	27×10^{-6}	0.130
PSL-K-17-B	110	12700	260	170	8	33×10^{-6}	0.145
PSL-K-18-B	110	12700	240	170	8	32×10^{-6}	0.140
PSL-K-19-B	120	12700	230	160	8	40×10^{-6}	0.155
PSL-K-20-B	130	12700	220	160	8	39×10^{-6}	0.150
PSL-K-22-B	210	19000	250	170	8	65×10^{-6}	0.210
PSL-K-24-B	230	19000	230	160	8	76×10^{-6}	0.220
PSL-K-25-B	240	19000	220	160	8	75×10^{-6}	0.210
PSL-K-28-B	380	27000	220	160	14	203×10^{-6}	0.390
PSL-K-30-B	400	27000	210	150	14	230×10^{-6}	0.400
PSL-K-32-B	430	27000	190	140	14	260×10^{-6}	0.425
PSL-K-35-B	630	36000	210	150	14	366×10^{-6}	0.525
PSL-K-38-B	680	35700	210	160	14	426×10^{-6}	0.580
PSL-K-40-B	720	36000	160	120	14	511×10^{-6}	0.599
PSL-K-42-B	750	35700	170	130	14	561×10^{-6}	0.657

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-K-□-B

Size

Type (B: Hexagon head bolt specifications)

Old model ETP - K - □ - B

Unit [mm]

Model	d	D	D1	D2	P	L	L1	L2	L3	L4	S	M1	M2
PSL-K-6-B	6	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-6.35-B	6.35	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-7-B	7	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-8-B	8	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9-B	9	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9.525-B	9.525	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-10-B	10	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-11-B	11	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-12-B	12	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-12.7-B	12.7	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-14-B	14	22	35	33	27	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-15-B	15	23	39	36	29	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-16-B	16	24	40	37	30	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-17-B	17	26	42	39	32	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-18-B	18	26	42	39	32	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-19-B	19	28	44	41	34	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-20-B	20	28	44	41	34	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-22-B	22	32	48	45	38	16	33	37.5	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-24-B	24	34	50	47	40	16	33	37.5	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-25-B	25	34	50	47	40	16	33	37.5	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-28-B	28	39	62	59	47	20	39	44	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-30-B	30	41	64	61	49	20	39	44	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-32-B	32	43	66	63	51	20	39	44	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-35-B	35	47	70	67	55	22	43	48	8	10	3	8-M6 × 18	2-M6
PSL-K-38-B	38	50	73	70	58	22	43	48	8	10	3	8-M6 × 18	2-M6
PSL-K-40-B	40	53	76	73	61	22	43	48	8	10	3	8-M6 × 18	2-M6
PSL-K-42-B	42	55	78	75	63	22	43	48	8	10	3	8-M6 × 18	2-M6

* L1, L2, and S are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

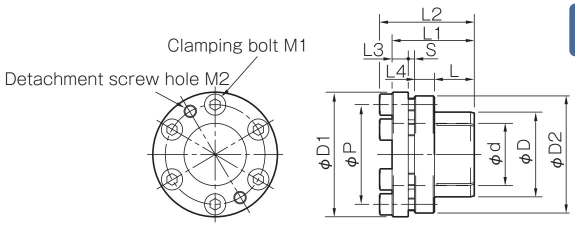
PSL-K C Types

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm^2]	Hub contact pressure [N/mm^2]	Tightening torque [N·m]	Moment of inertia [kg·m^2]	Mass [kg]
PSL-K-6-C	5.9	1950	160	80	2	2.5×10^{-6}	0.037
PSL-K-6.35-C	6.2	1950	150	80	2	2.5×10^{-6}	0.036
PSL-K-7-C	6.8	1950	130	80	2	2.5×10^{-6}	0.035
PSL-K-8-C	23	5900	290	160	4	5.0×10^{-6}	0.056
PSL-K-9-C	26	5900	260	160	4	5.0×10^{-6}	0.053
PSL-K-9.525-C	28	5900	250	130	4	7.8×10^{-6}	0.069
PSL-K-10-C	29	5900	230	130	4	7.7×10^{-6}	0.068
PSL-K-11-C	32	5900	210	130	4	7.6×10^{-6}	0.065
PSL-K-12-C	47	7800	260	160	4	10×10^{-6}	0.076
PSL-K-12.7-C	50	7800	250	140	4	10×10^{-6}	0.073
PSL-K-14-C	55	7800	220	140	4	13×10^{-6}	0.083
PSL-K-15-C	95	12700	290	190	8	24×10^{-6}	0.125
PSL-K-16-C	100	12700	270	180	8	27×10^{-6}	0.130
PSL-K-17-C	110	12700	260	170	8	33×10^{-6}	0.145
PSL-K-18-C	110	12700	240	170	8	32×10^{-6}	0.140
PSL-K-19-C	120	12700	230	160	8	40×10^{-6}	0.155
PSL-K-20-C	130	12700	220	160	8	39×10^{-6}	0.150
PSL-K-22-C	210	19000	250	170	8	65×10^{-6}	0.210
PSL-K-24-C	230	19000	230	160	8	76×10^{-6}	0.220
PSL-K-25-C	240	19000	220	160	8	75×10^{-6}	0.210
PSL-K-28-C	380	27000	220	160	14	203×10^{-6}	0.390
PSL-K-30-C	400	27000	210	150	14	230×10^{-6}	0.400
PSL-K-32-C	430	27000	190	140	14	260×10^{-6}	0.425
PSL-K-35-C	630	36000	210	150	14	366×10^{-6}	0.525
PSL-K-38-C	680	35700	210	160	14	426×10^{-6}	0.580
PSL-K-40-C	720	36000	160	120	14	511×10^{-6}	0.599
PSL-K-42-C	750	35700	170	130	14	561×10^{-6}	0.657

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



How to Place an Order

PSL-K-□-C
Size
Type (C: Simple antirust specifications)

Old model ETP - K - □ - C

Unit [mm]

Model	d	D	D1	D2	P	L	L1	L2	L3	L4	S	M1	M2
PSL-K-6-C	6	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-6.35-C	6.35	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-7-C	7	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-8-C	8	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9-C	9	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9.525-C	9.525	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-10-C	10	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-11-C	11	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-12-C	12	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-12.7-C	12.7	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-14-C	14	22	35	33	27	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-15-C	15	23	39	36	29	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-16-C	16	24	40	37	30	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-17-C	17	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-18-C	18	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-19-C	19	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-20-C	20	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-22-C	22	32	48	45	38	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-24-C	24	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-25-C	25	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-28-C	28	39	62	59	47	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-30-C	30	41	64	61	49	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-32-C	32	43	66	63	51	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-35-C	35	47	70	67	55	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-38-C	38	50	73	70	58	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-40-C	40	53	76	73	61	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-42-C	42	55	78	75	63	22	43	49	8	10	3	8-M6 × 18	2-M6

* L1, L2, and S are dimensions before the POS-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

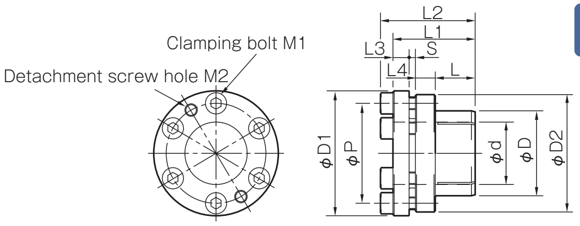
PSL-K F Types

Specifications

Model	Rated torque [N·m]	Rated thrust (N)	Shaft contact pressure [N/mm^2]	Hub contact pressure [N/mm^2]	Tightening torque [N·m]	Moment of inertia [kg·m^2]	Mass [kg]
PSL-K-6-F	4.7	1560	120	60	2	2.5×10^{-6}	0.037
PSL-K-6.35-F	4.9	1560	120	60	2	2.5×10^{-6}	0.036
PSL-K-7-F	5.4	1560	100	60	2	2.5×10^{-6}	0.035
PSL-K-8-F	18	4720	230	120	3.5	5.0×10^{-6}	0.056
PSL-K-9-F	20	4720	200	120	3.5	5.0×10^{-6}	0.053
PSL-K-9.525-F	22	4720	200	100	3.5	7.8×10^{-6}	0.069
PSL-K-10-F	23	4720	180	100	3.5	7.7×10^{-6}	0.068
PSL-K-11-F	25	4720	160	100	3.5	7.6×10^{-6}	0.065
PSL-K-12-F	37	6240	200	120	3.5	10×10^{-6}	0.076
PSL-K-12.7-F	40	6240	200	110	3.5	10×10^{-6}	0.073
PSL-K-14-F	44	6240	170	110	3.5	13×10^{-6}	0.083
PSL-K-15-F	76	10160	230	150	7	24×10^{-6}	0.125
PSL-K-16-F	80	10160	210	140	7	27×10^{-6}	0.130
PSL-K-17-F	88	10160	200	130	7	33×10^{-6}	0.145
PSL-K-18-F	88	10160	190	130	7	32×10^{-6}	0.140
PSL-K-19-F	96	10160	180	120	7	40×10^{-6}	0.155
PSL-K-20-F	104	10160	170	120	7	39×10^{-6}	0.150
PSL-K-22-F	168	15200	200	130	7	65×10^{-6}	0.210
PSL-K-24-F	184	15200	180	120	7	76×10^{-6}	0.220
PSL-K-25-F	192	15200	170	120	7	75×10^{-6}	0.210
PSL-K-28-F	304	21600	170	120	12	203×10^{-6}	0.390
PSL-K-30-F	320	21600	160	120	12	230×10^{-6}	0.400
PSL-K-32-F	344	21600	150	110	12	260×10^{-6}	0.425
PSL-K-35-F	504	28800	160	120	12	366×10^{-6}	0.525

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-K-□-F

Size

Type (F: Stainless-steel specification)

Old model ETP - K - □ - F

Unit [mm]

Model	d	D	D1	D2	P	L	L1	L2	L3	L4	S	M1	M2
PSL-K-6-F	6	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-6.35-F	6.35	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-7-F	7	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-8-F	8	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9-F	9	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9.525-F	9.525	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-10-F	10	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-11-F	11	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-12-F	12	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-12.7-F	12.7	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-14-F	14	22	35	33	27	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-15-F	15	23	39	36	29	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-16-F	16	24	40	37	30	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-17-F	17	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-18-F	18	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-19-F	19	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-20-F	20	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-22-F	22	32	48	45	38	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-24-F	24	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-25-F	25	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-28-F	28	39	62	59	47	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-30-F	30	41	64	61	49	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-32-F	32	43	66	63	51	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-35-F	35	47	70	67	55	22	43	49	8	10	3	8-M6 × 18	2-M6

* L1, L2, and S are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

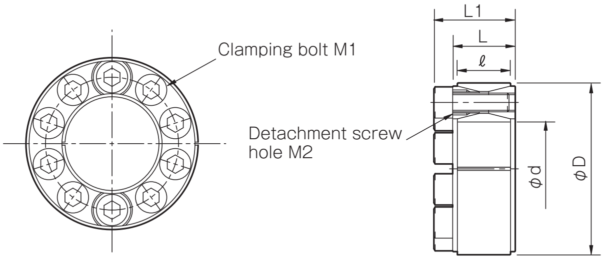
PSL-G Models

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-G-19	289	30500	250	101	17	0.70×10^{-4}	0.22
PSL-G-20	305	30500	238	101	17	0.70×10^{-4}	0.21
PSL-G-22	335	30500	216	101	17	0.69×10^{-4}	0.20
PSL-G-24	411	34300	223	107	17	0.89×10^{-4}	0.23
PSL-G-25	428	34300	214	107	17	0.88×10^{-4}	0.22
PSL-G-28	533	38100	212	108	17	1.28×10^{-4}	0.26
PSL-G-30	571	38100	198	108	17	1.25×10^{-4}	0.25
PSL-G-32	731	45700	223	119	17	1.80×10^{-4}	0.30
PSL-G-35	800	45700	204	119	17	1.74×10^{-4}	0.28
PSL-G-38	1020	53500	220	129	17	2.43×10^{-4}	0.34
PSL-G-40	1070	53500	209	129	17	2.37×10^{-4}	0.32
PSL-G-42	1680	80200	253	142	41	5.26×10^{-4}	0.56
PSL-G-45	1800	80200	236	142	41	5.11×10^{-4}	0.53
PSL-G-48	1920	80200	222	133	41	6.51×10^{-4}	0.59
PSL-G-50	2010	80200	213	133	41	6.36×10^{-4}	0.56
PSL-G-55	2570	93600	226	146	41	8.01×10^{-4}	0.62
PSL-G-60	2810	93600	207	138	41	9.68×10^{-4}	0.65
PSL-G-65	3090	95000	194	133	41	12.8×10^{-4}	0.77
PSL-G-70	4800	137000	218	138	82	28.3×10^{-4}	1.34
PSL-G-75	5160	138000	203	132	82	32.9×10^{-4}	1.40
PSL-G-80	5510	138000	190	127	82	37.9×10^{-4}	1.46
PSL-G-85	6500	153000	199	135	82	44.3×10^{-4}	1.56
PSL-G-90	6880	153000	188	130	82	50.4×10^{-4}	1.62
PSL-G-95	7940	167000	195	137	82	56.6×10^{-4}	1.67
PSL-G-100	10100	202000	205	142	142	91.4×10^{-4}	2.36
PSL-G-110	11100	202000	187	133	142	113.9×10^{-4}	2.53
PSL-G-120	13500	225000	190	138	142	142.7×10^{-4}	2.74

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



How to Place an Order

PSL-G-□

Size

Old model ETP - G - □

Unit [mm]

Model	d	D	L	ℓ	L1	M1	M2
PSL-G-19	19	47	20	17	26	8-M6 × 18	2-M8
PSL-G-20	20	47	20	17	26	8-M6 × 18	2-M8
PSL-G-22	22	47	20	17	26	8-M6 × 18	2-M8
PSL-G-24	24	50	20	17	26	8-M6 × 18	2-M8
PSL-G-25	25	50	20	17	26	8-M6 × 18	2-M8
PSL-G-28	28	55	20	17	26	10-M6 × 18	2-M8
PSL-G-30	30	55	20	17	26	10-M6 × 18	2-M8
PSL-G-32	32	60	20	17	26	12-M6 × 18	2-M8
PSL-G-35	35	60	20	17	26	12-M6 × 18	2-M8
PSL-G-38	38	65	20	17	26	14-M6 × 18	2-M8
PSL-G-40	40	65	20	17	26	14-M6 × 18	2-M8
PSL-G-42	42	75	24	20	32	12-M8 × 22	2-M10
PSL-G-45	45	75	24	20	32	12-M8 × 22	2-M10
PSL-G-48	48	80	24	20	32	12-M8 × 22	2-M10
PSL-G-50	50	80	24	20	32	12-M8 × 22	2-M10
PSL-G-55	55	85	24	20	32	14-M8 × 22	2-M10
PSL-G-60	60	90	24	20	32	14-M8 × 22	2-M10
PSL-G-65	65	95	24	20	32	16-M8 × 22	3-M10
PSL-G-70	70	110	28	24	38	14-M10 × 25	3-M12
PSL-G-75	75	115	28	24	38	14-M10 × 25	3-M12
PSL-G-80	80	120	28	24	38	14-M10 × 25	3-M12
PSL-G-85	85	125	28	24	38	16-M10 × 25	3-M12
PSL-G-90	90	130	28	24	38	16-M10 × 25	3-M12
PSL-G-95	95	135	28	24	38	18-M10 × 25	3-M12
PSL-G-100	100	145	33	26	45	14-M12 × 30	3-M14
PSL-G-110	110	155	33	26	45	14-M12 × 30	3-M14
PSL-G-120	120	165	33	26	45	16-M12 × 30	3-M14

* L and L1 are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.
* Screw hole M2 for removal purpose is indicated with a tool mark for sizes 19 to 60 and indicated by marking the head of the bolt with paint for sizes 65 or more.

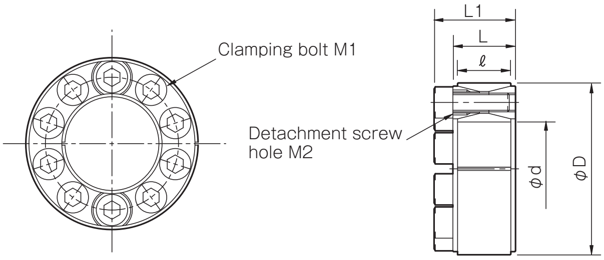
PSL-G C Types

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-G-19-C	289	30500	250	101	17	0.70×10^{-4}	0.22
PSL-G-20-C	305	30500	238	101	17	0.70×10^{-4}	0.21
PSL-G-22-C	335	30500	216	101	17	0.69×10^{-4}	0.20
PSL-G-24-C	411	34300	223	107	17	0.89×10^{-4}	0.23
PSL-G-25-C	428	34300	214	107	17	0.88×10^{-4}	0.22
PSL-G-28-C	533	38100	212	108	17	1.28×10^{-4}	0.26
PSL-G-30-C	571	38100	198	108	17	1.25×10^{-4}	0.25
PSL-G-32-C	731	45700	223	119	17	1.80×10^{-4}	0.30
PSL-G-35-C	800	45700	204	119	17	1.74×10^{-4}	0.28
PSL-G-38-C	1020	53500	220	129	17	2.43×10^{-4}	0.34
PSL-G-40-C	1070	53500	209	129	17	2.37×10^{-4}	0.32
PSL-G-42-C	1680	80200	253	142	41	5.26×10^{-4}	0.56
PSL-G-45-C	1800	80200	236	142	41	5.11×10^{-4}	0.53
PSL-G-48-C	1920	80200	222	133	41	6.51×10^{-4}	0.59
PSL-G-50-C	2010	80200	213	133	41	6.36×10^{-4}	0.56
PSL-G-55-C	2570	93600	226	146	41	8.01×10^{-4}	0.62
PSL-G-60-C	2810	93600	207	138	41	9.68×10^{-4}	0.65

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-G-□-C

Size

Type (C: Simple antirust specifications)

Old model ETP - G - □ - C

Unit [mm]

Model	d	D	L	ℓ	L1	M1	M2
PSL-G-19-C	19	47	20	17	26	8-M6 × 18	2-M8
PSL-G-20-C	20	47	20	17	26	8-M6 × 18	2-M8
PSL-G-22-C	22	47	20	17	26	8-M6 × 18	2-M8
PSL-G-24-C	24	50	20	17	26	8-M6 × 18	2-M8
PSL-G-25-C	25	50	20	17	26	8-M6 × 18	2-M8
PSL-G-28-C	28	55	20	17	26	10-M6 × 18	2-M8
PSL-G-30-C	30	55	20	17	26	10-M6 × 18	2-M8
PSL-G-32-C	32	60	20	17	26	12-M6 × 18	2-M8
PSL-G-35-C	35	60	20	17	26	12-M6 × 18	2-M8
PSL-G-38-C	38	65	20	17	26	14-M6 × 18	2-M8
PSL-G-40-C	40	65	20	17	26	14-M6 × 18	2-M8
PSL-G-42-C	42	75	24	20	32	12-M8 × 22	2-M10
PSL-G-45-C	45	75	24	20	32	12-M8 × 22	2-M10
PSL-G-48-C	48	80	24	20	32	12-M8 × 22	2-M10
PSL-G-50-C	50	80	24	20	32	12-M8 × 22	2-M10
PSL-G-55-C	55	85	24	20	32	14-M8 × 22	2-M10
PSL-G-60-C	60	90	24	20	32	14-M8 × 22	2-M10

* L and L1 are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

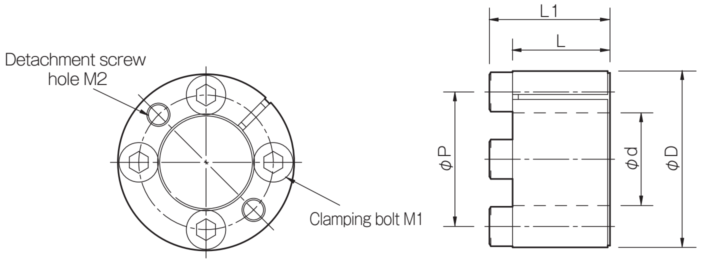
PSL-D Models

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm^2]	Hub contact pressure [N/mm^2]	Tightening torque [N·m]	Moment of inertia [kg·m^2]	Mass [kg]
PSL-D-6	6	2100	150	60	1	0.48×10^{-6}	0.012
PSL-D-7	8	2100	140	60	1	0.52×10^{-6}	0.013
PSL-D-8	10	2600	110	50	1	0.77×10^{-6}	0.015
PSL-D-9	15	3200	130	60	1	1.1×10^{-6}	0.020
PSL-D-10	16	3200	110	60	1	1.2×10^{-6}	0.019
PSL-D-11	17	3200	100	50	1	1.8×10^{-6}	0.024
PSL-D-12	19	3200	100	50	1	1.7×10^{-6}	0.022
PSL-D-14	34	4800	100	50	2	4.3×10^{-6}	0.039
PSL-D-15	36	4800	90	50	2	5.7×10^{-6}	0.044
PSL-D-16	67	8400	130	60	4	10×10^{-6}	0.068
PSL-D-17	70	8400	120	60	4	18×10^{-6}	0.093
PSL-D-18	75	8400	110	60	4	17×10^{-6}	0.090
PSL-D-19	80	8400	110	60	4	16×10^{-6}	0.085
PSL-D-20	140	13600	150	80	8	24×10^{-6}	0.120
PSL-D-22	150	13600	140	80	8	29×10^{-6}	0.130
PSL-D-24	230	19300	150	80	14	70×10^{-6}	0.220
PSL-D-25	240	19300	140	80	14	69×10^{-6}	0.210
PSL-D-28	400	28900	190	110	14	86×10^{-6}	0.240
PSL-D-30	430	28900	180	100	14	128×10^{-6}	0.270
PSL-D-32	460	28900	170	100	14	123×10^{-6}	0.260
PSL-D-35	670	38600	160	90	14	215×10^{-6}	0.370
PSL-D-38	730	38600	150	90	14	298×10^{-6}	0.420
PSL-D-40	770	38600	140	90	14	286×10^{-6}	0.410
PSL-D-42	1110	52700	150	80	34	682×10^{-6}	0.700
PSL-D-45	1200	52700	140	80	34	609×10^{-6}	0.630
PSL-D-48	1690	70300	190	110	34	769×10^{-6}	0.730
PSL-D-50	1760	70300	180	110	34	742×10^{-6}	0.710

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



How to Place an Order

PSL-D-☐

Size

Old model ETP - D - ☐

Unit [mm]

Model	d	D	P	L	L1	M1	M2
PSL-D-6	6	16	11	11	13.5	3-M2.5 × 10	2-M2.5
PSL-D-7	7	17	12	11	13.5	3-M2.5 × 10	2-M2.5
PSL-D-8	8	18	13	11	13.5	3-M2.5 × 10	2-M2.5
PSL-D-9	9	20	15	13	15.5	4-M2.5 × 12	2-M2.5
PSL-D-10	10	20	15	13	15.5	4-M2.5 × 12	2-M2.5
PSL-D-11	11	22	17	13	15.5	4-M2.5 × 12	2-M2.5
PSL-D-12	12	22	17	13	15.5	4-M2.5 × 12	2-M2.5
PSL-D-14	14	26	20	17	20	4-M3 × 16	2-M3
PSL-D-15	15	28	21.5	17	20	4-M3 × 16	2-M3
PSL-D-16	16	32	24	17	21	4-M4 × 16	2-M4
PSL-D-17	17	35	27	21	25	4-M4 × 20	2-M4
PSL-D-18	18	35	27	21	25	4-M4 × 20	2-M4
PSL-D-19	19	35	27	21	25	4-M4 × 20	2-M4
PSL-D-20	20	38	29	21	26	4-M5 × 20	2-M5
PSL-D-22	22	40	31	21	26	4-M5 × 20	2-M5
PSL-D-24	24	47	36	26	32	4-M6 × 25	2-M6
PSL-D-25	25	47	36	26	32	4-M6 × 25	2-M6
PSL-D-28	28	50	39	26	32	6-M6 × 25	2-M6
PSL-D-30	30	55	43.5	26	32	6-M6 × 25	2-M6
PSL-D-32	32	55	43.5	26	32	6-M6 × 25	2-M6
PSL-D-35	35	60	47.5	31	37	8-M6 × 30	2-M6
PSL-D-38	38	65	52.5	31	37	8-M6 × 30	2-M6
PSL-D-40	40	65	52.5	31	37	8-M6 × 30	2-M6
PSL-D-42	42	75	60	36	44	6-M8 × 35	2-M8
PSL-D-45	45	75	60	36	44	6-M8 × 35	2-M8
PSL-D-48	48	80	65	36	44	8-M8 × 35	2-M8
PSL-D-50	50	80	65	36	44	8-M8 × 35	2-M8

* L and L1 are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

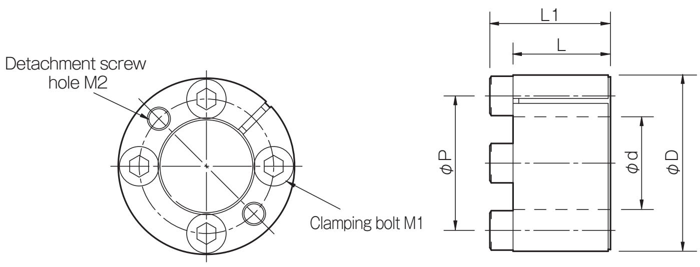
PSL-D C Types

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-D-16-C	67	8400	130	60	4	10×10^{-6}	0.068
PSL-D-17-C	70	8400	120	60	4	18×10^{-6}	0.093
PSL-D-18-C	75	8400	110	60	4	17×10^{-6}	0.090
PSL-D-19-C	80	8400	110	60	4	16×10^{-6}	0.085
PSL-D-20-C	140	13600	150	80	8	24×10^{-6}	0.120
PSL-D-22-C	150	13600	140	80	8	29×10^{-6}	0.130
PSL-D-24-C	230	19300	150	80	14	70×10^{-6}	0.220
PSL-D-25-C	240	19300	140	80	14	69×10^{-6}	0.210
PSL-D-28-C	400	28900	190	110	14	86×10^{-6}	0.240
PSL-D-30-C	430	28900	180	100	14	128×10^{-6}	0.270
PSL-D-32-C	460	28900	170	100	14	123×10^{-6}	0.260
PSL-D-35-C	670	38600	160	90	14	215×10^{-6}	0.370
PSL-D-38-C	730	38600	150	90	14	298×10^{-6}	0.420
PSL-D-40-C	770	38600	140	90	14	286×10^{-6}	0.410
PSL-D-42-C	1110	52700	180	110	34	682×10^{-6}	0.700
PSL-D-45-C	1200	52700	140	80	34	609×10^{-6}	0.630
PSL-D-48-C	1690	70300	190	110	34	769×10^{-6}	0.730
PSL-D-50-C	1760	70300	180	110	34	742×10^{-6}	0.710

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-D-□-C

Size

Type (C: Simple antirust specifications)

Old model ETP - D - □ - C

Unit [mm]

Model	d	D	P	L	L1	M1	M2
PSL-D-16-C	16	32	24	17	21	4-M4 × 16	2-M4
PSL-D-17-C	17	35	27	21	25	4-M4 × 20	2-M4
PSL-D-18-C	18	35	27	21	25	4-M4 × 20	2-M4
PSL-D-19-C	19	35	27	21	25	4-M4 × 20	2-M4
PSL-D-20-C	20	38	29	21	26	4-M5 × 20	2-M5
PSL-D-22-C	22	40	31	21	26	4-M5 × 20	2-M5
PSL-D-24-C	24	47	36	26	32	4-M6 × 25	2-M6
PSL-D-25-C	25	47	36	26	32	4-M6 × 25	2-M6
PSL-D-28-C	28	50	39	26	32	6-M6 × 25	2-M6
PSL-D-30-C	30	55	43.5	26	32	6-M6 × 25	2-M6
PSL-D-32-C	32	55	43.5	26	32	6-M6 × 25	2-M6
PSL-D-35-C	35	60	47.5	31	37	8-M6 × 30	2-M6
PSL-D-38-C	38	65	52.5	31	37	8-M6 × 30	2-M6
PSL-D-40-C	40	65	52.5	31	37	8-M6 × 30	2-M6
PSL-D-42-C	42	75	60	36	44	6-M8 × 35	2-M8
PSL-D-45-C	45	75	60	36	44	6-M8 × 35	2-M8
PSL-D-48-C	48	80	65	36	44	8-M8 × 35	2-M8
PSL-D-50-C	50	80	65	36	44	8-M8 × 35	2-M8

* L and L1 are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

PSL-K/PSL-G/PSL-D Models

Items Checked for Design Purposes

Selection Procedure

(1) Selection is determined by the used shaft diameter. In general, find the torque, Ta, applied to the connecting element using the output capacity, P, of the driver and usage rotation speed, n. Next, obtain the thrust, Fa, applied to the connecting element.

$$\mathrm{Ta\,[N\cdot m]} = 9550 \times \frac{\mathrm{P\,[kW]}}{\mathrm{n\,[min^{-1}]}}$$

Ta: Torque applied to the connecting element [N・m]
P: Driver's output [kW]
n: Connecting element's rotation speed [min^{-1}]
Fa: Thrust applied to the connecting element [N]

(2) Determine the service factor, K1, based on the load property and obtain the corrected torque, Td, and corrected thrust, Fd, applied to the connecting element.

$$\mathrm{Td} = \mathrm{Ta} \times \mathrm{K1}$$
$$\mathrm{Fd} = \mathrm{Fa} \times \mathrm{K1}$$

Td: Corrected torque applied to the connecting element [N・m]
Fd: Corrected thrust applied to the connecting element [N]
K1: Service factor based on the load property

(3) Correct the values according to the load property.

1. For the torque alone

Compare the connecting element's rated torque, T, based on the used diameter with the calculated corrected torque, Td.

$$\mathrm{T} \geqq \mathrm{Td}$$

T: Connecting element's rated torque [N・m]

2. For the thrust alone

Compare the connecting element's rated thrust, F, based on the used diameter with the calculated corrected thrust, Fd.

$$\mathrm{F} \geqq \mathrm{Fd}$$

F: Connecting element's rated thrust [N]

3. If torque and thrust are applied at the same time

Calculate the combined load, Mr, and compare the result with the rated torque, T.

$$\mathrm{Mr} = \sqrt{\mathrm{Td}^2 + \left(\mathrm{Fd} \times \frac{\mathrm{d}}{2}\right)^2}$$

$$\mathrm{T} \geqq \mathrm{Mr}$$

Mr: Combined load applied to the connecting element [N・m]
d: Shaft diameter [m]

(4) Obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter.

1. Obtain the hub's minimum external diameter based on the used hub material's strength.

$$\mathrm{DO} \geqq \mathrm{D}\sqrt{\frac{\delta_{0.2N} + \mathrm{CP}_2}{\delta_{0.2N} - \mathrm{CP}_2}}$$

$\mathrm{C} = 1 \quad \mathrm{B} = \mathrm{L}$
$\mathrm{C} = 0.8 \quad \mathrm{L} < \mathrm{B} < 2\mathrm{L}$
$\mathrm{C} = 0.6 \quad \mathrm{B} \geqq 2\mathrm{L}$

DO: Hub's minimum external diameter [mm]
D : Hub's internal diameter [mm]
P_2 : Hub contact pressure [N/mm^2]
$\delta_{0.2N}$: Hub material's yield stress [N/mm^2]
B : Hub length [mm]
L : Effective contact length [mm]
C : Coefficient

If the hub material's yield stress value is large, make sure the ratio of the hub's minimum external diameter to the hub's internal diameter is more than about 1.3 times to prevent the hub's deformation.

2.Obtain the hollow shaft's maximum internal diameter based on the used hollow shaft material's strength.

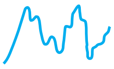
$$\mathrm{di} \leqq \mathrm{d}\sqrt{\frac{\delta_{0.2N} - 2\mathrm{P}_1\mathrm{C}}{\delta_{0.2N}}}$$

C = 0.6 when using a single one
C = 0.8 when using multiple ones

di : Hollow shaft's maximum internal diameter [mm]
$\delta_{0.2N}$: Hollow shaft material's yield stress [N/mm^2]
P_1 : Shaft contact pressure [N/mm^2]
d: Shaft diameter [mm]
C: Coefficient

Service Factors

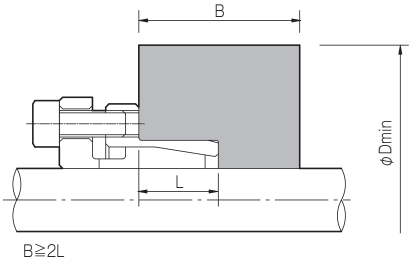
■ Service factor based on the load property: K1

Load property	Constant	Fluctuation: Small	Fluctuation: Medium	Fluctuation: Large
				
K1	1.0	1.25	1.75	2.25

Hub’s Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ PSL-K/PSL-K B/PSL-K C/PSL-K F



ø Dmin, unit [mm]

PSL-K PSL-K B PSL-K C (PSL-K F) size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 (N/mm²)									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
6	80 (60)	17 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)
6.35	80 (60)	17 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)
7	80 (60)	17 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)
8	160 (120)	32 (25)	27 (23)	25 (21)	23 (21)	22 (20)	21 (20)	21 (20)	20 (20)	20 (20)	20 (20)
9	160 (120)	32 (25)	27 (23)	25 (21)	23 (21)	22 (20)	21 (20)	21 (20)	20 (20)	20 (20)	20 (20)
9.525	130 (100)	32 (27)	29 (25)	27 (24)	26 (24)	25 (24)	24 (24)	24 (24)	24 (24)	24 (24)	24 (24)
10	130 (100)	32 (27)	29 (25)	27 (24)	26 (24)	25 (24)	24 (24)	24 (24)	24 (24)	24 (24)	24 (24)
11	130 (100)	32 (27)	29 (25)	27 (24)	26 (24)	25 (24)	24 (24)	24 (24)	24 (24)	24 (24)	24 (24)
12	160 (120)	43 (34)	36 (31)	33 (29)	31 (28)	30 (27)	29 (26)	28 (26)	27 (26)	26 (26)	26 (26)
12.7	140 (110)	38 (32)	33 (29)	31 (28)	29 (27)	28 (26)	27 (26)	27 (26)	26 (26)	26 (26)	26 (26)
14	140 (110)	41 (35)	36 (32)	34 (30)	32 (30)	31 (29)	30 (29)	29 (29)	29 (29)	29 (29)	29 (29)
15	190 (150)	62 (46)	49 (40)	42 (36)	40 (35)	38 (34)	35 (32)	34 (31)	32 (30)	31 (30)	30 (30)
16	180 (140)	59 (45)	48 (40)	42 (37)	40 (35)	38 (34)	36 (33)	35 (32)	33 (32)	32 (32)	32 (32)
17	170 (130)	60 (46)	49 (41)	44 (38)	42 (37)	40 (36)	38 (35)	37 (34)	35 (34)	34 (34)	34 (34)
18	170 (130)	60 (46)	49 (41)	44 (38)	42 (37)	40 (36)	38 (35)	37 (34)	35 (34)	34 (34)	34 (34)
19	160 (120)	60 (47)	51 (43)	46 (40)	44 (39)	42 (38)	40 (37)	39 (37)	37 (37)	37 (37)	37 (37)
20	160 (120)	60 (47)	51 (43)	46 (40)	44 (39)	42 (38)	40 (37)	39 (37)	37 (37)	37 (37)	37 (37)
22	170 (130)	73 (57)	61 (51)	54 (47)	52 (46)	49 (44)	47 (43)	46 (42)	43 (42)	42 (42)	42 (42)
24	160 (120)	73 (57)	62 (52)	56 (49)	53 (47)	51 (46)	49 (45)	47 (45)	45 (45)	45 (45)	45 (45)
25	160 (120)	73 (57)	62 (52)	56 (49)	53 (47)	51 (46)	49 (45)	47 (45)	45 (45)	45 (45)	45 (45)
28	160 (120)	83 (66)	71 (60)	64 (56)	61 (54)	58 (52)	56 (51)	54 (51)	52 (51)	51 (51)	51 (51)
30	150 (120)	82 (69)	71 (63)	65 (59)	62 (57)	60 (55)	57 (54)	56 (54)	54 (54)	54 (54)	54 (54)
32	140 (110)	81 (69)	71 (63)	66 (60)	63 (58)	61 (56)	59 (56)	57 (56)	56 (56)	56 (56)	56 (56)
35	150 (120)	94 (79)	81 (72)	74 (67)	71 (65)	69 (63)	66 (62)	64 (62)	62 (62)	62 (62)	62 (62)
38	160	107	91	82	78	75	71	70	66	65	65
40	120	89	81	76	73	71	69	69	69	69	69
42	130	98	87	81	78	76	73	72	72	72	72

* The hub's minimum external diameter shows a value calculated based on C=0.6 in the selection procedure on P.238.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.
* The values in parentheses are those of PSL-KF.

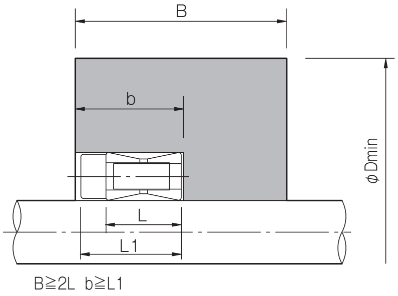
PSL-K/PSL-G/PSL-D Models

Items Checked for Design Purposes

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ PSL-G/PSL-G-C



ø Dmin, unit [mm]

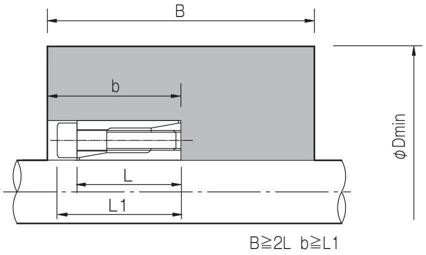
PSL-G PSL-G C size	Hub contact pressure [N/mm²]	Material's yield stress $\delta_{0.2}$ [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
19	101	72	67	63	62	62	62	62	62	62	62
20	101	72	67	63	62	62	62	62	62	62	62
22	101	72	67	63	62	62	62	62	62	62	62
24	107	79	73	69	67	65	65	65	65	65	65
25	107	79	73	69	67	65	65	65	65	65	65
28	108	87	80	76	73	72	72	72	72	72	72
30	108	87	80	76	73	72	72	72	72	72	72
32	119	101	91	85	83	80	78	78	78	78	78
35	119	101	91	85	83	80	78	78	78	78	78
38	129	115	103	96	92	90	86	85	85	85	85
40	129	115	103	96	92	90	86	85	85	85	85
42	142	143	125	115	111	107	103	100	98	98	98
45	142	143	125	115	111	107	103	100	98	98	98
48	133	145	129	119	115	111	107	105	104	104	104
50	133	145	129	119	115	111	107	105	104	104	104
55	146	166	145	133	127	123	117	117	117	117	117
60	138	168	148	137	131	127	122	119	117	117	117
65	133	172	153	142	136	132	127	125	124	124	124
70	138	205	181	167	160	155	149	146	143	143	143
75	132	207	184	171	165	160	154	151	150	150	150
80	127	210	189	176	169	164	159	156	156	156	156
85	135	229	203	188	181	175	168	165	163	163	163
90	130	231	207	192	185	180	173	170	169	169	169
95	137	250	221	204	196	190	183	179	176	176	176
100	142	276	243	223	214	207	199	194	189	189	189
110	133	280	250	231	223	216	208	204	202	202	202
120	138	307	271	250	241	233	224	219	215	215	215

* The hub's minimum external diameter shows a value calculated based on C=0.6 in the selection procedure on P.238.
* The above SUS values are proof stress values [N/mm²] after quenching and tempering.

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ PSL-D/PSL-D C



ø Dmin, unit [mm]

PSL-D PSL-D C size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
6	60	21	21	21	21	21	21	21	21	21	21
7	60	23	23	23	23	23	23	23	23	23	23
8	50	24	24	24	24	24	24	24	24	24	24
9	60	26	26	26	26	26	26	26	26	26	26
10	60	26	26	26	26	26	26	26	26	26	26
11	50	29	29	29	29	29	29	29	29	29	29
12	50	29	29	29	29	29	29	29	29	29	29
14	50	34	34	34	34	34	34	34	34	34	34
15	50	37	37	37	37	37	37	37	37	37	37
16	60	42	42	42	42	42	42	42	42	42	42
17	60	46	46	46	46	46	46	46	46	46	46
18	60	46	46	46	46	46	46	46	46	46	46
19	60	46	46	46	46	46	46	46	46	46	46
20	80	53	50	50	50	50	50	50	50	50	50
22	80	56	53	52	52	52	52	52	52	52	52
24	80	65	62	62	62	62	62	62	62	62	62
25	80	65	62	62	62	62	62	62	62	62	62
28	110	80	73	69	67	66	65	65	65	65	65
30	100	84	78	74	72	72	72	72	72	72	72
32	100	84	78	74	72	72	72	72	72	72	72
35	90	87	82	78	78	78	78	78	78	78	78
38	90	95	89	85	85	85	85	85	85	85	85
40	90	95	89	85	85	85	85	85	85	85	85
42	80	105	99	98	98	98	98	98	98	98	98
45	80	105	99	98	98	98	98	98	98	98	98
48	110	128	118	111	107	105	104	104	104	104	104
50	110	128	118	111	107	105	104	104	104	104	104

* The hub's minimum external diameter shows a value calculated based on C=0.6 in the selection procedure on P.238.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.

PSL-K/PSL-G/PSL-D Models

Items Checked for Design Purposes

Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

■ PSL-K

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
PSL-K	h8	H7	12.5S (center line's average roughness 3.2a) or less
PSL-K B			
PSL-K C			
PSL-K F			

■ PSL-G

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
PSL-G	h9	H8	12.5S (center line's average roughness 3.2a) or less
PSL-G C			

■ PSL-D

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
PSL-D	h9	H9	12.5S (center line's average roughness 3.2a) or less
PSL-D C			

Operating Temperature Range

■ PSL-K

Model	Operating temperature range [℃]
PSL-K	− 40 ～ 150
PSL-K B	
PSL-K C	
PSL-K F	

■ PSL-G

Model	Operating temperature range [℃]
PSL-G	− 40 ～ 150
PSL-G C	

■ PSL-D

Model	Operating temperature range [℃]
PSL-D	− 40 ～ 150
PSL-D C	

When the Shaft Has a Keyway

When the shaft of a motor or speed reducer has a keyway, the PSL-D can be used if the keyway width meets the JIS standard, but the rated torque and rated thrust decrease 10% to 15%.

Bending Moment

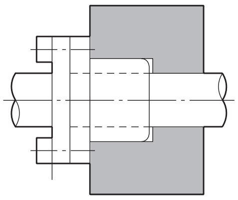
In principle, the POSI-LOCK does not allow a bending moment.

Centering Mechanism

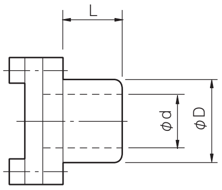
The POSI-LOCK does not have a centering mechanism. Accordingly, if you need accurate concentricity and runout, provide a centering mechanism. A centering mechanism brings the shaft in direct contact with part of the hub to control the concentricity and runout amount (see Figure A).

The accuracy by centering is determined by the centering length (the contact length of the shaft and the hub) and the fit tolerance. It is generally thought that the centering length (the contact length of the shaft and the hub) should be longer than the shaft diameter (see Figure B).

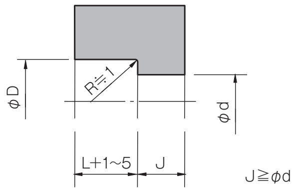
■ Figure A: Centering mechanism



■ PSL dimension series numbers



■ Figure B: Hub machining dimensions



The concentricity and runout accuracy by the centering mechanism is determined by the machining dimensions of the shaft and the hub. In other words, there is the possibility that the hub is inclined by a gap between the shaft's external diameter and the hub's internal diameter of the centering part. Accordingly, the shaft and the hub must be machined so that the concentricity and runout accuracy are within the desired values. Note that the concentricity and runout accuracy by the centering mechanisms can be calculated with the following formula.

● Maximum runout accuracy:
Ea (the runout is measured at the radius r)

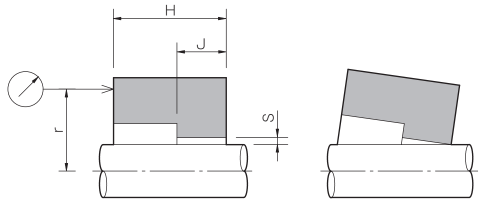
$Ea \fallingdotseq 2 \times r \times S/J$

S = [(hub's machining size) - (shaft's machining size)]/2

● Maximum concentricity runout: Eb

$Eb \fallingdotseq H \times S/J$

■ Runout by the centering mechanism



J: Centering length (contact length of the shaft and the hub)
r: Measurement position of the runout accuracy
H: Overall length of the hub

Items Checked for Design Purposes

Mounting

(1) Remove the rust, dust, oil, etc. completely off the internal surface of the shaft and hub, and apply oil or grease to coat it thinly.

(2) Wipe the rust-proof oil and dirt off the surface of the POSI-LOCK (the outer sleeve's (ring's) external surface and inner sleeve's (ring's) internal surface) using a cloth, etc. Do not disassemble or wipe any other parts.

(3) Apply only oil or grease to the internal surface of the shaft and hub that does not contain antifriction agent, and never use any oil or grease containing antifriction or other agent (molybdenum-, silicon-, or fluorine-based) which would dramatically affect the friction coefficient. If unsure about oil or grease selection, consult Miki Pulley.

(4) Mount the POSI-LOCK to the shaft and hub, lightly tighten the clamping bolts so that the parts slightly contact each other, and then perform positioning.

At this point, never tighten the clamping bolts before mounting the POSI-LOCK to the shaft and hub.

(5) Tighten the clamping bolts.

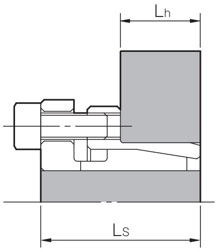
・For PSL-K/PSL-D
Increase tightening on diagonally opposed clamping bolts evenly. After that, tighten all the clamping bolts to the specified torque using a torque wrench. Because the PSL-K F clamping bolts are coated with a solid lubricant film, do not apply lubricants such as oil or grease to the clamping bolts when tightening them.

・For PSL-G
The PSL-G has many clamping bolts compared with other POSI-LOCK models, so tighten diagonally opposed clamping bolts evenly about four times to the specified torque. (If you tighten a bolt four times, tighten it so that the torque will increase about 25% every time.) Finally, tighten all the clamping bolts again to the specified torque. To prevent the bolts from coming loose after tightening them, check the tightening torque again after operating for a certain period of time.

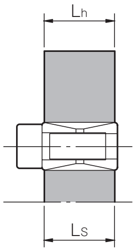
Standard Dimensions of the Shaft and the Hub

The performance of the POSI-LOCK is based on the case where the shaft and the hub have the effect for the entire standard shaft length (Ls) and the entire standard hub length (Lh), respectively. Accordingly, make sure in the design phase that the shaft and the hub have the effect for the respective entire standard length.

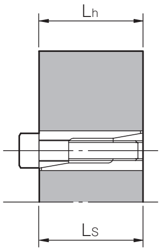
■ PSL-K



■ PSL-G



■ PSL-D



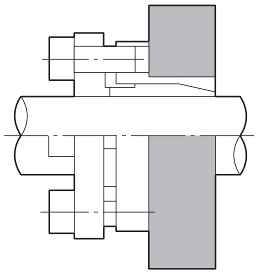
■ POSI-LOCK standard dimension series numbers

Model	Nominal standard dimensions	Dimensional drawing symbols
PSL-K	Shaft's standard dimension Ls	L1
	Hub's standard dimension Lh	L
PSL-G	Shaft's standard dimension Ls	ℓ
	Hub's standard dimension Lh	ℓ
PSL-D	Shaft's standard dimension Ls	L
	Hub's standard dimension Lh	L

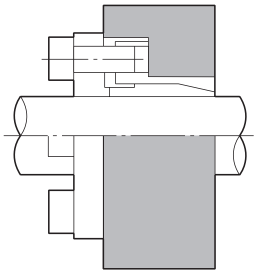
Hub's Movement in the Axial Direction

For the PSL-K and PSL-D models, mount the shaft and hub and then tighten the bolts. The hub will be slightly drawn and moved in the shaft direction. Special attention is required to mount it in the axial direction with high accuracy. However, if the hub is mounted as shown in Figure 1 for the PSL-K, tightening the bolt moves the hub (outer sleeve) slightly in the shaft direction. On the other hand, mounting the hub as shown in Figure 2 eliminates the movement in the shaft direction. In this case, the torque, thrust, and contact pressure decrease to 70% of the specified values.

■ Figure 1



■ Figure 2



Removal

(1) Before starting work, ensure safety by making sure no torque and thrust are applied to the POSI-LOCK and there is no risk of a fall due to the self-weight of the shaft and hub. The POSI-LOCK does not have a self-locking mechanism. The connecting force is instantaneously released by loosening the clamping bolts.

(2) Remove it.

・For PSL-K/PSL-D

The PSL-K or PSL-D model may not be removed by loosening the clamping bolts, because it is self-locked depending on the conditions. Never remove it forcibly, because the shaft, hub, and main body may be damaged. To remove it, first loosen the clamping bolts to open a gap between the flange and the clamping bolt bearing surface. (About a 2-mm gap is sufficient.) Then insert a bolt into the threaded hole for removal to release the connection. Normally one removal screw is enough to remove the device. If the device cannot be moved, use two screws.

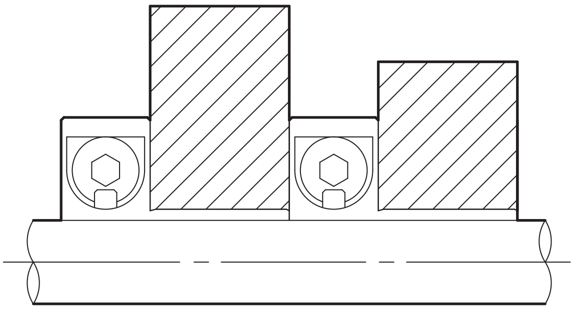
・For PSL-G

After ensuring safety, loosen the clamping bolts. The parts are automatically separated from each other. The PSL-G may not be removed by loosening the clamping bolts depending on the conditions. Never remove it forcibly, because the shaft, hub, and main body may be damaged. If the rear tapering cannot be loosened by loosening the clamping bolts, tap on the heads of the clamping bolts. The spring action of each part moves the rear tapering backward so that it is released. If the front tapering cannot be loosened by loosening the clamping bolts, insert a bolt into the threaded hole for removal (which is one size larger than the clamping bolt) and tap the bolt head with a hammer. This will enable the front tapering to be released.

Mounting Example

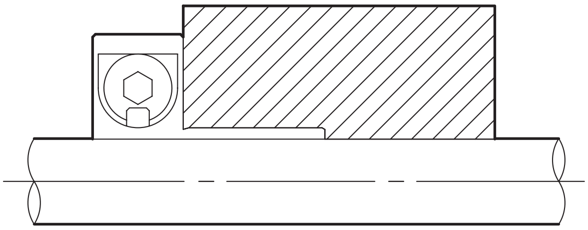
Connection with a Cam, Etc. (Phase Matching)

■ ETP-T



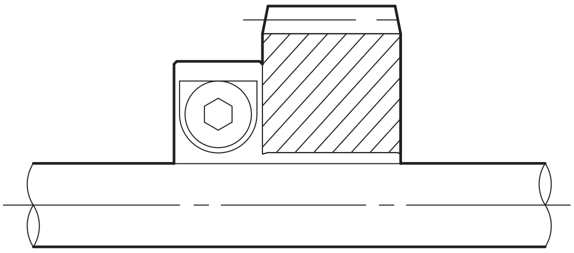
Connection with a Roller of a Printing Machinery

■ ETP-T



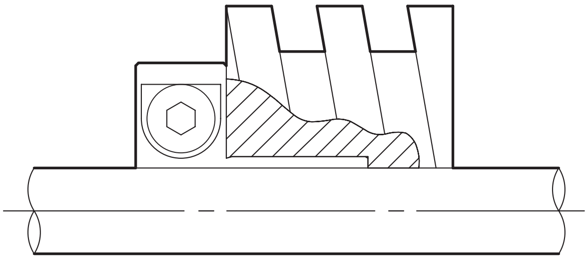
Connection with a Timing Gear

■ ETP-E



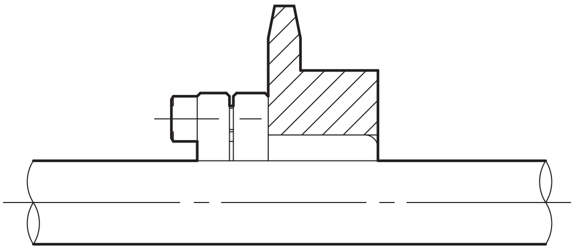
Connection with a Rotor

■ ETP-E



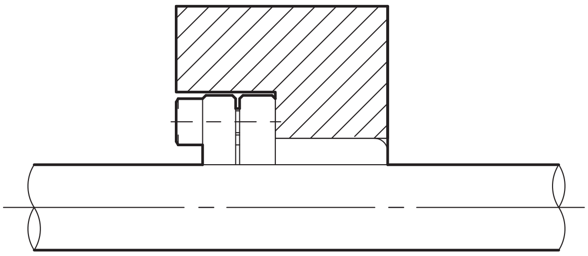
Connection with a Sprocket

■ ETP-A



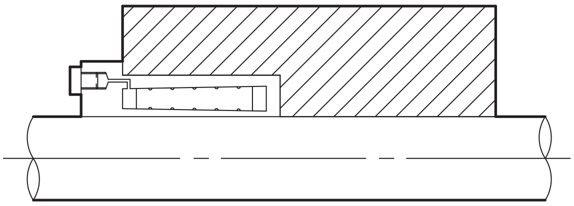
Drilling a Stepped Hole in the Hub for Connection

■ ETP-A



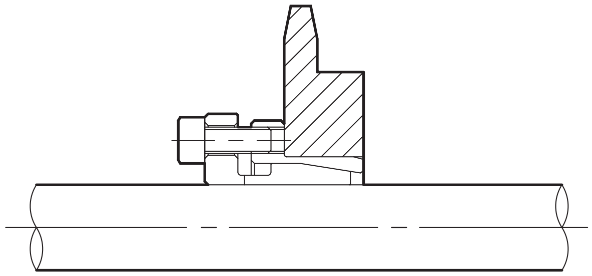
Connection with a Rolling Roller

■ ETP-H



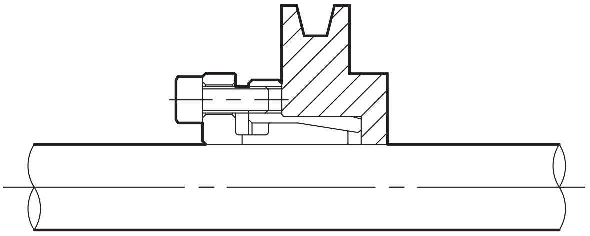
Connection with a Sprocket

■ PSL-K



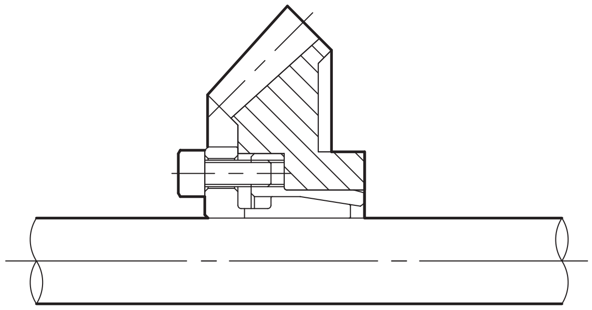
Connection with a V-pulley

■ PSL-K



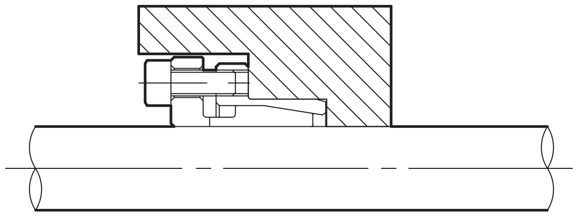
Connection with a Bevel Gear (Suppress Axial Movement)

■ PSL-K



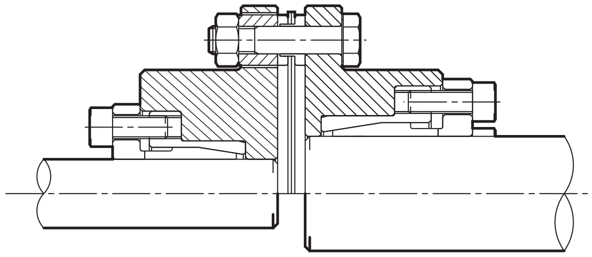
Stepped Hub (Saving Space)

■ PSL-K



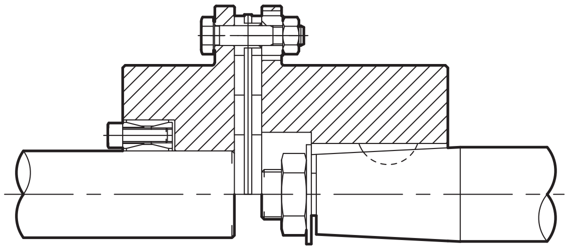
As a Connecting Element for Shaft Couplings

■ PSL-K



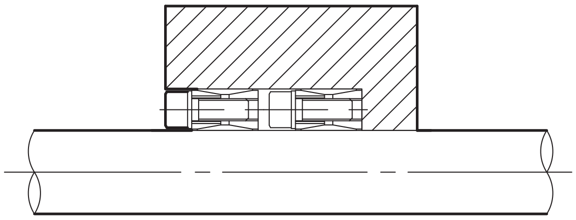
As a Connecting Element for Shaft Couplings

■ PSL-G



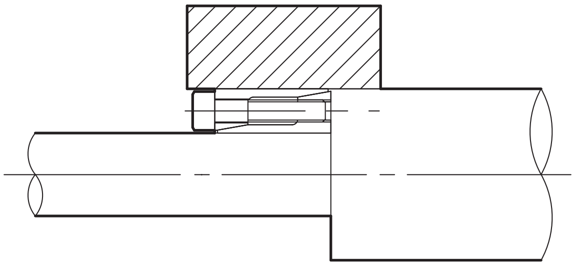
Connection when the Torque Is High (Using 2 Pieces)

■ PSL-G



Connection with a Small Diameter Hub

■ PSL-D



Torque Wrenches

ETP-E N, ETP-E C

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M10	7.0	N12SPCK × 7.0N・m	25HCK 5mm	15 ～ 35
M16	24.0	N25SPCK × 24.0N・m	25HCK 8mm	38 ～ 60

ETP-T, ETP-T C

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M12	12.0	N25SPCK × 12.0N・m	25HCK 6mm	15 ～ 20
M14	16.0	N25SPCK × 16.0N・m	25HCK 6mm	24 ～ 35
M16	24.0	N50SPCK × 24.0N・m	50HCK 8mm	40 ～ 50
M20	40.0	N50SPCK × 40.0N・m	50HCK 10mm	60 ～ 80
M22	60.0	N100SPCK × 60.0N・m	100HCK 10mm	90
M24	80.0	N100SPCK × 80.0N・m	100HCK 12mm	100

ETP-A, ETP-A C, ETP-A S

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M5	6.0	N6SPCK × 6.0N・m	25HCK 4mm	15
M5	8.0	N12SPCK × 8.0N・m	25HCK 4mm	19 ～ 42
M6	13.0	N25SPCK × 13.0N・m	25HCK 5mm	45 ～ 65
M8	32.0	N50SPCK × 32.0N・m	50HCK 6mm	70 ～ 100

ETP-A B

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Wrench attachment	Applicable size
M5	6.0	N6SPCK × 6.0N・m	25SCK 8mm	15
M5	8.0	N12SPCK × 8.0N・m	25SCK 8mm	19 ～ 42
M6	13.0	N25SPCK × 13.0N・m	25SCK 10mm	45 ～ 65
M8	32.0	N50SPCK × 32.0N・m	50SCK 13mm	70 ～ 100

ETP-A R

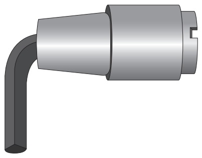
Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Wrench attachment	Applicable size
M5	4.5	N6SPCK × 4.5N・m	25SCK 8mm	15 ～ 40
M6	7.8	N12SPCK × 7.8N・m	25SCK 10mm	45 ～ 50

Torque Wrench (Single-function)

■ N-SPCK

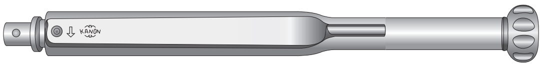
Hexagonal Head

■ HCK



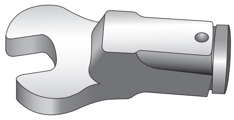
Torque Wrench (Preset Type)

■ N-LCK



Wrench Attachment

■ SCK



* The above torque wrench and wrench attachment models are those of Nakamura Mfg. Co., Ltd.

PSL-K, PSL-K C

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M4	2.0	N6SPCK × 2.0N・m	25HCK 3mm	6～7
M4	4.0	N6SPCK × 4.0N・m	25HCK 3mm	8～14
M5	8.0	N12SPCK × 8.0N・m	25HCK 4mm	15～25
M6	14.0	N25SPCK × 14.0N・m	25HCK 5mm	28～42

PSL-K B

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Wrench attachment	Applicable size
M4	2.0	N6SPCK × 2.0N・m	25SCK 7mm	6～7
M4	4.0	N6SPCK × 4.0N・m	25SCK 7mm	8～14
M5	8.0	N12SPCK × 8.0N・m	25SCK 8mm	15～25
M6	14.0	N25SPCK × 14.0N・m	25SCK 10mm	28～42

PSL-K F

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M4	2.0	N6SPCK × 2.0N・m	25HCK 3mm	6～7
M4	3.5	N6SPCK × 3.5N・m	25HCK 3mm	8～14
M5	7.0	N12SPCK × 7.0N・m	25HCK 4mm	15～25
M6	12.0	N25SPCK × 12.0N・m	25HCK 5mm	28～35

PSL-G, PSL-G C

Nominal diameter	Tightening torque [N・m]	Torque wrench (Preset type)	Hexagonal head	Applicable size
M6	17.0	N25LCK	25HCK 5mm	19～40
M8	41.0	N50LCK	50HCK 6mm	42～65
M10	82.0	N100LCK	100HCK 8mm	70～95
M12	142.0	N200LCK	200HCK 10mm	100～120

PSL-D, PSL-D C

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M2.5	1.0	N6SPCK × 1.0N・m	25HCK 2mm	6～12
M3	2.0	N6SPCK × 2.0N・m	25HCK 2.5mm	14～15
M4	4.0	N6SPCK × 4.0N・m	25HCK 3mm	16～19
M5	8.0	N12SPCK × 8.0N・m	25HCK 4mm	20～22
M6	14.0	N25SPCK × 14.0N・m	25HCK 5mm	24～40
M8	34.0	N50SPCK × 34.0N・m	50HCK 6mm	42～50

CLUTCHES & BRAKES

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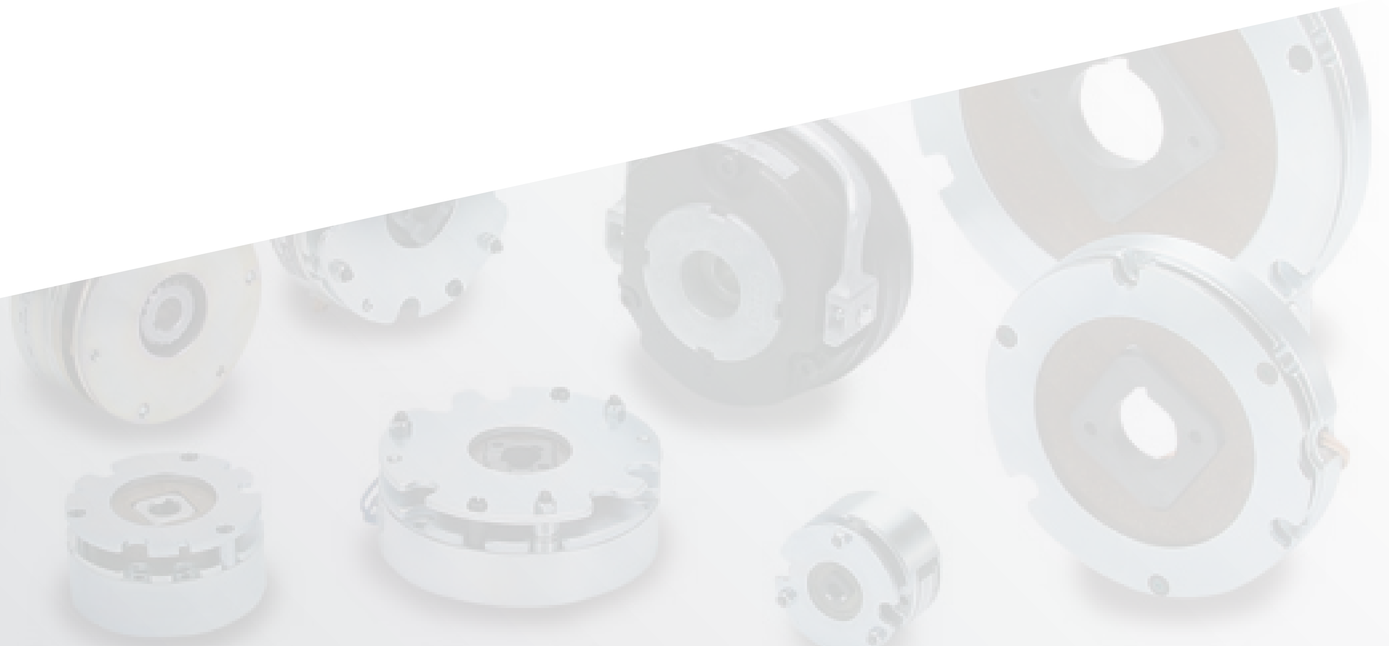


Electromagnetic Clutch & Brake Models

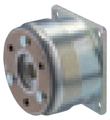
Series ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES

Device Micro Clutches | Micro Brakes

Models 102 | CYT | 112

Type

13



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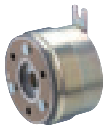

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33M

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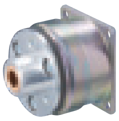

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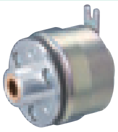

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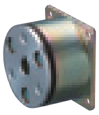

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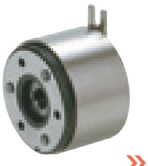
33B



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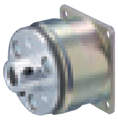

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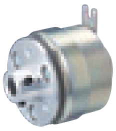

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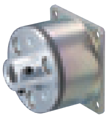

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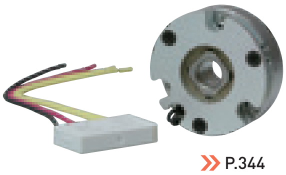
Series SPRING-ACTUATED BRAKES

Models

BXW-L/H/S

» P.340

BXR-LE



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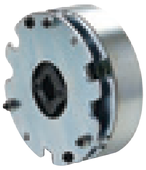
BXL



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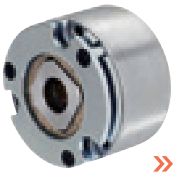
BXL-N

» P.358

BXW-R



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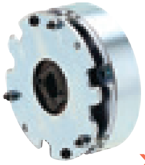
BXR

» P.346

BXH



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Series ELECTROMAGNETIC CLUTCH & BRAKE POWER SUPPLIES | RECTIFIED POWER SUPPLIES FOR SPRING-ACTUATED BRAKES DC45/90/180V

Models

BES

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BEH

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BEW

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BEW-S

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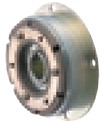
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES

Clutches

101

13G



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15G

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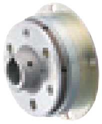
11G



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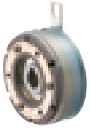
CS

33G



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35G

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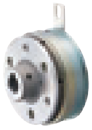
31G



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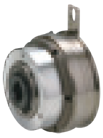
CSZ

35



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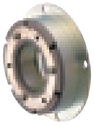
Brakes

111

13G



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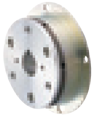
12G



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11G

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BSZ

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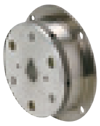

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Series

ELECTROMAGNETIC CLUTCH AND BRAKE UNITS

Device

Clutches & Brakes

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Double clutches

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Double clutches & brakes

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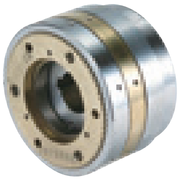
Series

ELECTROMAGNETIC TOOTH CLUTCHES

Models

546



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BRAKE MOTORS

BMS·BMM

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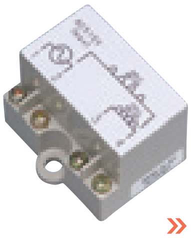
BEW-W



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BEW-FH

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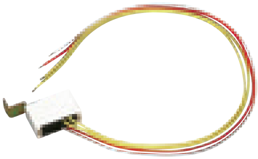
BEM



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BEM-T

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A selection guide for electromagnetic clutches and brakes begins on the next page.

Selection Guide

Miki Pulley divides its electromagnetic clutches & brakes into several major categories: electromagnetic-actuated clutches & brakes, spring-actuated clutches & brakes, electromagnetic tooth clutches, brake motors, and power supplies.

When selecting a product, have information handy on your application, required torque, performance, load properties, drive source and the like, and then use the diagram on the page at right as your guide. Selection details are described in the selection procedures given for each series.

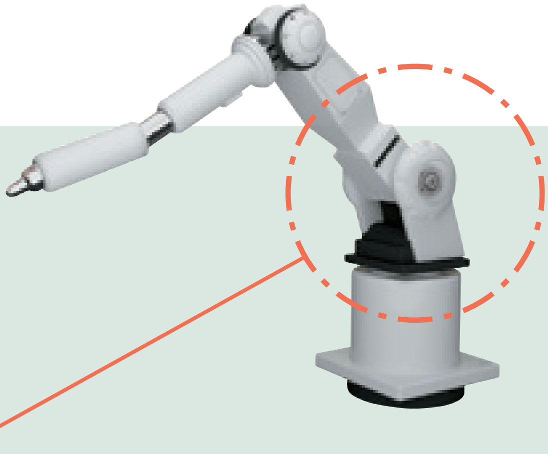
List of Products

- **MIKI PULLEY ELECTROMAGNETIC CLUTCHES & BRAKES**
  - **ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES**
    - ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES
    - ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES
    - CLUTCH & BRAKE UNITS
  - **SPRING-ACTUATED BRAKES**
  - **ELECTROMAGNETIC TOOTH CLUTCHES**
  - **BRAKE MOTORS**
  - **POWER SUPPLIES**

Select by Product Characteristics

			Torque (N·m)
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES	Electromagnetic-actuated micro	Clutches	**102** [0.4-2.4 N·m] **CYT** [0.4-1.0 N·m]
		Brakes	**112** [0.4-2.4 N·m]
	Electromagnetic-actuated	Clutches	**CSZ** [2.4-10 N·m] **101/CS** [5-320 N·m]
		Brakes	**BSZ** [2.4-10 N·m] **111** [5-320 N·m]
	Clutch & Brake Units	Drip-proof type	**125** [2.4-160 N·m]
		Open-disc brake system type	**121-□-20G** [5-320 N·m]
		Motor-coupled type	**126** [5-80 N·m]
		Speed reducer-integrated type	**CBW** [5-40 N·m]
		Motor/speed reducer-integrated type	**CMW** [5-40 N·m]
		Double-clutch units	**121-□-10G** [5-320 N·m]
		Double clutch and brake units	**122** [5-160 N·m]
SPRING-ACTUATED BRAKES	Holding use		**BXW-R** [0.30-2.50 N·m] **BXR** [5-55 N·m] **BXW-S** [0.36-5.20 N·m] **BXR-LE** [0.06-3.20 N·m]
	Holding and braking use		**BXW-H** [0.24-4.00 N·m] **BXH** [4-44 N·m]
	Braking use		**BXW-L** [0.12-2.00 N·m] **BXL** [2-22 N·m] **BXL-N** [2-80 N・m]
Tooth clutches			**546** [17.5-2200 N·m]
BRAKE MOTORS	Electromagnetic-actuated		**BMM** (2.5-50 N·m) Motor output 0.2 kW to 3.7 kW
	Spring-actuated		**BMS** (2-15 N·m) Motor output 0.2 kW to 1.5 kW

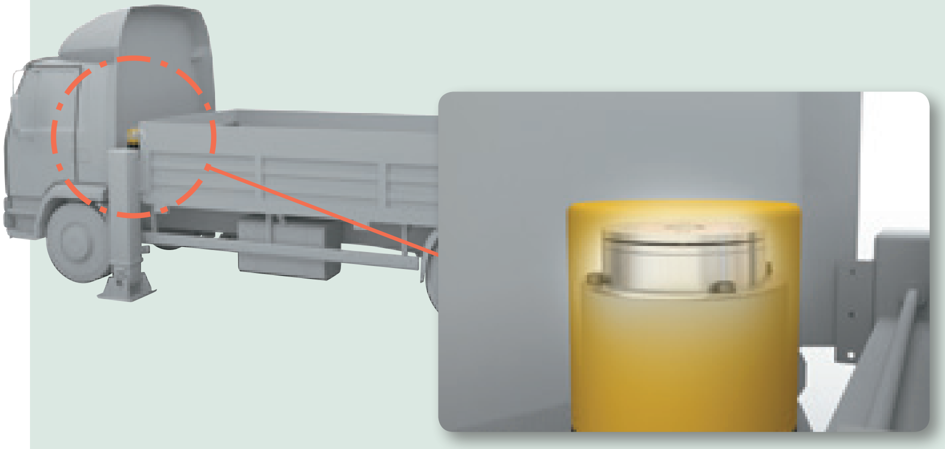
Applications



Product model BXR

Employed device Articulated Robot

BXR spline type for holding arms.
Saves space with slim design and greatly reduces drag wear by using light rotor.



Product model 111

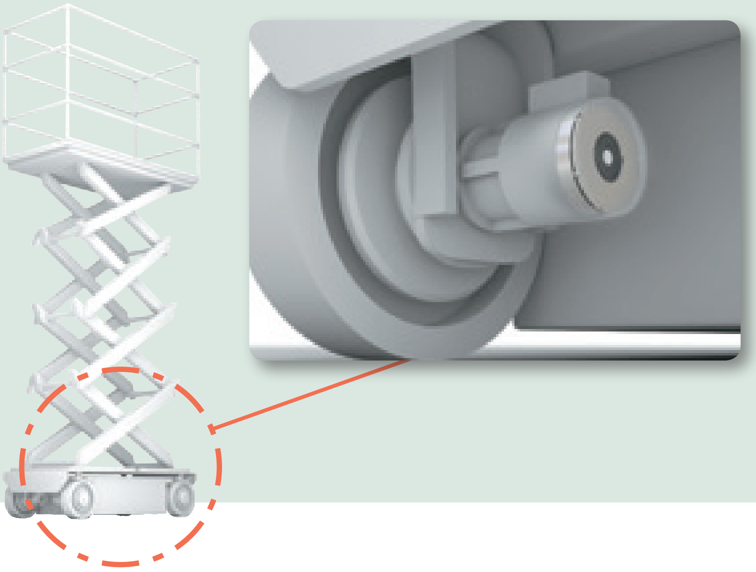
Employed device Special-purpose Vehicles

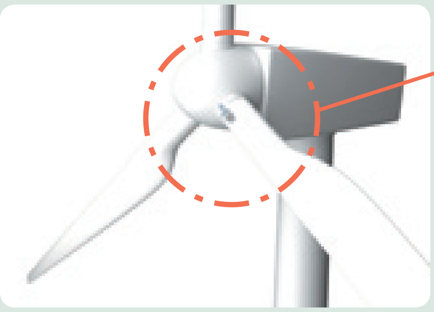
The Electromagnetic-actuated brake 111 model is used in the elevating device for the auxiliary leg.

Product model BXR

Employed device Aerial Vehicle

BXR model as the holding brake for drive motor. Slim design helps save space.

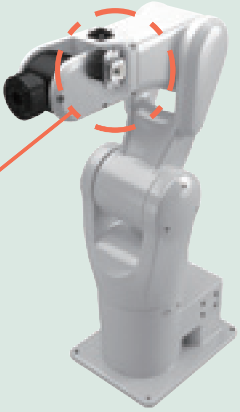


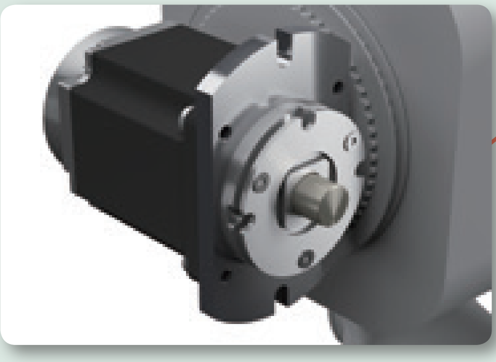


Product model BXW Large Size (Custom Product)

Employed device Wind Turbine Generator

Large BXW as the pitch drive device of a wind turbine generator.

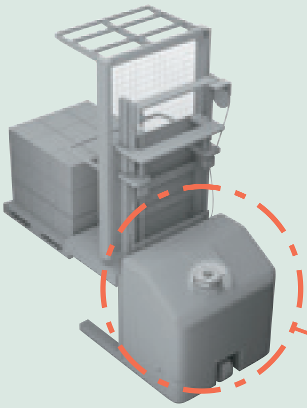




Product model BXR-LE

Employed device Vertically Articulated Robots

The BXR-LE models owes its ultra-thin profile to a dedicated controller. Mounted on the output shaft, it is ideal for applications where space is limited. Its dedicated controller also saves energy.

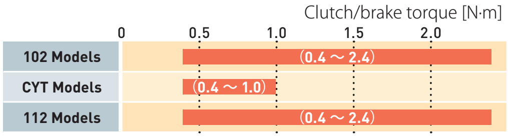


Product model BXH

Employed device Forklifts

Spring-actuated brake BXH model for electric forklift. Compact, high torque design.

ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES



Application Automated teller machines, sorters, office equipment, weighing and packaging machinery, printing machinery, bookbinding machinery, optical equipment

Micro Clutches and Micro Brakes for Precise Control of Compact Precision Equipment

These micro clutches and micro brakes are ideal for compact precision equipment where fluctuations in torque and response must be avoided, such as office equipment, communication equipment and automobiles. In addition to the 102 (clutch) and 112 (brake) models, which share the same basic clutch/brake design, we also supply CYT models (clutches), which can be customized into a wide variety of types to suit the requirements of our customers.

RoHS
Some exceptions apply

Available Models

Series	Applications	Lineup
MICRO CLUTCHES & BRAKES	Micro clutches	102
	Custom micro clutches	CYT
	Micro brakes	112

For details on selection, see P.312 to 319.

Micro Clutches

102-□-□□

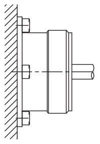
Size
Mounting
Shaft coupling system (armature)

Mounting

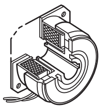
102-□-1□

Wall-mounted type

Uses a flange-mounted stator. Designed to be short in the axial direction, requiring less installation space.



Directly mounted to the wall

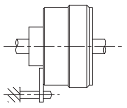


Flange-mounted type

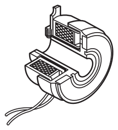
102-□-3□, CYT

Shaft-mounted type

Uses a bearing-mounted stator. Designed to be relatively easy to mount, reducing the processing and work required for mounting.



Mounted onto the shaft



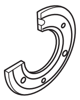
Bearing-mounted type

Shaft coupling system (armatures)

102-□-□3

Butt and parallel shaft type (Armature type-3)

These incorporate non-armature parts provided by the customer such as V pulleys, enabling use in designs that use either butt shafts or through-shafts.

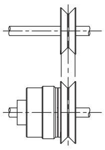


Armature type-3

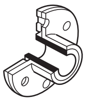
102-□-□5

Directly coupled type wound around the parallel axis (armature type-5)

Uses an armature assembly designed for use with through-shafts. Ensures that mounting is relatively easy to complete as well as extremely efficient in its approach.



Directly coupled by being wound around the parallel shaft

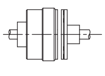


Armature type-5

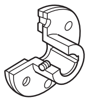
102-□-□1

Butt type (Armature type-1)

Uses an armature assembly designed for use with butt shafts. May be difficult to mount due to the need for centering and other adjustments, may require the use of a fitting flange, or may require use in combination with flexible couplings.



Coupled directly to the butt shaft



Armature type-1

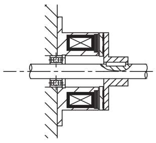
Micro Brakes

112-□-1□

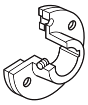
Size
Shaft Coupling System (Armature)

Shaft-mounted type

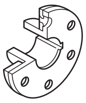
These use axial braking in most cases, the effectiveness of which depends on how efficiently parts are mounted.



Mounted to the shaft



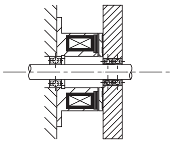
Armature type-1



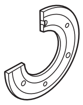
Armature type-2

Rotor-mounted type

Uses an armature assembly mounted directly to an inertial body not fastened to the shaft that continues to move even after the shaft has stopped.



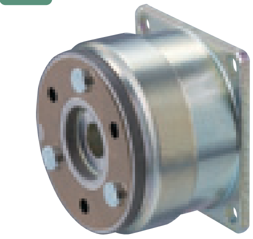
Mounted to the rotor

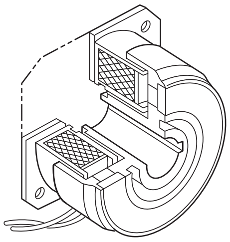


Armature type-3

Product Lineup

102-□-1□ Electromagnetic-actuated Micro Clutches - Flange-mounted Type



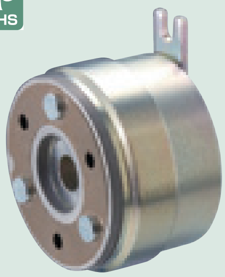


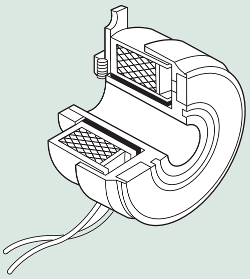
Flange-mounted type

Stator and rotor are combined and directly mounted on stationary parts, such as frames, and fixed in place. These are short in the axial direction and can use space near walls effectively. Select the armature according to the coupling type used (through-shaft, butt shaft, etc.).

Clutch torque	[N·m]	0.4～2.4
Operating temperature	[℃]	－10～＋40
Backlash		Zero

102-□-3□ Electromagnetic-actuated Micro Clutches - Bearing-mounted Type



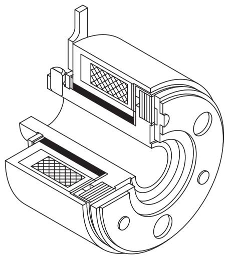


Bearing-mounted type

These integrate the stator and rotor, which are held to the stationary parts of the machine by a drive pin arm; the rotor is locked to the rotation shaft by a set screw. They are designed to be relatively easy to mount, reducing the processing work required for mounting. Select the armature according to the coupling type used (through-shaft, butt shaft, etc.).

Clutch torque	[N·m]	0.4～2.4
Operating temperature	[℃]	－10～＋40
Backlash		Zero

CYT Electromagnetic-actuated Micro Clutches - Custom Type

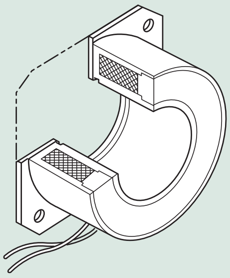


The CYT models are the basic building blocks for customized micro-clutches. The basic model is bearing mounted. Two types are available for different shaft rotation speeds: a dry metal type and a ball bearing type. Armature type-3 is standard, but many customizations are possible.

Clutch torque	[N·m]	0.4～1.0
Operating temperature	[℃]	－10～＋40
Backlash		Zero

112 Electromagnetic-actuated Micro Brakes

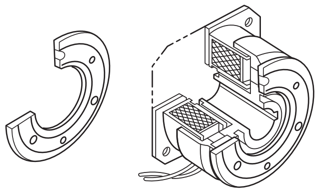
Except size #02



Brakes are used to brake and hold rotating bodies. The flange of the stator is locked securely to a strong stationary part. Select an armature that factors in the mounting space available.

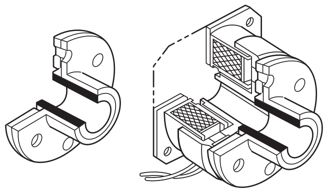
Brake torque	[N·m]	0.4～2.4
Operating temperature	[℃]	－10～＋40
Backlash		Zero

Types for through-shaft or butt shaft



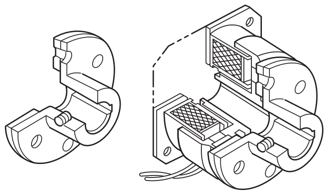
Armature type-3 102-☐-13

Through-shaft (coupled by winding around parallel shaft) type



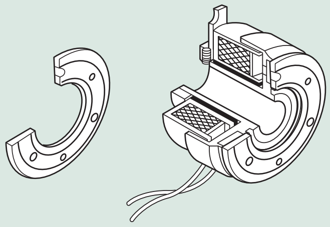
Armature type-5 102-☐-15

Butt shaft type



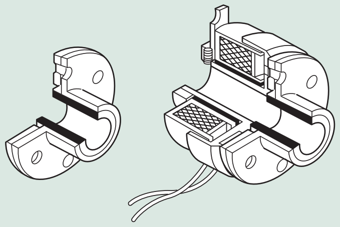
Armature type-1 102-☐-11

Types for through-shaft or butt shaft



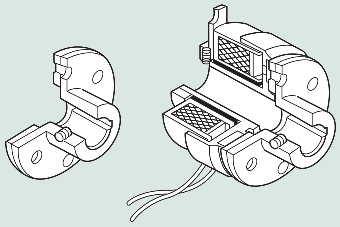
Armature type-3 102-☐-33

Through-shaft (coupled by winding around parallel shaft) type



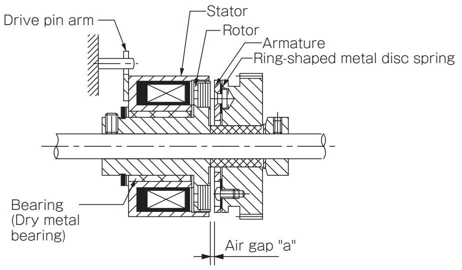
Armature type-5 102-☐-35

Butt shaft type



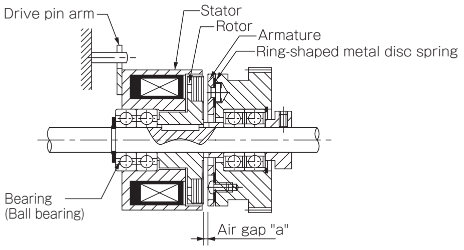
Armature type-1 102-☐-31

Dry metal type



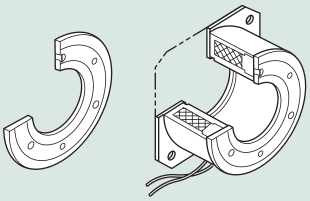
CYT-☐-33M

Ball bearing type



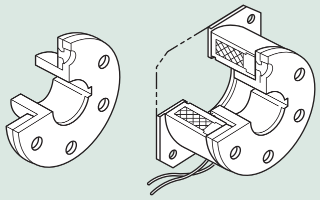
CYT-☐-33B

Types with many applications



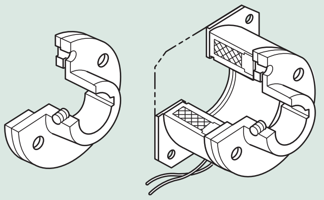
Armature type-3 112-☐-13

Slim, space-saving type



Armature type-2 112-☐-12

Easy-to-use standard-shape type

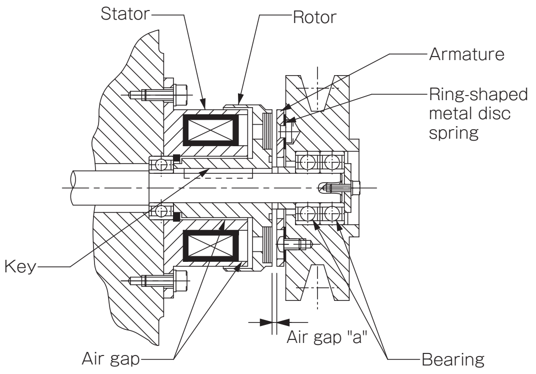


Armature type-1 112-☐-11

Mounting and CYT Customization Examples

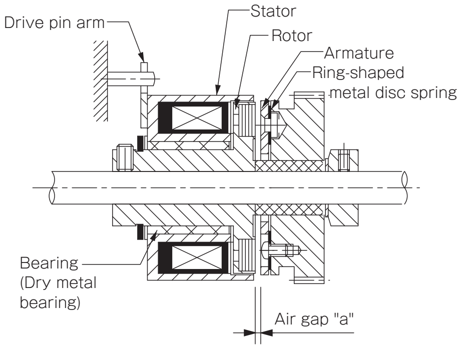
Flange-mounting example with 102

The stator is directly mounted on a stationary part, such as a frame, by a mounting flange, and fixed in place. The rotor is locked to the rotation shaft using a key. The stator and rotor are combined via a narrow air gap that serves as part of the magnetic circuit to form a magnetic pole.



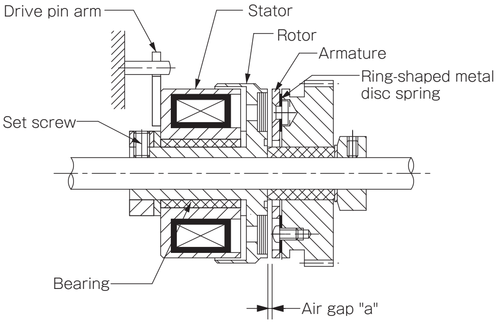
Dry-metal type mounting example with CYT

The stator is integrated with the rotor via dry metal, and held to the stationary parts of the machine by a drive pin arm. The rotor is locked to the rotation shaft using a set screw. The stator and rotor form a magnetic pole via the dry metal.



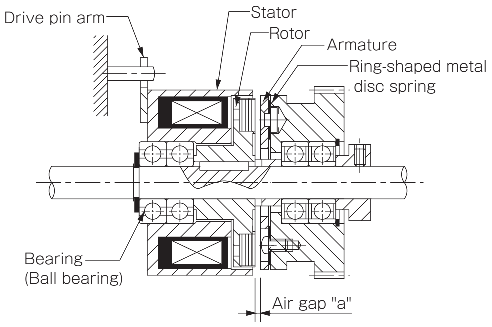
Bearing-mounting example with 102.

The stator is integrated with the rotor via a bearing and held to the stationary parts of the machine by a drive pin arm. The rotor is locked to the rotation shaft using a set screw. The stator and rotor form a magnetic pole via the bearing (ferrous oil-impregnated metal).



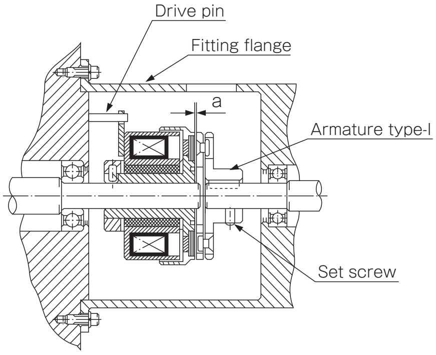
Ball-bearing type mounting example with CYT

The stator is mounted on the shaft via a bearing and held to the stationary parts of the machine by a drive pin arm. The stator and rotor are combined via a narrow air gap that serves as part of the magnetic circuit to form a magnetic pole.



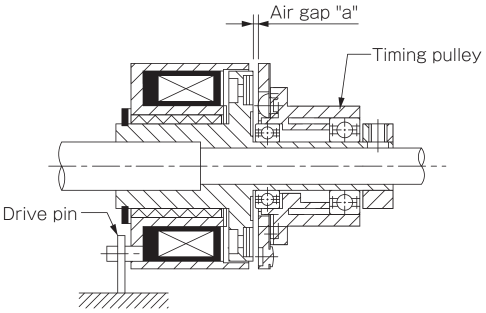
Butt shaft mounting example with 102

In designs that use butt shafts, the two shafts can be reliably centered using fitting flanges, as shown in the figure.



Dry-metal type embedding example with CYT

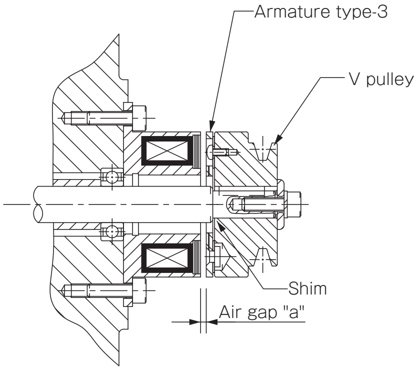
We design to your requirements using timing pulleys, gears and the like mounted on armature type-3.



Mounting and CYT Customization Examples

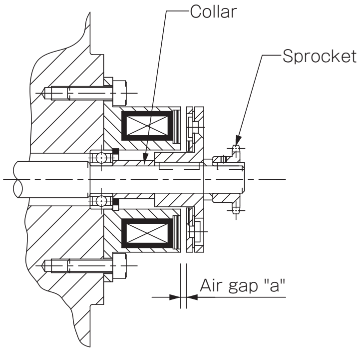
Armature type-3 mounting example with 112

Armature type-3 is used by directly mounting it to a transmission element such as a V-pulley or to a rotating body that stops inertial force.
The shaft of the brake part requires no processing. The shaft diameter may also be determined freely. Air gap "a" can be set easily using collars and shims. Corrections are easily accomplished by adding or removing shims.



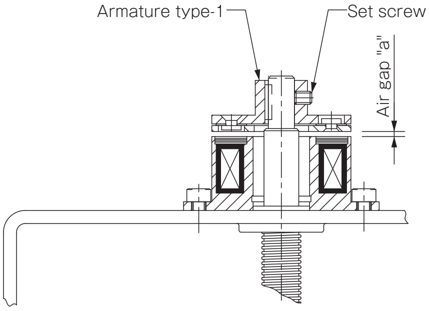
Armature type-2 mounting example with 112

Armature type-2 has the smallest mounting-space footprint of any of the armatures, so overhang is not a concern even when a sprocket or the like is mounted on the brake tip.
Air gap "a" can be set easily using collars and shims.
Corrections are easily accomplished by adding or removing shims.



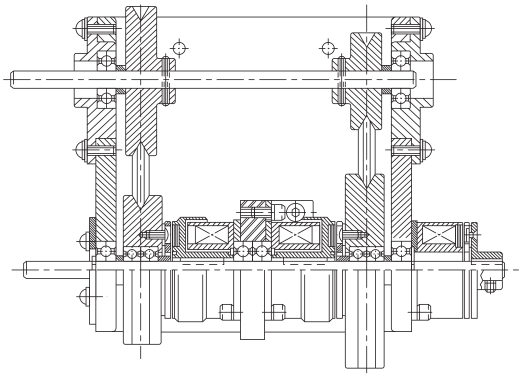
Armature type-1 mounting example on vertical shaft with 112

Since there is no restriction on mounting direction, there is no running torque or abnormal wear even when mounted on vertical shafts.
It is easy to set air gap a: simply move armature type-1 and lock it in place with a set screw.



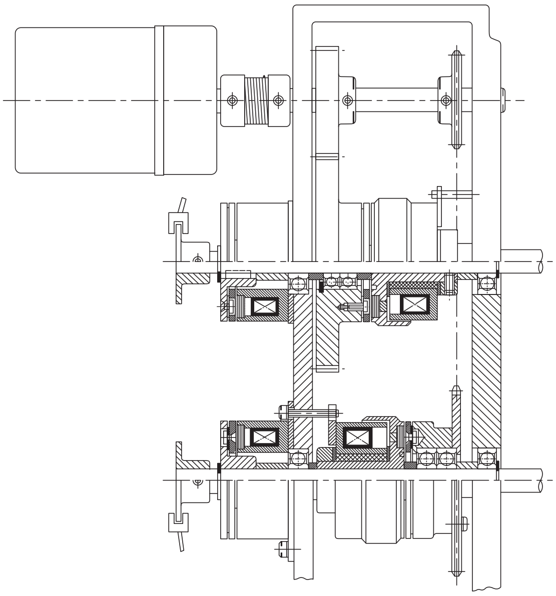
Example of the combination of clutches and brakes

This example uses a two-step speed-change mechanism combining two clutches and a brake.



Example of the combination of clutches and brakes

Shaft drive is both forward and reverse in combination with a clutch in this example. Start and stop freely by mounting brakes on each shaft.



102-□-1□ Types Electromagnetic Micro Clutches - Flange-mounted Type

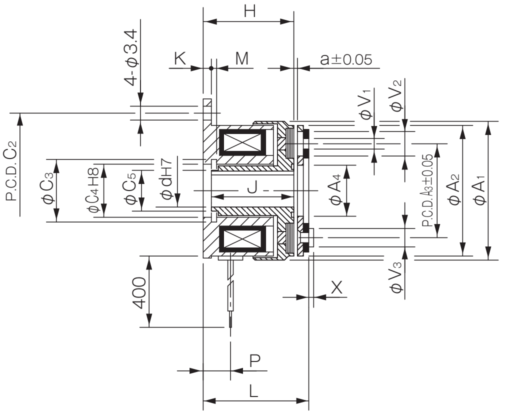
Specifications

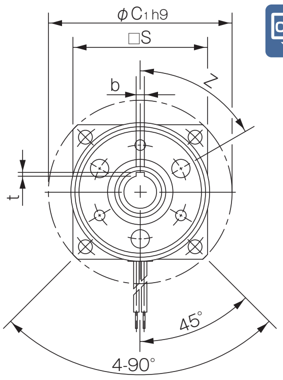
Model	Size	Dynamic friction torque Td [N·m]	Coil (at 20℃) Voltage [V]	Coil (at 20℃) Wattage [W]	Coil (at 20℃) Current [A]	Coil (at 20℃) Resistance [Ω]	Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J Armature [kg·m²]	Rotating part moment of inertia J Rotor [kg·m²]	Allowable engaging energy Eeaℓ [J]	Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque rise time tp [s]	Torque extinction time td [s]	Mass [kg]
102-02-13	02	0.4	DC24	6	0.25	96	B	10000	6.75×10^{-7}	2.45×10^{-6}	1500	2×10^{6}	0.009	0.019	0.017	0.075
102-02-15								500	1.00×10^{-6}							0.081
102-02-11								10000	1.00×10^{-6}							0.079
102-03-13	03	0.6	DC24	6	0.25	96	B	10000	1.30×10^{-6}	3.25×10^{-6}	2300	3×10^{6}	0.009	0.022	0.020	0.096
102-03-15								500	1.95×10^{-6}							0.105
102-03-11								10000	1.95×10^{-6}							0.103
102-04-13	04	1.2	DC24	8	0.33	72	B	10000	4.38×10^{-6}	1.41×10^{-5}	4500	6×10^{6}	0.011	0.028	0.030	0.178
102-04-15								500	6.15×10^{-6}							0.195
102-04-11								10000	6.15×10^{-6}							0.191
102-05-13	05	2.4	DC24	10	0.42	58	B	10000	9.08×10^{-6}	3.15×10^{-5}	9000	9×10^{6}	0.012	0.031	0.040	0.310
102-05-15								500	1.38×10^{-5}							0.335
102-05-11								10000	1.38×10^{-5}							0.325

* The dynamic friction torque, Td, is measured at a relative speed of 100 min⁻¹.
* The moment of inertia of a rotating body and mass are measured for the maximum bore diameter.
* Keep supply voltage fluctuation to within 10% of coil voltage.

Dimensions (102-□-13)

(For direct mounting)





Unit [mm]

Size	Shaft bore dimensions d₁ H7	Models compliant with the new JIS standards b P9	Models compliant with the new JIS standards t	Models compliant with the old JIS standards b E9	Models compliant with the old JIS standards t
02	5	—	—		
03	6	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
04	8	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
05	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions A₁	A₂	A₃	A₄	C₁	C₂	C₃	C₄	C₅	S	V₁	V₂	V₃	Z	Axial direction dimensions H	J	K	L	P	M	a	X
02	31	28	19.5	10.5	39	33.5	11.4	11	8	—	2-2.1	2-5.3	2-4	4-90°	18	16.5	1.5	20.5	5	1.1	0.1	0.8
03	34	32	23	12.5	45	38	13.6	13	10	33	3-2.6	3-6	3-4.5	6-60°	22.2	20.2	2	24.5	6.7	1.3	0.15	1.2
04	43	40	30	18.5	54	47	20	19	15.5	41	3-3.1	3-6	3-5	6-60°	25.4	23.4	2	28.2	7	1.3	0.15	1.5
05	54	50	38	25.5	65	58	27.2	26	22	51	3-3.1	3-6.5	3-5.5	6-60°	28.1	26.1	2	31.3	8.2	1.5	0.2	1.5

* Size 02 is a rounded flange.
* The rotor of size 02 has no keyway. Lock it in place by press-fitting it onto the shaft or the like.

How to Place an Order

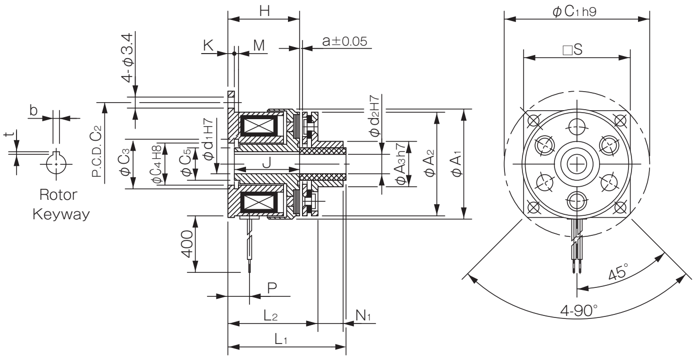
102-03-13 24V 6DIN

Size
Rotor bore diameter (dimensional symbol d)
Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

*Models for which there are no keyway standards (models marked by [-]) on the Shaft Bore Dimensions table need not be marked with a keyway standards designation. Products with standards marked by diagonal lines are not set as standard products.

Dimensions (102-□-15)

(For through-shafts)



Unit [mm]

Size	Shaft bore dimensions					
	d₁ H7	d₂ H7	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
			b P9	t	b E9	t
02	5	5	—	—		
03	6	6	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
04	8	8	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
	10	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
05	10	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$

* The armature type-5 bore d₂ is a straight bore.

Unit [mm]

Size	Radial direction dimensions									Axial direction dimensions								
	A₁	A₂	A₃	C₁	C₂	C₃	C₄	C₅	S	H	J	K	L₁	L₂	M	P	N₁	a
02	31	28	13	39	33.5	11.4	11	8	—	18	16.5	1.5	27.5	22.4	1.1	5	4.8	0.1
03	34	32	14	45	38	13.6	13	10	33	22.2	20.2	2	34.5	26.5	1.3	6.7	7.8	0.15
04	43	40	18	54	47	20	19	15.5	41	25.4	23.4	2	40.2	30.8	1.3	7	9.1	0.15
05	54	50	28	65	58	27.2	26	22	51	28.1	26.1	2	43.3	34.3	1.5	8.2	8.8	0.2

* Size 02 is a rounded flange.
* The rotor of size 02 has no keyway. Lock it in place by press-fitting it onto the shaft or the like.

How to Place an Order

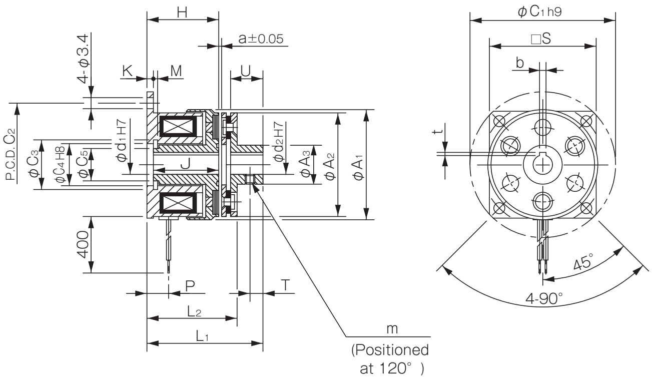
102-03-15 24V R6DIN A6

Size
Rotor bore diameter (dimensional symbol d1)
Armature bore diameter (dimensional symbol d2)
Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

*Models for which there are no keyway standards (models marked by [-]) on the Shaft Bore Dimensions table need not be marked with a keyway standards designation. Products with standards marked by diagonal lines are not set as standard products.

Dimensions (102-□-11)

(For butt shafts)



Unit [mm]

Size	Shaft bore dimensions					
	d₁ H7	d₂ H7	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
			b P9	t	b E9	t
02	5	5	—	—		
03	6	6	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
04	8	8	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
	10	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
05	10	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions										Axial direction dimensions									
	A₁	A₂	A₃	C₁	C₂	C₃	C₄	C₅	S	m	H	J	K	L₁	L₂	M	P	U	T	a
02	31	28	9.5	39	33.5	11.4	11	8	—	M3	18	16.5	1.5	27.5	22.5	1.1	5	7	2.5	0.1
03	34	32	12	45	38	13.6	13	10	33	2-M3	22.2	20.2	2	34.5	26.5	1.3	6.7	10	4	0.15
04	43	40	17	54	47	20	19	15.5	41	2-M3	25.4	23.4	2	40.2	30.8	1.3	7	12	5	0.15
05	54	50	24	65	58	27.2	26	22	51	2-M4	28.1	26.1	2	43.3	34.3	1.5	8.2	12	5	0.2

* Size 02 is a rounded flange.
* The rotor of size 02 has no keyway. Lock it in place by press-fitting it onto the shaft or the like.

How to Place an Order

102-03-11 24V R6DIN A6DIN

Size
Rotor bore diameter (dimensional symbol d1)
Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards
Armature bore diameter (dimensional symbol d2)
Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

*Models for which there are no keyway standards (models marked by [-]) on the Shaft Bore Dimensions table need not be marked with a keyway standards designation. Products with standards marked by diagonal lines are not set as standard products.

102- □ -3 □ Types Electromagnetic Micro Clutches - Bearing-mounted Type

Specifications

Model	Size	Dynamic friction torque T_d [N·m]	Coil (at 20℃) Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]	Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J Armature [kg·m²]	Rotor [kg·m²]	Allowable engaging energy $E_{ea\ell}$ [J]	Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque rise time t_p [s]	Torque extinction time t_d [s]	Mass [kg]
102-02-33	02	0.4	DC24	6	0.25	96	B	500	6.75×10^{-7}	2.75×10^{-6}	1500	2×10^6	0.009	0.019	0.017	0.076
102-02-35									1.00×10^{-6}							0.082
102-02-31									1.00×10^{-6}							0.080
102-03-33	03	0.6	DC24	6	0.25	96	B	500	1.30×10^{-6}	4.08×10^{-6}	2300	3×10^6	0.009	0.022	0.020	0.101
102-03-35									1.95×10^{-6}							0.110
102-03-31									1.95×10^{-6}							0.108
102-04-33	04	1.2	DC24	8	0.33	72	B	500	4.38×10^{-6}	1.44×10^{-5}	4500	6×10^6	0.011	0.028	0.030	0.183
102-04-35									6.15×10^{-6}							0.200
102-04-31									6.15×10^{-6}							0.196
102-05-33	05	2.4	DC24	10	0.42	58	B	500	9.08×10^{-6}	2.90×10^{-5}	9000	9×10^6	0.012	0.031	0.040	0.321
102-05-35									1.38×10^{-5}							0.346
102-05-31									1.38×10^{-5}							0.336

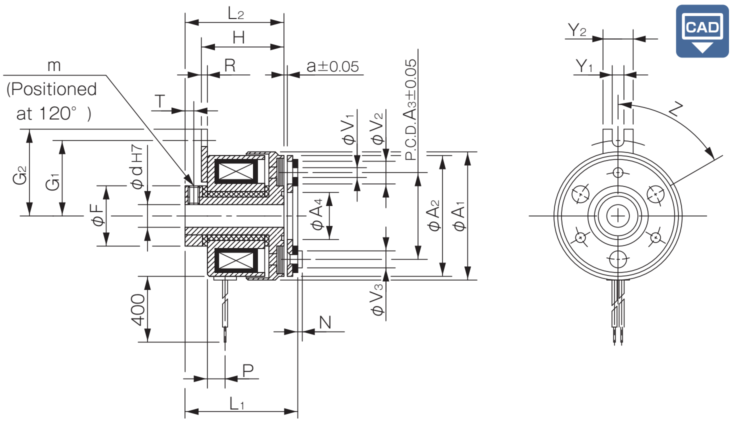
* The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

* The moment of inertia of a rotating body and mass are measured for the maximum bore diameter.

* Keep supply voltage fluctuation to within 10% of coil voltage.

Dimensions (102- □ -33)

(For direct mounting)



Unit [mm]

Size	Shaft bore dimensions d H7
02	5
03	6
04	8 10
05	10 15

Unit [mm]

Size	Radial direction dimensions A₁	A₂	A₃	A₄	F	V₁	V₂	V₃	G₁	G₂	Y₁	Y₂	Z	m	Axial direction dimensions H	R	L₁	L₂	P	N	T	a
02	31	28	19.5	10.5	14	2-2.1	2-5.3	2-4	16.8	20	3.1	8	4-90°	2-M3	19.5	1.6	25.9	23.5	5	0.8	2.5	0.1
03	34	32	23	12.5	16	3-2.6	3-6	3-4.5	20	23	3.1	8	6-60°	2-M3	21.9	1.6	28.5	26.2	4.7	1.2	2.3	0.15
04	43	40	30	18.5	22	3-3.1	3-6	3-5	23	26	3.1	8	6-60°	2-M4	25.1	1.6	33.2	30.4	5	1.5	2.8	0.15
05	54	50	38	25.5	30	3-3.1	3-6.5	3-5.5	28	31	3.1	8	6-60°	2-M5	27.9	1.6	37.3	34.1	6	1.5	3.3	0.2

How to Place an Order

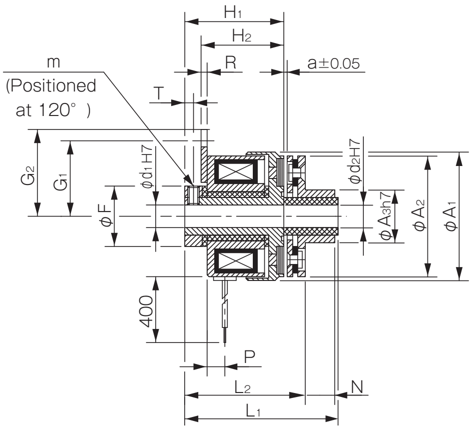
102-03-33 24V 6

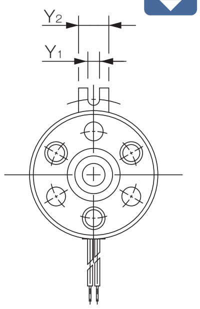
Size

Rotor bore diameter (dimensional symbol d)

Dimensions (102- □ -35)

(For through-shafts)





Unit [mm]

Size	Shaft bore dimensions	
	d1 H7	d2 H7
02	5	5
03	6	6
04	8	8
	10	10
05	10	10
	15	15

Unit [mm]

Size	Radial direction dimensions									Axial direction dimensions								
	A1	A2	A3	F	G1	G2	Y1	Y2	m	H1	H2	R	L1	L2	P	N	T	a
02	31	28	13	14	16.8	20	3.1	8	2-M3	23.5	19.5	1.6	33	27.9	5	4.8	2.5	0.1
03	34	32	14	16	20	23	3.1	8	2-M3	26.2	21.9	1.6	38.5	30.5	4.7	7.8	2.3	0.15
04	43	40	18	22	23	26	3.1	8	2-M4	30.4	25.1	1.6	45.2	35.8	5	9.1	2.8	0.15
05	54	50	28	30	28	31	3.1	8	2-M5	34.1	27.9	1.6	49.3	40.3	6	8.8	3.3	0.2

How to Place an Order

102-03-35 24V R6 A6

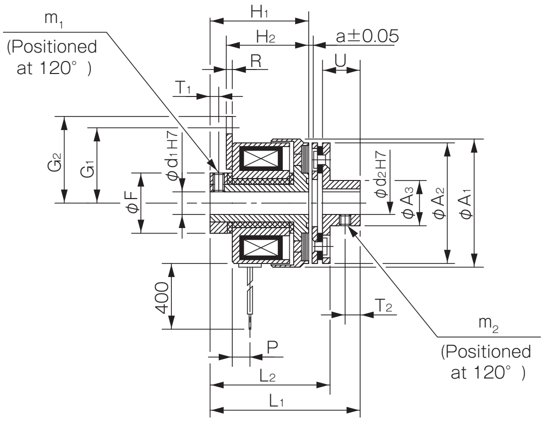
Size

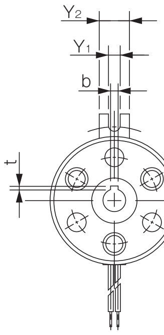
Armature bore diameter (dimensional symbol d2)

Rotor bore diameter (dimensional symbol d1)

Dimensions (102- □ -31)

(For butt shafts)





Unit [mm]

Size	Shaft bore dimensions					
	d1	d2	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
	H7	H7	b P9	t	b E9	t
02	5	5	—	—		
03	6	6	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
04	8	8	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
	10	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
05	10	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions										Axial direction dimensions									
	A1	A2	A3	F	G1	G2	Y1	Y2	m1	m2	H1	H2	R	L1	L2	P	U	T1	T2	a
02	31	28	9.5	14	16.8	20	3.1	8	2-M3	M3	23.5	19.5	1.6	33	27.9	5	7	2.5	2.5	0.1
03	34	32	12	16	20	23	3.1	8	2-M3	2-M3	26.2	21.9	1.6	38.5	30.5	4.7	10	2.3	4	0.15
04	43	40	17	22	23	26	3.1	8	2-M4	2-M3	30.4	25.1	1.6	45.2	35.8	5	12	2.8	5	0.15
05	54	50	24	30	28	31	3.1	8	2-M5	2-M4	34.1	27.9	1.6	49.3	40.3	6	12	3.3	5	0.2

How to Place an Order

102-03-31 24V R6 A6DIN

Size

Rotor bore diameter (dimensional symbol d1)

Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

Armature bore diameter (dimensional symbol d2)

*Models for which there are no keyway standards (models marked by [-]) on the Shaft Bore Dimensions table need not be marked with a keyway standards designation. Products with standards marked by diagonal lines are not set as standard products.

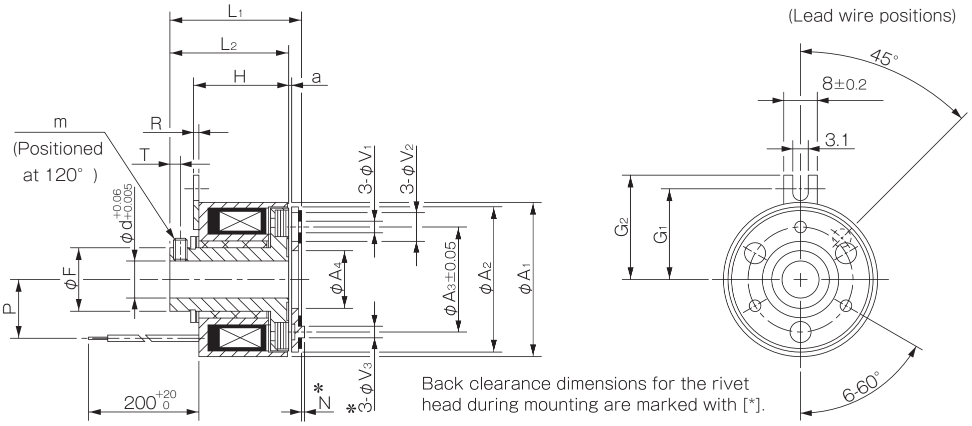
CYT Models Electromagnetic Micro Clutches - Bearing-mounted Type

Specifications

Model	Size	Dynamic friction torque T_d [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min^{-1}]	Rotating part moment of inertia		Allowable engaging energy $E_{eaℓ}$ [J]	Total work E_T [J]	Armature pull-in time t_a [s]	Torque rise time t_p [s]	Torque extinction time t_d [s]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]			Armature [kg·m²]	Rotor [kg·m²]						
CYT-025-33B	025	0.4	DC24	4.5	0.188	128	B	3600	1.00×10^{-6}	1.43×10^{-6}	800	1.0×10^6	0.014	0.028	0.030	0.07
CYT-03-33B	03	0.5	DC24	5.5	0.23	105	B	3600	1.30×10^{-6}	1.85×10^{-6}	900	1.5×10^6	0.015	0.030	0.040	0.13
CYT-03-33M								500		1.90×10^{-6}						0.11
CYT-04-33B	04	1.0	DC24	5.9	0.25	98	B	3600	5.15×10^{-6}	1.00×10^{-5}	1900	2.0×10^6	0.030	0.040	0.040	0.26
CYT-04-33M								500		1.05×10^{-5}						0.23

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min^{-1}.
* The rotating part moment of inertia and mass are measured for the maximum bore diameter.
* Keep supply voltage fluctuation to within 10% of coil voltage. Also, be careful that energization does not exceed 50%.

Dimensions (CYT- □ -33M)



Back clearance dimensions for the rivet head during mounting are marked with [*].

Unit [mm]

Size	Radial direction dimensions												Axial direction dimensions							
	d	A_1	A_2	A_3	A_4	F	V_1	V_2	V_3	G_1	G_2	m	H	R	L_1	L_2	P	N	T	a
03	6 8	34	32	23	12.5	14	3-2.6	3-5.5	3-6	20	23	M3	21	1.2	28.6	26.2	13	3	2.3	0.2 ± 0.05
04	8 10	45	42	30	18.5	18	3-3.1	3-6	3-6	25	27.5	M4	25.3	1.2	35.1	32.4	17.5	3.5	3	$0.2 {}^{+0.05}_{-0.1}$

* Dimensional symbols N and V3 indicate the clearance dimensions for the rivet head during mounting.

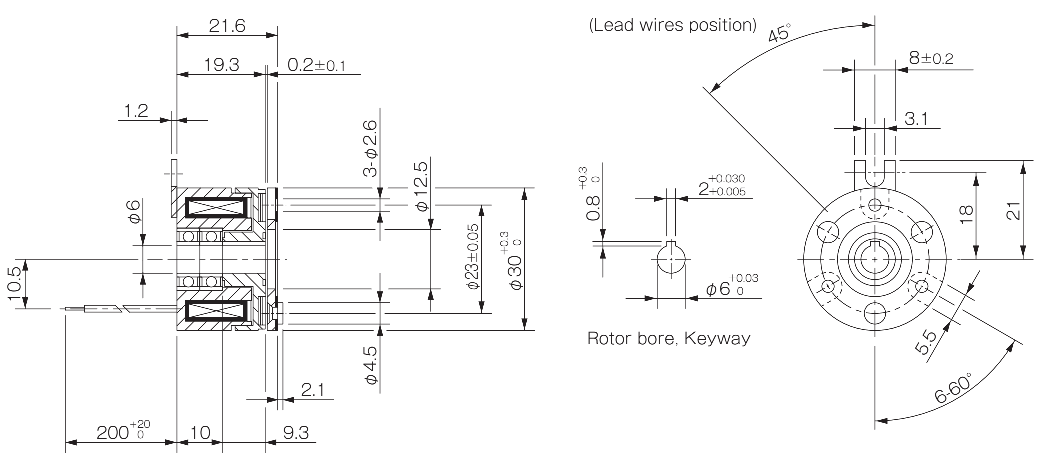
How to Place an Order

CYT-03-33M 24V 6

Size

Rotor bore diameter (dimensional symbol d)

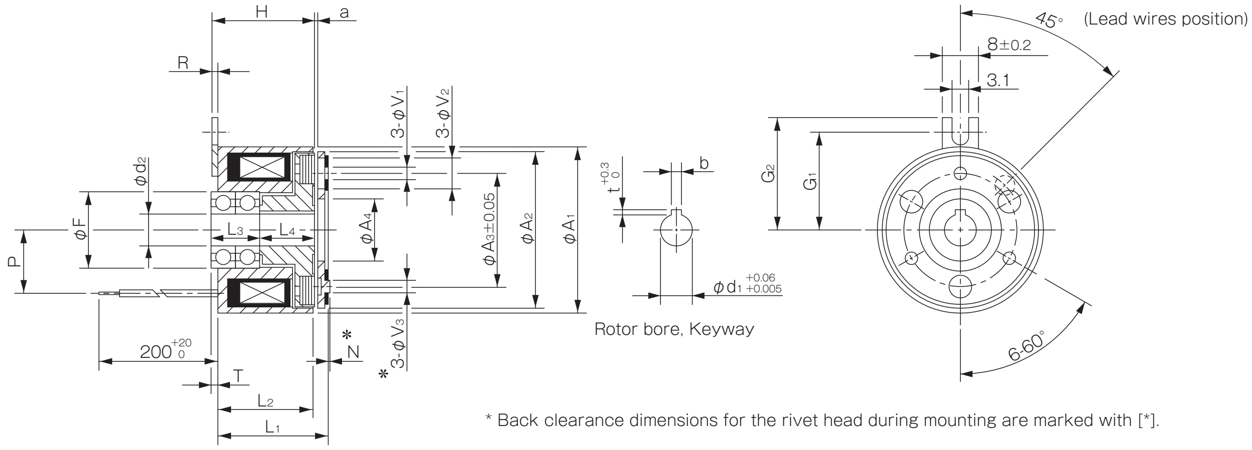
Dimensions (CYT-025-33B)



How to Place an Order

CYT-025-33B 24V 6

Dimensions (CYT-□-33B)



* Back clearance dimensions for the rivet head during mounting are marked with [*].

Unit [mm]

Size	Nominal diameter	Radial direction dimensions										Axial direction dimensions										Shaft bore dimensions			
		A₁	A₂	A₃	A₄	F	V₁	V₂	V₃	G₁	G₂	H	R	L₁	L₂	L₃	L₄	P	N	T	a	d₂	d₁	b	t
03	6	34	32	23	12.5	15	3-2.6	3-5.5	3-6	20	23	21	1.2	22.2	19.8	10	11.3	13	3	1.5	0.2 ±0.05	6	6	2 $^{+0.030}_{+0.005}$	0.8 $^{+0.3}_{0}$
	8	34	32	23	12.5	16	3-2.6	3-5.5	3-6	20	23	21	1.2	22.2	19.8	10	11.3	13	3	1.5	0.2 ±0.05	8	8	2 $^{+0.030}_{+0.005}$	0.8 $^{+0.3}_{0}$
04	8	45	42	30	18.5	19	3-3.1	3-6	3-6	25	28	25.3	1.2	26.8	24.1	12	13	17.5	3.5	0.9	0.2 $^{+0.05}_{-0.1}$	8	8	2 $^{+0.030}_{+0.005}$	0.8 $^{+0.3}_{0}$
	10	45	42	30	18.5	19	3-3.1	3-6	3-6	25	28	25.3	1.2	26.8	24.1	14	11	17.5	3.5	0.9	0.2 $^{+0.05}_{-0.1}$	10	10	3 $^{+0.025}_{0}$	1.2 $^{+0.3}_{0}$

* Dimensional symbols N and V3 indicate the clearance dimensions for the rivet head during mounting.

How to Place an Order

CYT-03-33B 24V 6

Size

Nominal diameter

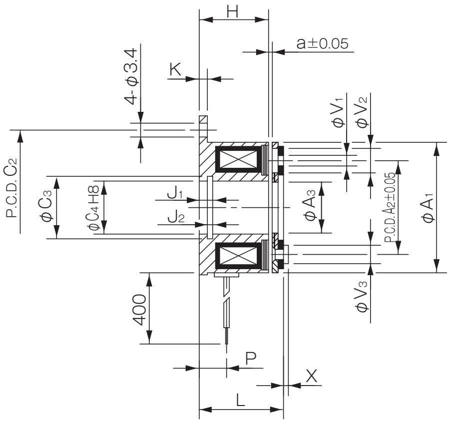
112 Models Electromagnetic Micro Brakes

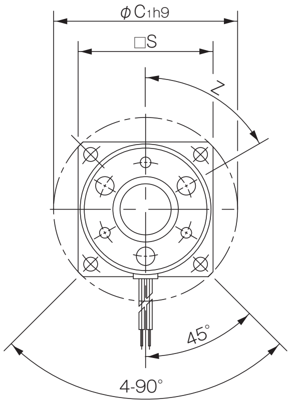
Specifications

Model	Size	Dynamic friction torque Td [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Armature moment of inertia J [kg·m²]	Allowable engaging energy Eaℓ [J]	Total work performed until Readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]									
112-02-13	02	0.4	DC24	6	0.25	96	B	10000	6.75×10^{-7}	1500	2×10^6	0.004	0.010	0.010	0.053
112-02-12									1.00×10^{-6}						0.057
112-02-11									1.00×10^{-6}						0.057
112-03-13	03	0.6	DC24	6	0.25	96	B	10000	1.30×10^{-6}	2300	3×10^6	0.005	0.012	0.008	0.072
112-03-12									1.95×10^{-6}						0.079
112-03-11									1.95×10^{-6}						0.079
112-04-13	04	1.2	DC24	8	0.33	72	B	10000	4.38×10^{-6}	4500	6×10^6	0.007	0.016	0.010	0.118
112-04-12									6.15×10^{-6}						0.131
112-04-11									6.15×10^{-6}						0.131
112-05-13	05	2.4	DC24	10	0.42	58	B	10000	9.08×10^{-6}	9000	9×10^6	0.010	0.023	0.012	0.200
112-05-12									1.38×10^{-5}						0.215
112-05-11									1.38×10^{-5}						0.215

* The dynamic friction torque, Td, is measured at a relative speed of 100 min⁻¹.
* The rotating part moment of inertia and mass are measured for the maximum bore diameter.
* Keep supply voltage fluctuation to within 10% of coil voltage.

Dimensions (112-□-13)





Unit [mm]

Size	Radial direction dimensions												Axial direction dimensions							
	A₁	A₂	A₃	C₁	C₂	C₃	C₄	S	V₁	V₂	V₃	Z	H	K	J₁	J₂	L	P	X	a
02	28	19.5	10.5	39	33.5	11.4	11	—	2-2.1	2-5.3	2-4	4-90°	13.7	1.5	2.6	1.3	16.1	5	0.8	0.1
03	32	23	12.5	45	38	13.6	13	33	3-2.6	3-6	3-4.5	6-60°	17	2	3.3	1.3	19.3	6.7	1.2	0.15
04	40	30	18.5	54	47	20	19	41	3-3.1	3-6	3-5	6-60°	20	2	3.3	1.3	22.8	7	1.6	0.15
05	50	38	25.5	65	58	27.2	26	51	3-3.1	3-6.5	3-5.5	6-60°	22	2	3.5	1.5	25.2	8	1.6	0.2

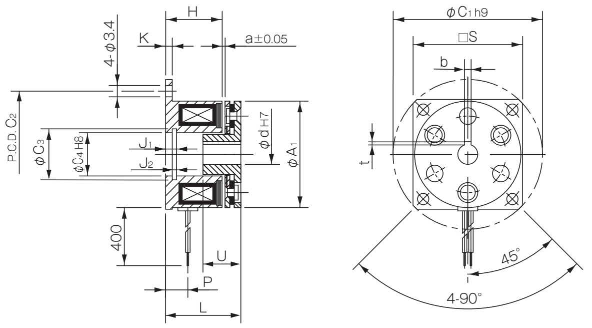
* Size 02 is a rounded flange.

How to Place an Order

112-03-13 24V

Size

Dimensions (112-☐-12)



Unit [mm]

Size	Shaft bore dimensions				
	d	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
	H7	b P9	t	b E9	t
02	5	—	—		
03	6	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
04	8	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
05	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions						Axial direction dimensions							
	A_1	C_1	C_2	C_3	C_4	S	H	K	J_1	J_2	L	P	U	a
02	28	39	33.5	11.4	11	—	13.7	1.5	2.6	1.3	18.1	5	7	0.1
03	32	45	38	13.6	13	33	17	2	3.3	1.3	21.3	6.7	10	0.15
04	40	54	47	20	19	41	20	2	3.3	1.3	25.5	7	12	0.15
05	50	65	58	27.2	26	51	22	2	3.5	1.5	28.2	8	12	0.2

* Size 02 is a rounded flange.
* The armature hub of size 02 has no keyway. Lock it in place by press-fitting it onto the shaft or the like.

How to Place an Order

112-03-12 24V 6DIN

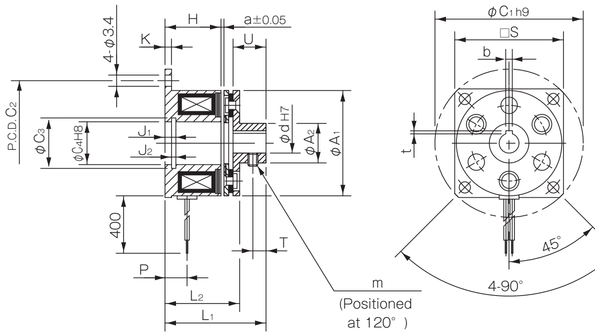
Size

Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

Armature bore diameter (dimensional symbol d)

* Models for which there are no keyway standards (models marked by [-]) on the Shaft Bore Dimensions table need not be marked with a keyway standards designation. Products with standards marked by diagonal lines are not set as standard products.

Dimensions (112-☐-11)



Unit [mm]

Size	Shaft bore dimensions				
	d	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
	H7	b P9	t	b E9	t
02	5	—	—		
03	6	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
04	8	$2^{-0.006}_{-0.031}$	$0.8^{+0.3}_{0}$		
	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
05	10	$3^{-0.006}_{-0.031}$	$1.2^{+0.3}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions								Axial direction dimensions									
	A_1	A_2	C_1	C_2	C_3	C_4	S	m	H	K	J_1	J_2	L_1	L_2	P	U	T	a
02	28	9.5	39	33.5	11.4	11	—	M3	13.7	1.5	2.6	1.3	23.1	18.1	5	7	2.5	0.1
03	32	12	45	38	13.6	13	33	2-M3	17	2	3.3	1.3	29.3	21.3	6.7	10	4	0.15
04	40	17	54	47	20	19	41	2-M3	20	2	3.3	1.3	34.8	25.5	7	12	5	0.15
05	50	24	65	58	27.2	26	51	2-M4	22	2	3.5	1.5	37.2	28.2	8	12	5	0.2

* Size 02 is a rounded flange.

How to Place an Order

112-03-11 24V 6DIN

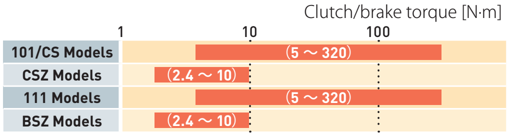
Size

Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

Armature bore diameter (dimensional symbol d)

* Models for which there are no keyway standards (models marked by [-]) on the Shaft Bore Dimensions table need not be marked with a keyway standards designation. Products with standards marked by diagonal lines are not set as standard products.

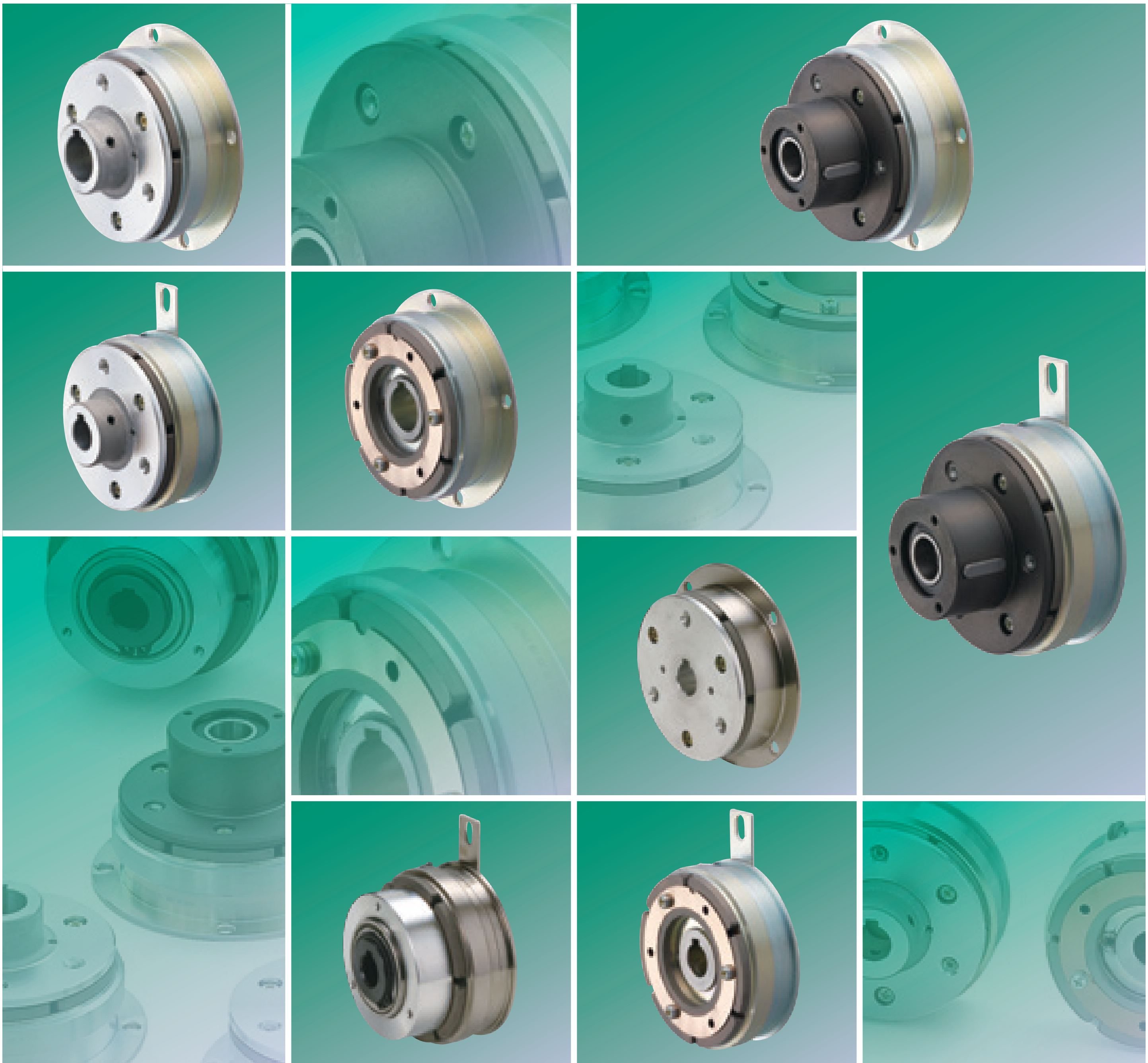
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES



Application	Printing machinery, bookbinding machinery, food machinery, wrapping machinery, textiles machinery

Clutches and Brakes that Accurately Control a Variety of General Industrial Machinery

Clutches accurately connect and release power by being located between the driver and the load. Brakes are used to slow or stop load inertia and machinery and to hold things in stationary positions. Using these basic operations and combining clutches and brakes enable a variety of applications such as stepped speed-changing mechanisms, switching between forward and reverse operation, positioning/indexing, and inching. Part of their appeal is the simplicity of control and ease of maintenance.



Available Models

Series	Applications		Lineup
CLUTCHES & BRAKES	Clutches	Standard type	101/CS
		One-touch mounted type	CSZ
	Brakes	Standard type	111
		One-touch mounted type	BSZ

For details on selection, see P.312 to 319.

Clutches

101-☐-1☐
Mounting
Size
Shaft Coupling System (Armature)

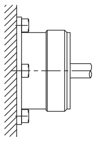
CS-☐-3☐
Mounting
Size
Shaft Coupling System (Armature)

Mounting

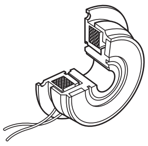
101

Wall-mounted type

Uses a flange-mounted stator. Designed to be short in the axial direction, requiring less installation space.



Directly mounted to the wall

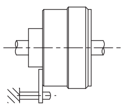


Flange-mounted type

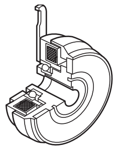
CS

Shaft-mounted type

Uses a bearing-mounted stator. Designed to be relatively easy to mount, reducing the processing and work required for mounting.



Mounted onto the shaft



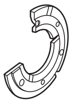
Bearing-mounted type

Shaft Coupling System (Armatures)

101-☐-☐3, CS-☐-☐3

Butt and parallel shaft type (Armature type-3)

These incorporate non-armature parts provided by the customer such as V pulleys, enabling use in designs that use either butt shafts or through-shafts.

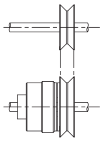


Armature type-3

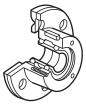
101-☐-☐5, CS-☐-☐5

Directly coupled type wound around the parallel axis (armature type-5)

Uses an armature assembly designed for use with through-shafts. Ensures that mounting is relatively easy to complete as well as extremely efficient in its approach.



Directly coupled by being wound around the parallel shaft

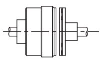


Armature type-5

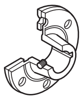
101-☐-☐1, CS-☐-☐1

Butt type (Armature type-1)

Uses an armature assembly designed for use with butt shafts. May be difficult to mount due to the need for centering and other adjustments, may require the use of a fitting flange, or may require use in combination with flexible couplings.



Coupled directly to the butt shaft



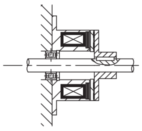
Armature type-1

Brake

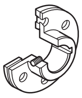
111-☐-1☐
Size
Shaft Coupling System (Armature)

Shaft-mounted type

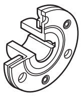
These use axial braking in most cases, the effectiveness of which depends on how efficiently parts are mounted.



Mounted to the shaft



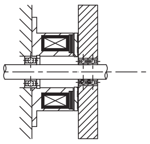
Armature type-1



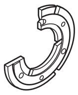
Armature type-2

Rotor-mounted type

Uses an armature assembly mounted directly to an inertial body not fastened to the shaft that continues to move even after the shaft has stopped.



Mounted to the rotor

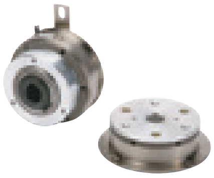


Armature type-3

One-touch mounted type

CSZ, BSZ

Designed with the same basic construction as that of the standard type. Comes equipped with a stator armature, eliminating the need for time-consuming gap adjustments. Easy to assemble, guaranteeing dramatic reductions in assembly times.

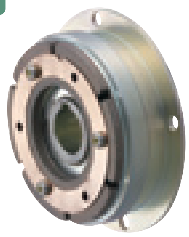


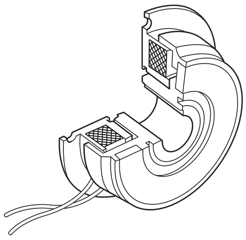
Product Lineup

101

Electromagnetic-actuated Clutches - Flange-mounted Type

RoHS





Flange-mounted type

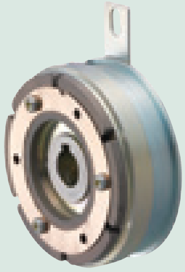
Stator and rotor are combined and directly mounted on stationary parts, such as frames, and fixed in place. These are short in the axial direction and can make effective use of space near windows. Select the armature according to the coupling type used (through-shaft, butt shaft, etc.).

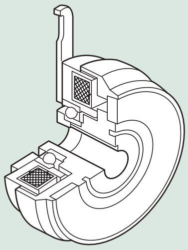
Clutch torque	[N·m]	5 ～ 320
Operating temperature	[℃]	−10 ～ +40
Backlash		Zero

CS

Electromagnetic-actuated Clutches - Bearing-mounted Type

RoHS





Bearing-mounted type

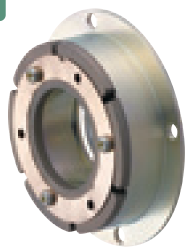
These integrate the stator and rotor, which are held to the stationary parts of the machine by a drive pin arm; the rotor is locked to the rotation shaft by a key. They are designed to be relatively easy to mount, reducing the processing work required for mounting.

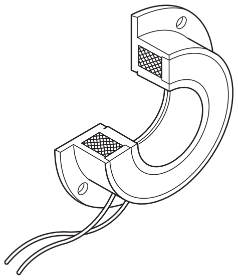
Clutch torque	[N·m]	5 ～ 320
Operating temperature	[℃]	−10 ～ +40
Backlash		Zero

111

Electromagnetic-actuated Brakes

RoHS





Brakes are used to brake and hold rotating bodies. The flange of the stator is locked securely to a strong stationary part. Select an armature that factors in the mounting space available.

Brake torque	[N·m]	5 ～ 320
Operating temperature	[℃]	−10 ～ +40
Backlash		Zero

CSZ/BSZ

Electromagnetic-actuated Clutches & Brakes - One-touch-mounted Type

RoHS

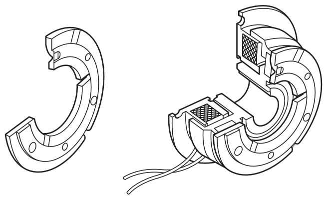
CSZ

BSZ

These models adjust the gap to the frictional surface that clutches and brakes require to operate and come pre-assembled. Clutches are simply placed on the shaft and brakes mounted on the flange surface. They do not require gap adjustment or adjustment of concentricity/parallel misalignment, greatly reducing installation work.

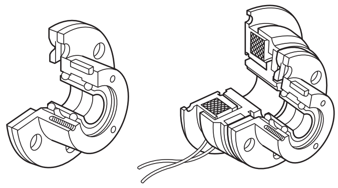
Clutch/brake torque	[N·m]	2.4 ～ 10
Operating temperature	[℃]	−10 ～ +40
Backlash		Zero

Types for through-shaft or butt shaft



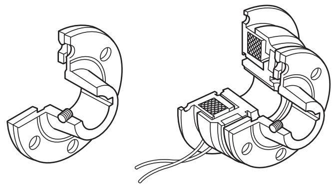
Armature type-3 101-□-13G

Through-shaft (coupled by winding around parallel shaft) type



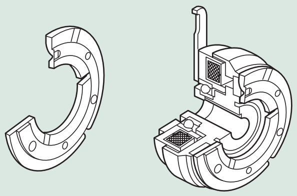
Armature type-5 101-□-15G

Butt shaft type



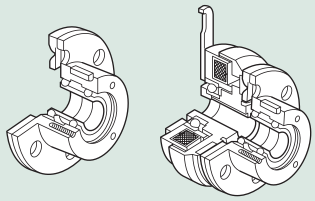
Armature type-1 101-□-11G

Types for through-shaft or butt shaft



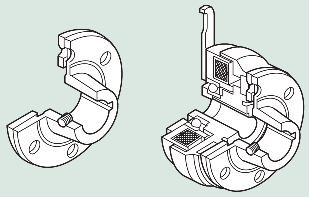
Armature type-3 CS-□-33G

Through-shaft (coupled by winding around parallel shaft) type



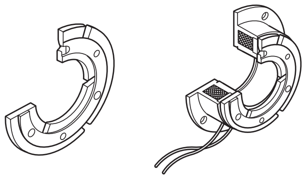
Armature type-5 CS-□-35G

Butt shaft type



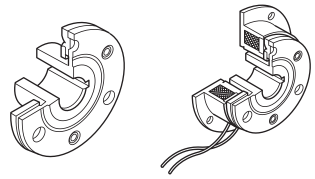
Armature type-1 CS-□-31G

Types with many applications



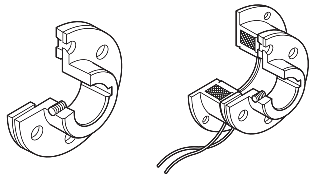
Armature type-3 111-□-13G

Slim, space-saving type



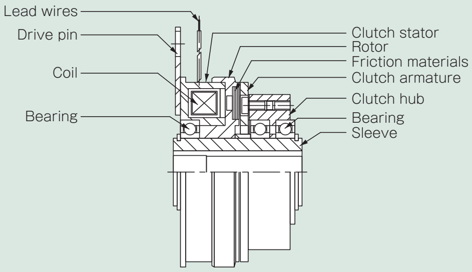
Armature type-2 111-□-12G

Easy-to-use standard-shape type

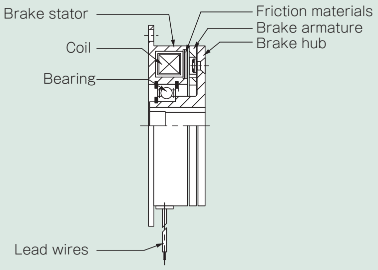


Armature type-1 111-□-11G

CSZ



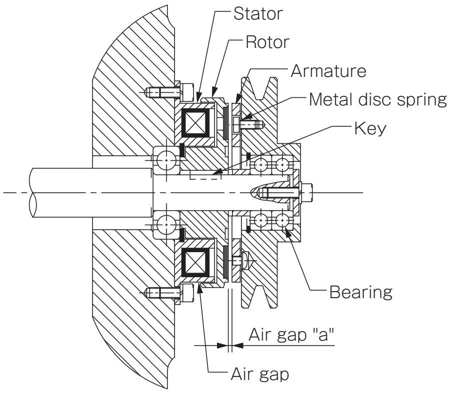
BSZ



Mounting Example

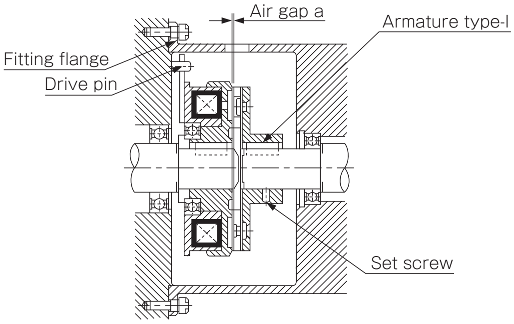
Flange-mounting example with 101

The stator is directly mounted on a stationary part, such as a frame, by a mounting flange, and fixed in place. The rotor is locked to the rotation shaft using a key. The stator and rotor are combined via a narrow air gap that serves as part of the magnetic circuit to form a magnetic pole.



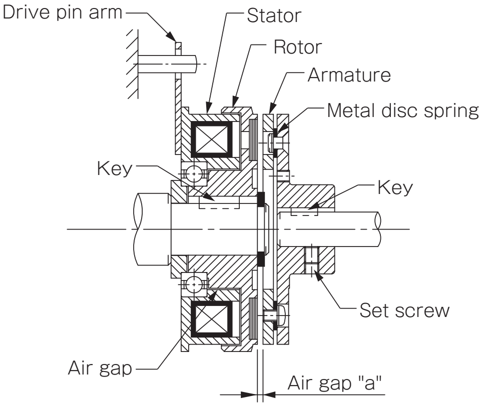
Butt shaft mounting example with CS

In designs that use butt shafts, the two shafts can be reliably centered using fitting flanges, as shown in the figure.



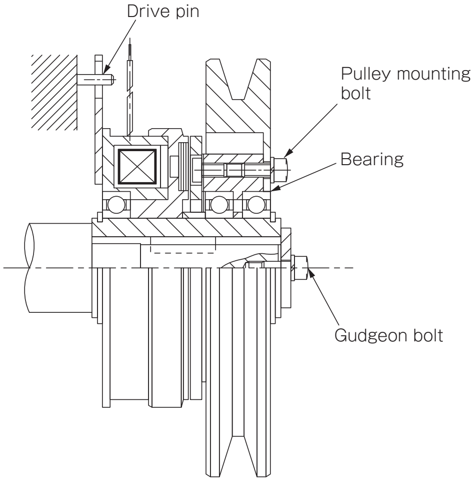
Bearing-mounting example with CS

The stator is integrated with the rotor via a bearing and held to the stationary parts of the machine by a drive pin arm. The rotor is locked to the rotation shaft using a set screw. The stator and rotor form a magnetic pole via the bearing.



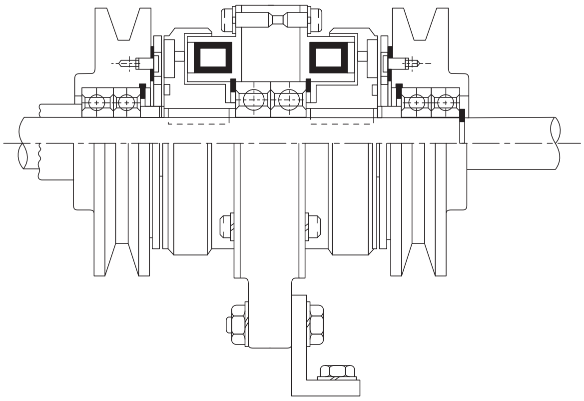
Mounting example with CSZ

Simply insert the shaft in the sleeve and fasten a CSZ on the shaft end and mounting is complete.



Example of combining clutches

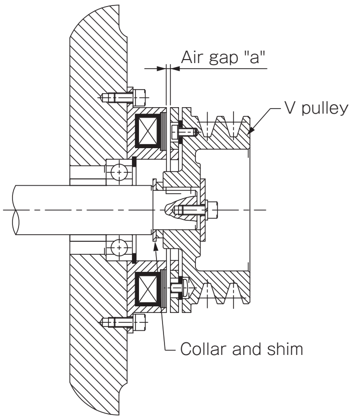
In this example, two clutches are assembled on a through-shaft. This is very effective when controls such as two-step speed changing and forward/reverse operation are needed and space is limited.



Mounting Example

Armature type-3 mounting example with 111

When armature type-3 is directly mounted on the end face of a V pulley, no armature hub is needed, making for a very efficient design. These are optimal when space is limited or when a shaft overhangs from a wall and the overhang load must be kept extremely low.

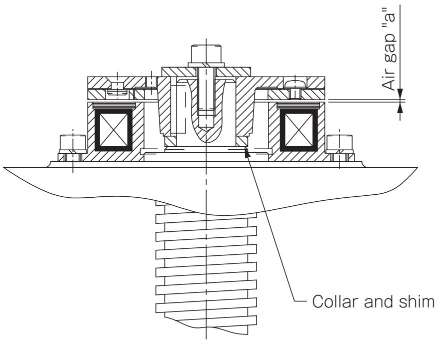


Armature type-2 mounting example on vertical shaft with 111

Armature type-2 is a special armature that puts the boss part of the armature hub into the space within the stator. That makes it compact. It is short in the axial direction even when a pulley or the like is installed on the tip of the brake. Since running torque is zero, it does not take up space even when mounted on a vertical shaft, and is also easy to install.

Air gap "a" can be set easily using collars and shims.

Corrections are easily accomplished by adding or removing shims.

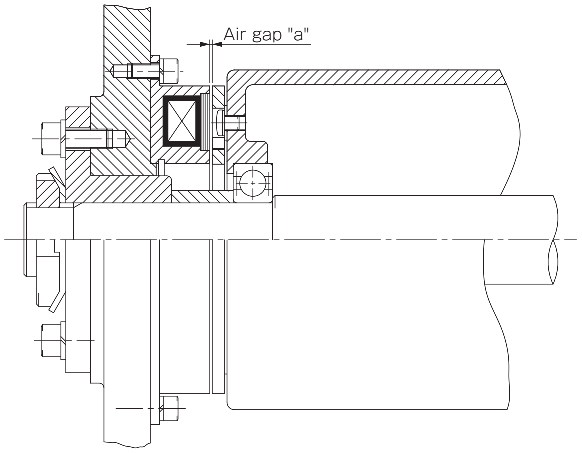


Armature type-3 mounting example with 111

If a rotating body floating above a shaft by means of a bearing (an idler pulley, guide roller, or the like) has an armature type-3 mounted on it directly, it can be assembled easily without taking up a lot of space.

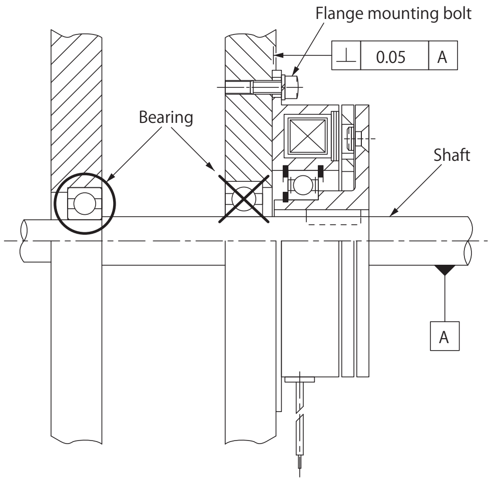
Air gap "a" can be set easily using collars and shims.

Corrections are easily accomplished by adding or removing shims.



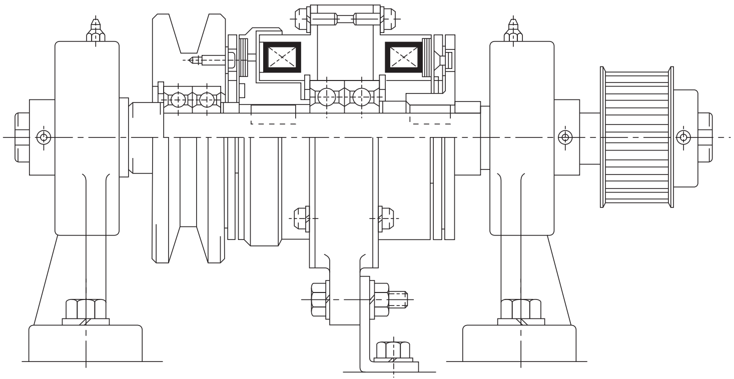
Mounting example with BSZ

Simply insert onto the shaft to be braked and lock the BSZ on the wall surface and mounting is complete. Be careful when designing that the mounting shaft does not cantilever and end up a three-point mounting.



Example of combining clutches and brakes

In this example, a clutch and brake are assembled on a through-shaft. This is effective when mounting space is limited or when there is no wall on which to mount the stator.



101 Models Electromagnetic Clutches - Flange-mounted Type

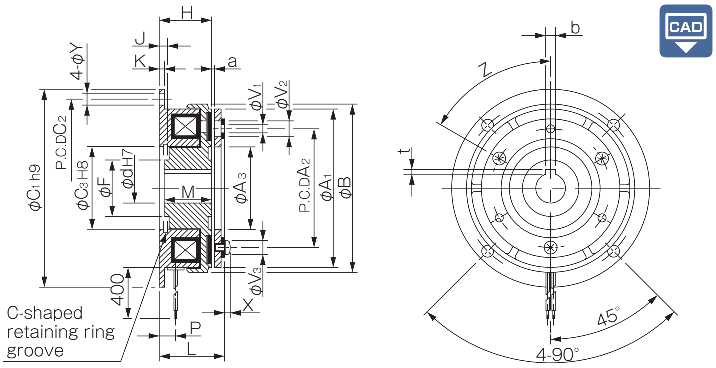
Specifications

Model	Size	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20°C)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J		Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]			Rotor [kg·m²]	Armature [kg·m²]					
101-06-13G	06	5	5.5	DC24	11	0.46	52	B	8000	7.35×10^{-5}	4.23×10^{-5}	36×10^6	0.020	0.041	0.020	0.46
101-06-15G											1.05×10^{-4}					0.66
101-06-11G											6.03×10^{-5}					0.5
101-08-13G	08	10	11	DC24	15	0.63	38	B	6000	2.24×10^{-4}	1.18×10^{-4}	60×10^6	0.023	0.051	0.030	0.83
101-08-15G											3.00×10^{-4}					1.19
101-08-11G											1.71×10^{-4}					0.91
101-10-13G	10	20	22	DC24	20	0.83	29	B	5000	6.78×10^{-4}	4.78×10^{-4}	130×10^6	0.025	0.063	0.050	1.5
101-10-15G											9.45×10^{-4}					2.11
101-10-11G											6.63×10^{-4}					1.66
101-12-13G	12	40	45	DC24	25	1.09	23	B	4000	2.14×10^{-3}	1.31×10^{-3}	250×10^6	0.040	0.115	0.065	2.76
101-12-15G											2.75×10^{-3}					3.8
101-12-11G											1.81×10^{-3}					3.05
101-16-13G	16	80	90	DC24	35	1.46	16	B	3000	6.30×10^{-3}	4.80×10^{-3}	470×10^6	0.050	0.160	0.085	5.1
101-16-15G											9.05×10^{-3}					6.9
101-16-11G											6.35×10^{-3}					5.4
101-20-13G	20	160	175	DC24	45	1.88	13	B	2500	1.93×10^{-2}	1.37×10^{-2}	10×10^8	0.090	0.250	0.130	9.3
101-20-15G											2.65×10^{-2}					13
101-20-11G											1.90×10^{-2}					10.5
101-25-13G	25	320	350	DC24	60	2.5	9.6	B	2000	4.48×10^{-2}	3.58×10^{-2}	20×10^8	0.115	0.335	0.210	17
101-25-15G											7.45×10^{-2}					23.6
101-25-11G											4.83×10^{-2}					18.7

* The dynamic friction torque, Td, is measured at a relative speed of 100 min⁻¹.
* The rotating part moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (101-□-13G)

(For direct mounting)



C-shaped retaining ring groove

Unit [mm]

Size	Shaft bore dimensions				
	d	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
	H7	b P9	t	b E9	t
06	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
08	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
12	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
20	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
25	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
	60	$18^{-0.018}_{-0.061}$	$4^{+0.5}_{0}$	$15^{+0.075}_{+0.032}$	$5^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions												Axial direction dimensions							
	A₁	A₂	A₃	B	C₁	C₂	C₃	F	V₁	V₂	V₃	Y	Z	H	J	K	L	M	P	X	a
06	63	46	34.5	67.5	80	72	35	23	3-3.1	3-6.3	3-5.5	5	6-60°	24	3.5	2.1	28	22	7.3	2.5	0.2 ± 0.05
08	80	60	41.5	85	100	90	42	28.5	3-4.1	3-8	3-7	6	6-60°	26.5	4.3	2.6	31	24	8.3	2.85	0.2 ± 0.05
10	100	76	51.5	106	125	112	52	40	3-5.1	3-10.5	3-9	7	6-60°	30	5	3.1	36	27	9	3.3	0.2 ± 0.05
12	125	95	61.5	133	150	137	62	45	3-6.1	3-12	3-11	7	6-60°	33.5	5.5	3.6	40.5	30	9.3	3.3	$0.3^{+0.05}_{-0.1}$
16	160	120	79.5	169	190	175	80	62	3-8.1	3-15	3-14	9.5	6-60°	37.5	6	4.1	46.5	34	11.7	3.5	$0.3^{+0.05}_{-0.1}$
20	200	158	99.5	212.5	230	215	100	77	3-10.2	3-18	3-17	9.5	6-60°	44	7	5.1	55.5	40	13.4	4.9	$0.5^{0}_{-0.2}$
25	250	210	124.5	264	290	270	125	100	4-12.2	4-22	4-20	11.5	8-45°	51	8	6.1	64	47	16	5.5	$0.5^{0}_{-0.2}$

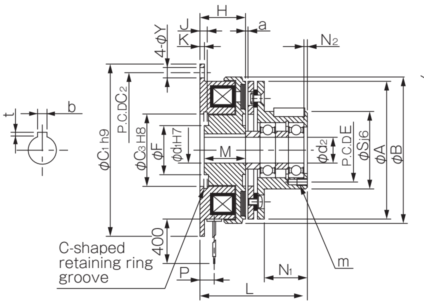
How to Place an Order

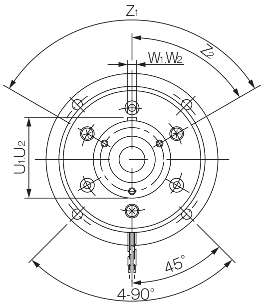
101-06-13G 24V 12DIN

Size
Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards
Rotor bore diameter (dimensional symbol d)

Dimensions (101-□-15G)

(For through-shafts)





Unit [mm]

Size	Shaft bore dimensions					
	d₁ H7	d₂	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
			b P9	t	b E9	t
06	12	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
08	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
12	25	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
20	40	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
25	50	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions											Axial direction dimensions													
	A	B	C_1	C_2	C_3	E	F	Y	S	Z_1	Z_2	H	J	K	L	M	N_1	N_2	P	U_1	W_1	U_2	W_2	a	m
06	63	67.5	80	72	35	33	23	5	38	3-120°	60°	24	3.5	2.1	51.5	22	20	2	7.3	39.5	4	39.5	4	0.2 ± 0.05	3-M4 × 0.7, length: 4
08	80	85	100	90	42	37	28.5	6	45	3-120°	60°	26.5	4.3	2.6	60	24	25	2	8.3	47	5	47	5	0.2 ± 0.05	3-M4 × 0.7, length: 6
10	100	106	125	112	52	47	40	7	55	4-90°	45°	30	5	3.1	71	27	30	3	9	57	5	57.5	6	0.2 ± 0.05	4-M4 × 0.7, length: 8
12	125	133	150	137	62	52	45	7	64	4-90°	45°	33.5	5.5	3.6	86.5	30	40	2	9.3	67	7	67	8	$0.3^{+0.05}_{-0.1}$	4-M4 × 0.7, length: 8
16	160	169	190	175	80	62	62	9.5	75	6-60°	30°	37.5	6	4.1	103.5	34	50	3	11.7	78	7	78	8	$0.3^{+0.05}_{-0.1}$	6-M5 × 0.8, length: 8
20	200	212.5	230	215	100	74.5	77	9.5	90	4-90°	45°	44	7	5.1	124.5	40	60	5	13.4	93.5	10	93	10	$0.5^{0}_{-0.2}$	4-M6 × 1, length: 12
25	250	264	290	270	125	101.5	100	11.5	115	8-45°	22.5°	51	8	6.1	145	47	70	6	16	118.5	12	118	12	$0.5^{0}_{-0.2}$	8-M6 × 1, length: 12

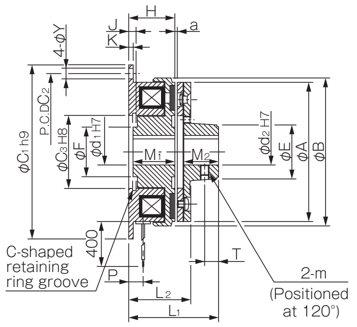
How to Place an Order

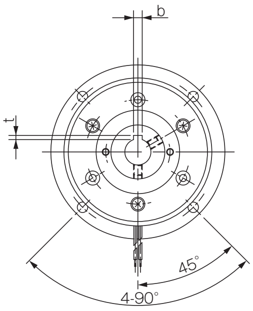
101-06-15G 24V R12DIN A12JIS

- Size
- Rotor bore diameter (dimensional symbol d1)
- Keyway standards DIN: Compliant with the new JIS standards
  JIS: Compliant with the old JIS standards
- Armature bore diameter (dimensional symbol d2)
- Armature type-5 keyway standards
  Dimensional symbol U2, W2: Compliant with the new JIS standards: DIN
  Dimensional symbol U1, W1: Compliant with the old JIS standards: JIS

Dimensions (101-□-11G)

(For butt shafts)





Unit [mm]

Size	Shaft bore dimensions					
	d₁ H7	d₂ H7	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
			b P9	t	b E9	t
06	12	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
08	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	20	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	25	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
12	25	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	30	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	40	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
20	40	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
	50	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
25	50	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
	60	60	$18^{-0.018}_{-0.061}$	$4^{+0.5}_{0}$	$15^{+0.075}_{+0.032}$	$5^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions									Axial direction dimensions									
	A	B	C_1	C_2	C_3	E	F	Y	m	H	J	K	L_1	L_2	M_1	M_2	P	T	a
06	63	67.5	80	72	35	26	23	5	M4	24	3.5	2.1	43	31.5	22	15	7.3	6	0.2 ± 0.05
08	80	85	100	90	42	31	28.5	6	M5	26.5	4.3	2.6	51	35	24	20	8.3	8	0.2 ± 0.05
10	100	106	125	112	52	41	40	7	M5	30	5	3.1	61	41	27	25	9	10	0.2 ± 0.05
12	125	133	150	137	62	49	45	7	M6	33.5	5.5	3.6	70.5	46.5	30	30	9.3	12	$0.3^{+0.05}_{-0.1}$
16	160	169	190	175	80	65	62	9.5	M8	37.5	6	4.1	84.5	53.5	34	38	11.7	15	$0.3^{+0.05}_{-0.1}$
20	200	212.5	230	215	100	83	77	9.5	M8	44	7	5.1	100.5	64.5	40	45	13.4	18	$0.5^{0}_{-0.2}$
25	250	264	290	270	125	105	100	11.5	M10	51	8	6.1	118	75	47	54	16	22	$0.5^{0}_{-0.2}$

How to Place an Order

101-06-11G 24V R12DIN A12DIN

- Size
- Rotor bore diameter (dimensional symbol d1)
- Keyway standards DIN: Compliant with the new JIS standards
  JIS: Compliant with the old JIS standards
- Armature bore diameter (dimensional symbol d2)
- Keyway standards DIN: Compliant with the new JIS standards
  JIS: Compliant with the old JIS standards

CS Models Electromagnetic Clutches - Bearing-mounted Type

Specifications

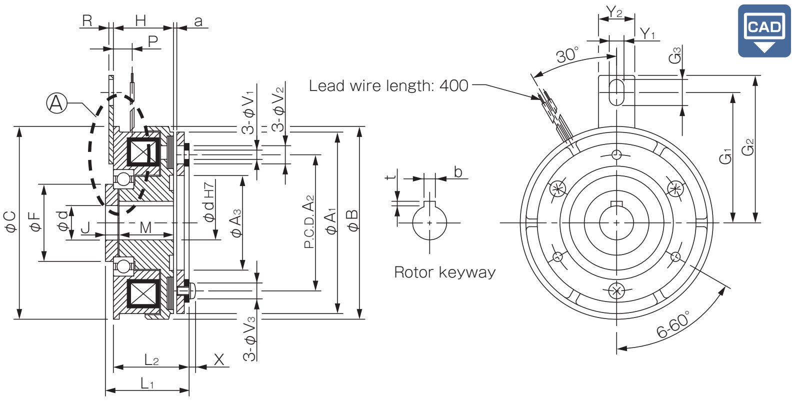
Model	Size	Dynamic friction torque Td [N·m]	Static friction torque Ts [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J		Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]			Rotor [kg·m²]	Armature [kg·m²]					
CS-06-33G	06	5	5.5	DC24	11	0.46	52	B	3000	7.35×10^{-5}	4.23×10^{-5}	36×10^{6}	0.020	0.041	0.020	0.50
CS-06-35G											1.05×10^{-4}					0.70
CS-06-31G											6.03×10^{-5}					0.54
CS-08-33G	08	10	11	DC24	15	0.63	38	B	3000	2.24×10^{-4}	1.18×10^{-4}	60×10^{6}	0.023	0.051	0.030	0.87
CS-08-35G											3.00×10^{-4}					1.23
CS-08-31G											1.71×10^{-4}					0.95
CS-10-33G	10	20	22	DC24	20	0.83	29	B	3000	6.78×10^{-4}	4.78×10^{-4}	130×10^{6}	0.025	0.063	0.050	1.57
CS-10-35G											9.45×10^{-4}					2.18
CS-10-31G											6.63×10^{-4}					1.73
CS-12-33G	12	40	45	DC24	25	1.09	23	B	2000	2.14×10^{-3}	1.31×10^{-3}	250×10^{6}	0.040	0.115	0.065	2.89
CS-12-35G											2.75×10^{-3}					3.93
CS-12-31G											1.81×10^{-3}					3.18
CS-16-33G	16	80	90	DC24	35	1.46	16	B	2000	6.30×10^{-3}	4.80×10^{-3}	470×10^{6}	0.050	0.160	0.085	5.3
CS-16-35G											9.05×10^{-3}					7.1
CS-16-31G											6.35×10^{-3}					5.6
CS-20-33G	20	160	175	DC24	45	1.88	13	B	1500	1.93×10^{-2}	1.37×10^{-2}	10×10^{8}	0.090	0.250	0.130	9.8
CS-25-33G	25	320	350	DC24	72	3.00	8	B	1500	4.48×10^{-2}	3.58×10^{-2}	20×10^{8}	0.115	0.335	0.210	17.5

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

* The moment of inertia of a rotating body and mass are measured for the maximum bore diameter.

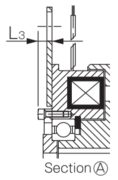
Dimensions (CS- □ -33G)

(For direct mounting)



Unit [mm]

Size	Shaft bore dimensions				
	d H7	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
		b P9	t	b E9	t
06	12	$4\,^{-0.012}_{-0.042}$	$1.5\,^{+0.5}_{0}$	$4\,^{+0.050}_{+0.020}$	$1.5\,^{+0.5}_{0}$
08	15	$5\,^{-0.012}_{-0.042}$	$2\,^{+0.5}_{0}$	$5\,^{+0.050}_{+0.020}$	$2\,^{+0.5}_{0}$
10	20	$6\,^{-0.012}_{-0.042}$	$2.5\,^{+0.5}_{0}$	$5\,^{+0.050}_{+0.020}$	$2\,^{+0.5}_{0}$
12	25	$8\,^{-0.015}_{-0.051}$	$3\,^{+0.5}_{0}$	$7\,^{+0.061}_{+0.025}$	$3\,^{+0.5}_{0}$
16	30	$8\,^{-0.015}_{-0.051}$	$3\,^{+0.5}_{0}$	$7\,^{+0.061}_{+0.025}$	$3\,^{+0.5}_{0}$
20	40	$12\,^{-0.018}_{-0.061}$	$3\,^{+0.5}_{0}$	$10\,^{+0.061}_{+0.025}$	$3.5\,^{+0.5}_{0}$
25	50	$14\,^{-0.018}_{-0.061}$	$3.5\,^{+0.5}_{0}$	$12\,^{+0.075}_{+0.032}$	$3.5\,^{+0.5}_{0}$



Section Ⓐ

Size	L3
20	9
25	6.8

* On sizes 20 and 25, the head of the bolt for pressing down the bearing will stick out. See the above dimensions.

Unit [mm]

Size	Radial direction dimensions														Axial direction dimensions								
	A_1	A_2	A_3	B	C	F	G_1	G_2	G_3	V_1	V_2	V_3	Y_1	Y_2	H	L_1	L_2	M	J	P	R	X	a
06	63	46	34.5	67.5	67.5	24	42.5	50	9.5	3.1	6.3	5.5	4.5	14	24	31	28	22	5	7.3	2	2.5	$0.2\,\pm0.05$
08	80	60	41.5	85	85	34	57.5	65	11.5	4.1	8	7	6.5	16	26.5	34.5	31	24	6	8.3	2	2.85	$0.2\,\pm0.05$
10	100	76	51.5	106	106	40	62.5	70	11.5	5.1	10.5	9	6.5	16	30	39.5	36	27	6.5	9	2	3.3	$0.2\,\pm0.05$
12	125	95	61.5	133	133	45	77.5	85	11.5	6.1	12	11	6.5	16	33.5	44.5	40.5	30	7.5	9.3	2	3.3	$0.3\,^{+0.05}_{-0.1}$
16	160	120	79.5	169	169	58	100	112	18.5	8.1	15	14	8.5	25	37.5	50.5	46.5	34	7.5	11.7	3.2	3.5	$0.3\,^{+0.05}_{-0.1}$
20	200	158	99.5	212.5	212	75	125	138	18.5	10.2	18	16.2	8.5	25	44	60.5	55.5	40	9	13.4	3	5	$0.5\,^{0}_{-0.2}$
25	250	210	124.5	264	250	100	155	173	24	12.2	22	20	12	30	53	69	66	47	9	18	6	4.5	$0.5\,^{0}_{-0.2}$

* The V_1, V_2, and V_3 dimensions of size 25 are located in four places 90° apart.

How to Place an Order

CS-06-33G 24V 12DIN

Size

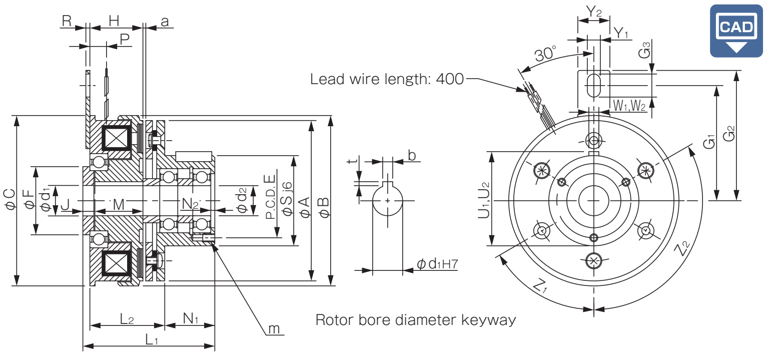
Rotor bore diameter (dimensional symbol d)

Keyway standards DIN: Compliant with the new JIS standards

JIS: Compliant with the old JIS standards

Dimensions (CS-□-35G)

(For through-shafts)



Unit [mm]

Size	Shaft bore dimensions					
	d₁ H7	d₂	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
			b P9	t	b E9	t
06	12	12	4 $^{-0.012}_{-0.042}$	1.5 $^{+0.5}_{0}$	4 $^{+0.050}_{+0.020}$	1.5 $^{+0.5}_{0}$
08	15	15	5 $^{-0.012}_{-0.042}$	2 $^{+0.5}_{0}$	5 $^{+0.050}_{+0.020}$	2 $^{+0.5}_{0}$
10	20	20	6 $^{-0.012}_{-0.042}$	2.5 $^{+0.5}_{0}$	5 $^{+0.050}_{+0.020}$	2 $^{+0.5}_{0}$
12	25	25	8 $^{-0.015}_{-0.051}$	3 $^{+0.5}_{0}$	7 $^{+0.061}_{+0.025}$	3 $^{+0.5}_{0}$
16	30	30	8 $^{-0.015}_{-0.051}$	3 $^{+0.5}_{0}$	7 $^{+0.061}_{+0.025}$	3 $^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions													Axial direction dimensions														
	A	B	C	E	F	G_1	G_2	G_3	S	Y_1	Y_2	Z_1	Z_2	H	L_1	L_2	M	J	N_1	N_2	P	R	U_1	W_1	U_2	W_2	a	m
06	63	67.5	67.5	33	24	42.5	50	9.5	38	4.5	14	3-120°	0°	24	54.5	31.5	22	5	20	2	7.3	2	39.5	4	39.5	4	0.2 ±0.05	3-M4 × 0.7, length: 4
08	80	85	85	37	34	57.5	65	11.5	45	6.5	16	3-120°	0°	26.5	63.5	35	24	6	25	2	8.3	2	47	5	47	5	0.2 ±0.05	3-M4 × 0.7, length: 6
10	100	106	106	47	40	62.5	70	11.5	55	6.5	16	4-90°	45°	30	74.5	41	27	6.5	30	3	9	2	57	5	57.5	6	0.2 ±0.05	4-M4 × 0.7, length: 8
12	125	133	133	52	45	77.5	85	11.5	64	6.5	16	4-90°	45°	33.5	90.5	46.5	30	7.5	40	2	9.3	2	67	7	67	8	0.3 $^{+0.05}_{-0.1}$	4-M4 × 0.7, length: 8
16	160	169	169	62	58	100	112	18.5	75	8.5	25	6-60°	30°	37.5	107.5	53.5	34	7.5	50	3	11.7	3.2	78	7	78	8	0.3 $^{+0.05}_{-0.1}$	6-M5 × 0.8, length: 8

How to Place an Order

CS-06-35G 24V R12DIN A12JIS

Size

Rotor bore diameter (dimensional symbol)

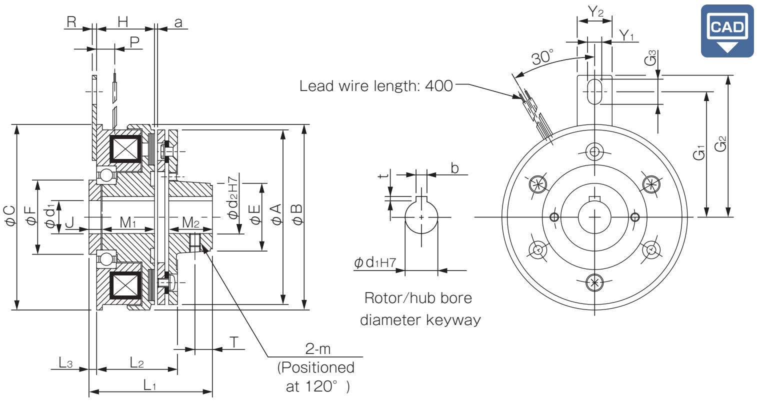
Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

Armature type-5 keyway standards
Dimensional symbol U₂, W₂: Compliant with the new JIS standards: DIN
Dimensional symbol U₁, W₁: Compliant with the old JIS standards: JIS

Armature bore diameter (dimensional symbol d2)

Dimensions (CS-□-31G)

(For butt shafts)



Unit [mm]

Size	Shaft bore dimensions					
	d₁ H7	d₂ H7	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
			b P9	t	b E9	t
06	12	12	4 $^{-0.012}_{-0.042}$	1.5 $^{+0.5}_{0}$	4 $^{+0.050}_{+0.020}$	1.5 $^{+0.5}_{0}$
08	15	15	5 $^{-0.012}_{-0.042}$	2 $^{+0.5}_{0}$	5 $^{+0.050}_{+0.020}$	2 $^{+0.5}_{0}$
10	20	20	6 $^{-0.012}_{-0.042}$	2.5 $^{+0.5}_{0}$	5 $^{+0.050}_{+0.020}$	2 $^{+0.5}_{0}$
12	25	25	8 $^{-0.015}_{-0.051}$	3 $^{+0.5}_{0}$	7 $^{+0.061}_{+0.025}$	3 $^{+0.5}_{0}$
16	30	30	8 $^{-0.015}_{-0.051}$	3 $^{+0.5}_{0}$	7 $^{+0.061}_{+0.025}$	3 $^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions											Axial direction dimensions										
	A	B	C	E	F	G_1	G_2	G_3	Y_1	Y_2	m	H	L_1	L_2	L_3	M_1	M_2	J	P	R	T	a
06	63	67.5	67.5	26	24	42.5	50	9.5	4.5	14	M4	24	46	31.5	3	22	15	5	7.3	2	6	0.2 ±0.05
08	80	85	85	31	34	57.5	65	11.5	6.5	16	M5	26.5	54.5	35	3.5	24	20	6	8.3	2	8	0.2 ±0.05
10	100	106	106	41	40	62.5	70	11.5	6.5	16	M5	30	64.5	41	3.5	27	25	6.5	9	2	10	0.2 ±0.05
12	125	133	133	49	45	77.5	85	11.5	6.5	16	M6	33.5	74.5	46.5	4	30	30	7.5	9.3	2	12	0.3 $^{+0.05}_{-0.1}$
16	160	169	169	65	58	100	112	18.5	8.5	25	M8	37.5	88.5	53.5	4	34	38	7.5	11.7	3.2	15	0.3 $^{+0.05}_{-0.1}$

How to Place an Order

CS-06-31G 24V R12DIN A12DIN

Size

Rotor bore diameter (dimensional symbol d1)

Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

Armature bore diameter (dimensional symbol d2)

Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

111 Models Electromagnetic Brakes

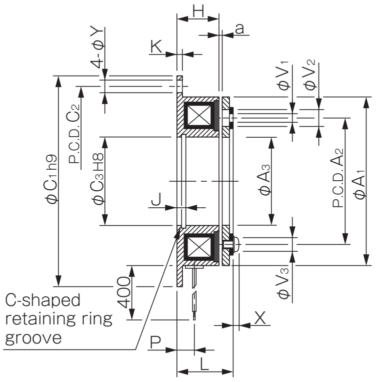
Specifications

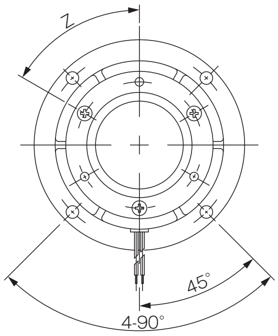
Model	Size	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min^{-1}]	Armature Moment of inertia J [kg·m^2]	Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque rise time t_p [s]	Torque extinction time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
111-06-13G	06	5	5.5	DC24	11	0.46	52	B	8000	4.23×10^{-5}	36×10^6	0.015	0.033	0.015	0.28
111-06-12G										6.03×10^{-5}					0.32
111-06-11G										6.03×10^{-5}					0.32
111-08-13G	08	10	11	DC24	15	0.63	38	B	6000	1.18×10^{-4}	60×10^6	0.016	0.042	0.025	0.5
111-08-12G										1.71×10^{-4}					0.58
111-08-11G										1.71×10^{-4}					0.58
111-10-13G	10	20	22	DC24	20	0.83	29	B	5000	4.78×10^{-4}	130×10^6	0.018	0.056	0.030	0.91
111-10-12G										6.63×10^{-4}					1.07
111-10-11G										6.63×10^{-4}					1.07
111-12-13G	12	40	45	DC24	25	1.09	23	B	4000	1.31×10^{-3}	250×10^6	0.027	0.090	0.050	1.68
111-12-12G										1.81×10^{-3}					1.97
111-12-11G										1.81×10^{-3}					1.97
111-16-13G	16	80	90	DC24	35	1.46	16	B	3000	4.80×10^{-3}	470×10^6	0.035	0.127	0.055	3.15
111-16-12G										6.35×10^{-3}					3.45
111-16-11G										6.35×10^{-3}					3.45
111-20-13G	20	160	175	DC24	45	1.88	13	B	2500	1.37×10^{-2}	10×10^8	0.065	0.200	0.070	5.9
111-20-12G										1.90×10^{-2}					7.1
111-20-11G										1.90×10^{-2}					7.1
111-25-13G	25	320	350	DC24	60	2.5	9.6	B	2000	3.58×10^{-2}	20×10^8	0.085	0.275	0.125	10.5
111-25-12G										4.83×10^{-2}					12.2
111-25-11G										4.83×10^{-2}					12.2

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min^{-1}.

* The rotating part moment of inertia and mass are measured for the maximum bore diameter.

Dimensions (111-□-13G)





Unit [mm]

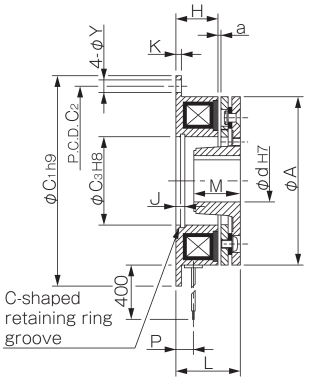
Size	Radial direction dimensions											Axial direction dimensions						
	A_1	A_2	A_3	C_1	C_2	C_3	V_1	V_2	V_3	Y	Z	H	J	K	L	P	X	a
06	63	46	34.5	80	72	35	3-3.1	3-6.3	3-5.5	5	6-60°	18	3.5	2.1	22	7.3	2.5	0.2 ± 0.05
08	80	60	41.5	100	90	42	3-4.1	3-8	3-7	6	6-60°	20	4.3	2.6	24.5	8.3	2.85	0.2 ± 0.05
10	100	76	51.5	125	112	52	3-5.1	3-10.5	3-9	7	6-60°	22	5	3.1	28	9	3.3	0.2 ± 0.05
12	125	95	61.5	150	137	62	3-6.1	3-12	3-11	7	6-60°	24	5.5	3.6	31	9.3	3.3	$0.3^{+0.05}_{-0.1}$
16	160	120	79.5	190	175	80	3-8.2	3-15	3-13	9.5	6-60°	26	6	4.1	35	11.7	3.5	$0.3^{+0.05}_{-0.1}$
20	200	158	99.5	230	215	100	3-10.2	3-18	3-17	9.5	6-60°	30	7	5.1	41.5	13.4	4.9	$0.5^{\ 0}_{-0.2}$
25	250	210	124.5	290	270	125	4-12.2	4-22	4-20	11.5	8-45°	35	8	6.1	48	16	5.5	$0.5^{\ 0}_{-0.2}$

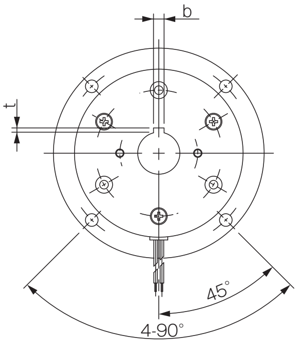
How to Place an Order

111-06-13G 24V

Size (06)

Dimensions (111-□-12G)





Unit [mm]

Size	Shaft bore dimensions				
	d H7	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
		b P9	t	b E9	t
06	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
08	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
12	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
20	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
25	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
	60	$18^{-0.018}_{-0.061}$	$4^{+0.5}_{0}$	$15^{+0.075}_{+0.032}$	$5^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions					Axial direction dimensions						
	A	C_1	C_2	C_3	Y	H	J	K	L	M	P	a
06	63	80	72	35	5	18	3.5	2.1	25.5	15	7.3	0.2 ± 0.05
08	80	100	90	42	6	20	4.3	2.6	28.5	20	8.3	0.2 ± 0.05
10	100	125	112	52	7	22	5	3.1	33	25	9	0.2 ± 0.05
12	125	150	137	62	7	24	5.5	3.6	37	30	9.3	$0.3^{+0.05}_{-0.1}$
16	160	190	175	80	9.5	26	6	4.1	42	38	11.7	$0.3^{+0.05}_{-0.1}$
20	200	230	215	100	9.5	30	7	5.1	50.5	45	13.4	$0.5^{0}_{-0.2}$
25	250	290	270	125	11.5	35	8	6.1	59	54	16	$0.5^{0}_{-0.2}$

How to Place an Order

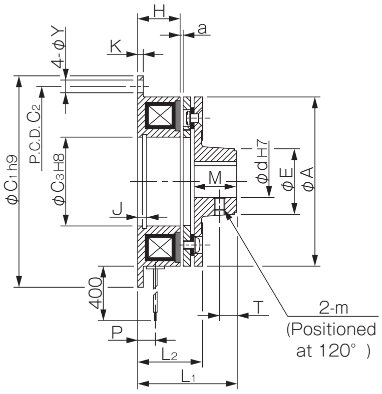
111-06-12G 24V 12DIN

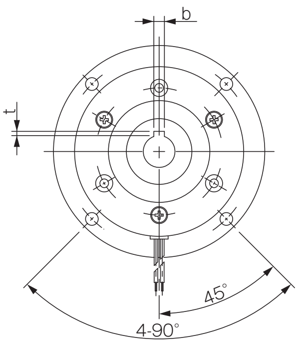
Size

Armature bore diameter (dimensional symbol d)

Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

Dimensions (111-□-11G)





Unit [mm]

Size	Shaft bore dimensions				
	d H7	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
		b P9	t	b E9	t
06	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
08	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
12	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
20	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
25	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
	60	$18^{-0.018}_{-0.061}$	$4^{+0.5}_{0}$	$15^{+0.075}_{+0.032}$	$5^{+0.5}_{0}$

Unit [mm]

Size	Radial direction dimensions							Axial direction dimensions								
	A	C_1	C_2	C_3	E	Y	M	H	J	K	L_1	L_2	M	P	T	a
06	63	80	72	35	26	5	M4	18	3.5	2.1	37	25.5	15	7.3	6	0.2 ± 0.05
08	80	100	90	42	31	6	M5	20	4.3	2.6	44.5	28.5	20	8.3	8	0.2 ± 0.05
10	100	125	112	52	41	7	M5	22	5	3.1	53	33	25	9	10	0.2 ± 0.05
12	125	150	137	62	49	7	M6	24	5.5	3.6	61	37	30	9.3	12	$0.3^{+0.05}_{-0.1}$
16	160	190	175	80	65	9.5	M8	26	6	4.1	73	42	38	11.7	15	$0.3^{+0.05}_{-0.1}$
20	200	230	215	100	83	9.5	M8	30	7	5.1	86.5	50.5	45	13.4	18	$0.5^{0}_{-0.2}$
25	250	290	270	125	105	11.5	M10	35	8	6.1	102	59	54	16	22	$0.5^{0}_{-0.2}$

How to Place an Order

111-06-11G 24V 12DIN

Size

Armature bore diameter (dimensional symbol d)

Keyway standards DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

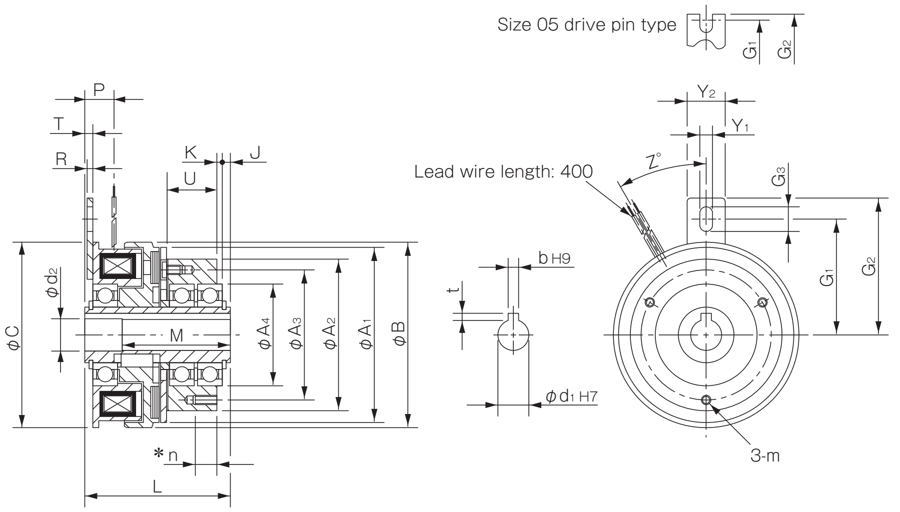
CSZ Models Electromagnetic Clutches - One-touch-mounted Type

Specifications

Model	Size	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia		Total work performed readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]	Mass [kg]	Bearing used
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]			Rotor [kg·m²]	Armature [kg·m²]						
CSZ-05-35	05	2.4	2.4	DC24	10	0.42	57	B	1800	2.87×10^{-5}	2.43×10^{-5}	9×10^6	0.017	0.035	0.023	0.38	6902ZZ
CSZ-06-35	06	5	5.5	DC24	11	0.46	52	B	1800	8.94×10^{-5}	7.57×10^{-5}	29×10^6	0.023	0.050	0.010	0.67	6904ZZ
CSZ-08-35	08	10	11	DC24	15	0.63	38	B	1800	2.41×10^{-4}	2.08×10^{-4}	60×10^6	0.025	0.064	0.020	1.23	6906ZZ

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

Dimensions



Unit [mm]

Size	Shaft bore dimensions			
	d_1 H7	d_2	b H9	t
05	10	10.2	$3^{+0.030}_{0}$	$1.2^{+0.3}_{0}$
06	12	12.2	$4^{+0.030}_{0}$	$1.8^{+0.3}_{0}$
08	15	15.5	$5^{+0.030}_{0}$	$2.3^{+0.3}_{0}$

Unit [mm]

Size	Radial direction dimensions											Axial direction dimensions										
	A_1	A_2	A_3	A_4	B	C	G_1	G_2	G_3	Y_1	Y_2	J	K	L	M	P	R	T	U	Z	m	n*
05	50	47	38	$28^{\ 0}_{-0.009}$	54	50	28	31	—	3.1	8	2.1	2	47.2	33	7.9	1.6	1.9	14	180	M4	6
06	63	55	46	$37^{\ 0}_{-0.011}$	67.5	67.5	42.5	50	9.5	4.5	14	2.5	2.3	53.5	40	9.8	2	2.5	18	30	M4	6
08	80	70	60	$47^{\ 0}_{-0.011}$	85	85	57.5	65	11.5	6.5	16	3	2.5	58	43	11.5	2	3	18.5	30	M4	8

* For bolts mounted on clutch hubs marked with an asterisk, select a length no greater than the n dimension.

How to Place an Order

CSZ-05-35

Size

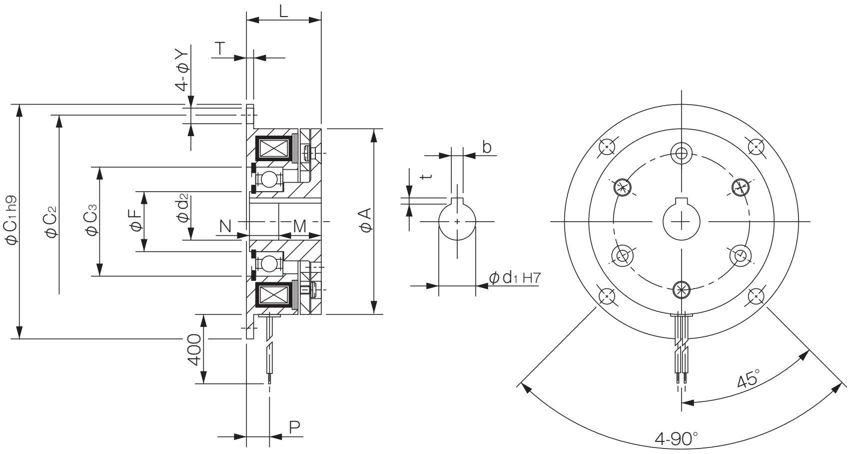
BSZ Models Electromagnetic Brakes - One-touch-mounted Type

Specifications

Model	Size	Dynamic friction torque Td [N·m]	Static friction torque Ts [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Armature Moment of inertia J [kg·m²]	Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]	Mass [kg]	Bearing used
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]									
BSZ-05-12	05	2.4	2.4	DC24	10	0.42	57	B	1800	1.46×10^{-5}	9×10^{6}	0.020	0.030	0.010	0.25	6902ZZ
BSZ-06-12	06	5	5.5	DC24	11	0.46	52	B	1800	5.77×10^{-5}	29×10^{6}	0.017	0.033	0.010	0.36	6904ZZ
BSZ-08-12	08	10	11	DC24	15	0.63	38	B	1800	1.63×10^{-4}	60×10^{6}	0.020	0.052	0.015	0.67	6905ZZ

* The dynamic friction torque, Td, is measured at a relative speed of 100 min⁻¹.

Dimensions



Unit [mm]

Size	Radial direction dimensions					Axial direction dimensions					Shaft bore dimensions				
	A	C₁	C₂	C₃	F	L	M	N	P	T	Y	d₁H7	d₂	bH9	t
05	50	65	58	28	15	28.3	18	9.8	8.2	2	3.4	10	10.2	$3^{+0.030}_{0}$	$1.2^{+0.3}_{0}$
06	63	80	72	37	20	25.5	15	10	7.3	2	5	12	12.2	$4^{+0.030}_{0}$	$1.8^{+0.3}_{0}$
08	80	100	90	42	25	28.5	20	8	8.3	2.6	6	15	15.5	$5^{+0.030}_{0}$	$2.3^{+0.3}_{0}$

How to Place an Order

BSZ-05-12

Size

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES
ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES
ELECTROMAGNETIC CLUTCH & BRAKE UNITS
SPRING-ACTUATED BRAKE
ELECTROMAGNETIC TOOTH CLUTCHES
BRAKE MOTORS
POWER SUPPLIES
MODELS
101
CS
111
CSZ
BSZ

ELECTROMAGNETIC CLUTCH AND BRAKE UNITS

Application	Printing machinery, bookbinding machinery, woodworking machinery, semiconductor manufacturing equipment

Connection and Release, Required Functions Integrated in a Compact Form Factor, Electromagnetic Clutch and Brake Units

Multiple clutches and brakes are required when designing complex actions. You can select from our clutch and brake units to get the operation you require rather than just combine as many clutches and brakes you need. We provide not just clutch and brake combinations, but total solutions that also include motors, speed reducers and the like.

RoHS
Some exceptions apply

Available Models

Series	Clutches & Brakes	Structure	Lineup
CLUTCH AND BRAKE UNITS	Clutch and brake units	Butt shaft construction, drip-proof type	125
		Through-shaft construction, open-disc brake system type	121-□-20G
		Motor-coupled type	126
		Speed reducer-integrated type	CBW
		Motor/speed reducer integrated type	CMW
	Double-clutch units		121-□-10G
	Double clutch and brake units		122

Model Selection

Model/Type	Torque [N·m]	Device		Shaft structure		Unitized construction		Position control	Forward/ reverse operation	Two-step speed changing
		Clutch	Brake	Through-shaft	Butt shaft	Motor	Speed reducer			
125	2.4 ～ 160	◎	◎		◎			◎		
121-□-20G	5 ～ 320	◎	◎	◎				◎		
126	5 ～ 80	◎	◎		◎	◎		◎		
CBW	5 ～ 40	◎	◎	◎			◎	◎		
CMW	5 ～ 40	◎	◎	◎		◎	◎	◎		
121-□-10G	5 ～ 320	◎ (Double clutch)		◎					◎	◎
122	5 ～ 160	◎ (Double clutch)	◎	◎				◎	◎	◎

For details on selection, see P.312.

Product Lineup

125

125-□-12G only

Butt shaft construction, drip-proof type

Handling is made simpler by drip-proof construction that encloses clutch and brake inside a light alloy housing.

Mounting direction freedom

Disc springs are used, so this clutch/brake unit can be used vertically.

This design preserves the performance of clutch and brake to the maximum extent. Its construction is sturdy, yet lightmass. Its easy-to-use butt-connected construction is drip proof, making it suitable for a variety of general industrial machinery applications. The base can be either steel plate or cast (E type made to order). Mounting is simple and service life is long.

Unit types	125-□-12G	125-□-12E
Clutch/brake torque [N·m]	2.4 ～ 80	5 ～ 160
Operating temperature [℃]	−10 ～ +40	
Backlash	Zero	

121-□-20G

Through-shaft construction, open-disc brake system type

These are open-disc brake system type with clutch and brake mounted on the outside of a light alloy drum. They use through-shaft construction.

Ideal for winding or geared transmission

The construction holds up well under radial loads due to a wide bearing span, so they can be used under high tension when mounted with V pulleys, spur gears or the like.

Output shaft can be used in many applications

Through-shaft construction means that output is available on both sides of the shaft. Many mechanism layouts are possible, including using both ends in split driving or mounting a detection disc or the like on one end.

This design preserves the performance of clutch and brake to the maximum extent. Its construction is sturdy, yet lightmass. Its compact through-shaft construction is open, making it suitable for a variety of general industrial machinery applications. Mounting is simple and service life is long.

Clutch/brake torque [N·m]	5 ～ 320
Operating temperature [℃]	−10 ～ +40
Backlash	Zero

126

Easy to mount and handle

These types directly connect 3-phase induction motors to clutch/brake units, requiring less installation space and eliminating cumbersome tasks such as centering and processing of mounts. Since the output shaft is simply engaged to the load, handling is easy.

Capable of high-frequency operation

These can repeatedly start and stop the output shaft without stopping the motor, so they can operate intermittently at a higher frequency than on/off operation of the motor.

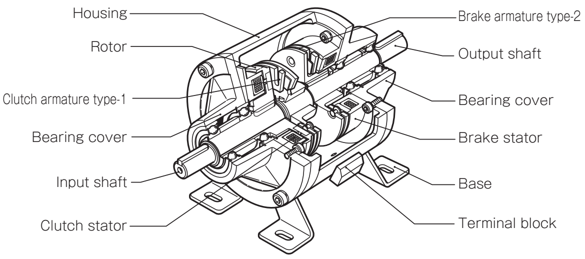
Two ways to mount

Base and flange types are available. Decide which to use based on your installation location. Flange mountings have the same shape mounting surface as general-purpose flange motors, so they can be integrated with speed reducers.

These are practical units in which induction motors are directly connected to clutch/brake units in advance. Base and flange types are available.

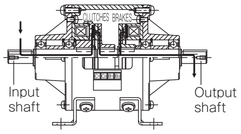
Unit types	126-□-4B	126-□-4F-N
Clutch/brake torque [N·m]	5 ～ 80	
Operating temperature [℃]	−10 ～ +40	
Backlash	Zero	
Motor output [kW]	0.2 to 3.7 3-phase 4-pole fully-sealed external fan type	

Structure



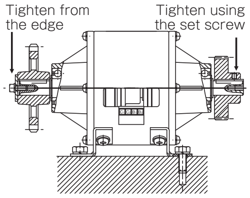
Power transmission

Input and output shafts are isolated. A pulley or the like is mounted on the input shaft, connecting it to the driver so it is always rotating. When electricity flows to the clutch, the two shafts are connected, and rotation is transmitted. If the brake mounted on the output shaft is supplied with electricity simultaneously with clutch current being shut off, the input and output shafts are isolated and the output shaft is quickly braked.

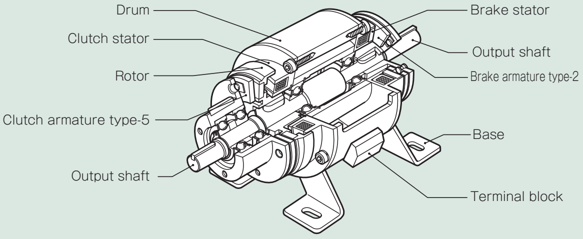


Mounting

The end faces of the input and output shafts are equipped with screw holes, so pulleys and the like can be easily mounted using jig accessories. They are attached by screwing them in from the end face or by using a set screw.

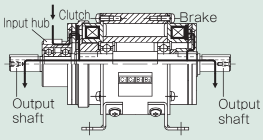


Structure



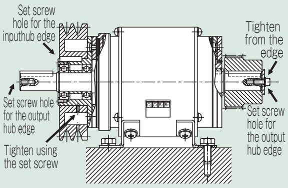
Power transmission

The input hub floats on the shaft on bearings, is connected to the drive by mounting pulleys or the like, and is always rotating. When electricity flows to the clutch, the output shaft is connected, and rotation is transmitted. If the brake on the output shaft is supplied with electricity simultaneously with clutch current being shut off, the input and output shafts are isolated and the output shaft is quickly braked. They have excellent response performance, so they are capable of high-frequency intermittent operation.

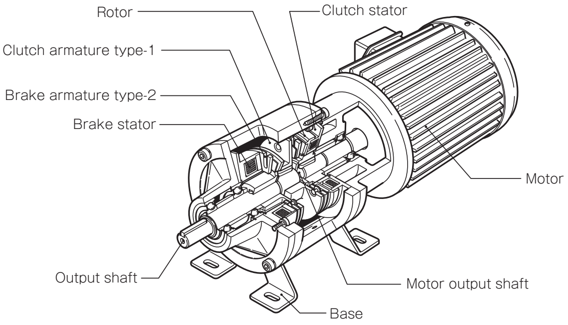


Mounting

The input hub and output shaft end face have screw holes, so they are pushed into each other using a jig accessory. Lock them in place either using a set screw or by pressing from the end face.

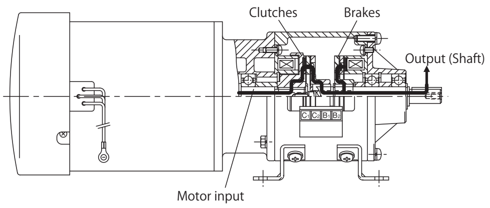


Structure



Power transmission

The motor shaft serves as the clutch input shaft, while the output shaft is isolated. When current flows to the clutch, the motor's rotation is transmitted to the output shaft via the clutch. If the brake is supplied with electricity simultaneously with clutch current being shut off, the output shaft is isolated from the motor side and instantly stopped.



Product Lineup

CBW

Compact, space saving

These are very compact units that combine a worm reducer and clutch/brake in a single unit. They can greatly save on space required for mounting.

Easy to mount and handle

A V pulley comes mounted as standard on the input part, so simply connect it to a drive with a belt. Install the speed reducer to complete the mounting. No troublesome centering or processing is needed.

Efficient starting and stopping

Integration keeps self-inertia low, so the efficiency of starting and stopping is good. It can be combined with a speed changer for a wide range of speed changes, and excellent performance can be achieved in many applications, such as 360° rotation stop of the output shaft.

These are practical units in which worm reducers are directly connected to clutch/brake units in advance. A standard V belt pulley is installed on the input part of the clutch. Two models are available, based on worm reducer type.

Unit types	CBW-□N-H□	CBW-□N-B□
Speed reducer manufacturer	Hirai Reduction Gear Manufacturing Co.	Bellpony Co., Ltd.
Clutch/brake torque [N·m]	5～40	
Operating temperature [℃]	0～＋40	
Backlash	Zero (clutch/brake units)	

CMW

Easy to mount and handle

These types integrate induction motors, clutch/brake units, couplings, and speed reducers in a single unit, requiring less installation space and eliminating cumbersome tasks such as centering and processing of mounts. Since the output shaft is simply engaged to the load, handling is easy.

Efficient starting and stopping

Integration keeps self-inertia low, so the efficiency of starting and stopping is good.

Capable of high-frequency operation

These can repeatedly start and stop the output shaft without stopping the motor, so they can operate intermittently at a higher frequency than on/off operation of the motor.

These are practical units in which motors, clutch/brake units, and speed reducers are combined into a single unit in advance. An induction motor and a clutch are coupled by a MIKI PULLEY CENTAFLEX coupling, which features shock absorption, and then combined in a unit with a worm reducer to make a multifunction drive unit.

Clutch/brake torque [N·m]	5～40
Operating temperature [℃]	0～＋40
Backlash	Zero (clutch/brake units)
Motor output [kW]	0.2 to 1.5 3-phase 4-pole fully-sealed external fan type

121-□-10G

Compact through-shaft construction

This is an efficient unit whose basic design is the same as that of clutch/brake type 121. It is a strong construction for winding, gear transmission, and the like.

Multi-function unit

This single unit can perform functions such as two-step speed changing, forward/reverse operation, and power distribution, so the transmission mechanism can be simplified.

These are compact, open units that place two clutches (101-□-15) on a through-shaft. Since one unit can perform many functions, and is also easy to install and handle, the transmission mechanism can be simplified.

Clutch torque [N·m]	5～320
Operating temperature [℃]	－10～＋40
Backlash	Zero

122

Compact through-shaft construction

These unique units have everything placed extremely skilfully on the through-shaft. They are suitable for winding, gear transmission, and the like.

Multi-function unit

These multifunction units perform complex and precision control in a single unit, including two-step speed changing, stopping at predetermined positions, and high-frequency forward/reverse operation. The transmission mechanism can be greatly simplified.

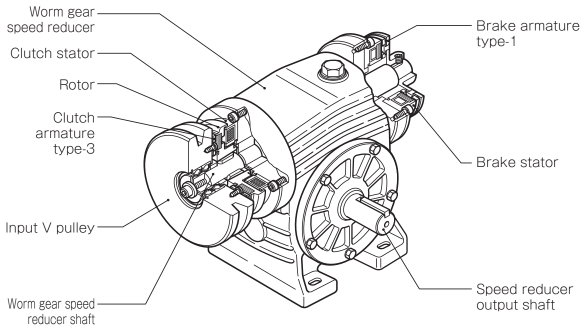
Easy handling

They not only perform many functions, they also are easy to build into machinery, just like other units.

These are units unlike any other, which combine two clutches (101- □ -15G) with a brake (111- □ -12G) in a compact form factor. They provide high-precision positioning and applied control of complex operations from a single unit. Installation and handling are as easy as on other units.

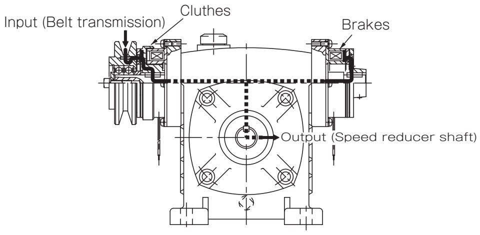
Clutch/brake torque [N·m]	5～160
Operating temperature [℃]	－10～＋40
Backlash	Zero

Structure

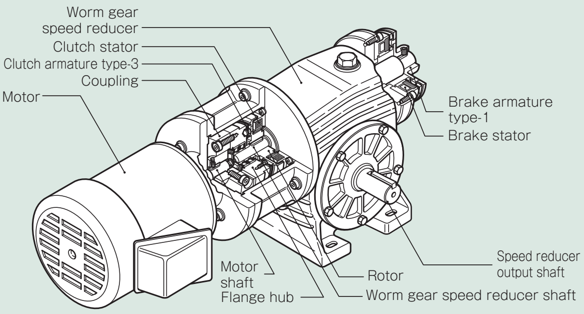


Power transmission

A V pulley is installed on the input part of the clutch, connected by a belt to the drive, and rotates continuously. When current flows to the clutch, rotation is transmitted to the worm shaft, and the output shaft of the speed reducer rotates. If the brake is supplied with electricity when clutch current is shut off, the output shaft stops.

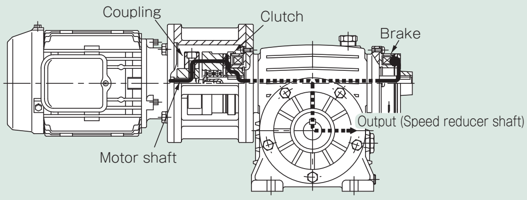


Structure

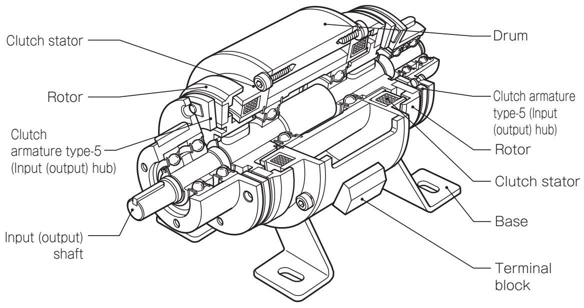


Power transmission

The motor shaft becomes the clutch input shaft via a CENTAFLEX coupling, and the worm shaft is isolated. When current flows to the clutch, the motor's rotation is transmitted to the worm shaft via the clutch, and the output shaft of the speed reducer rotates. If the brake is supplied with electricity when clutch current is shut off, the output shaft stops.

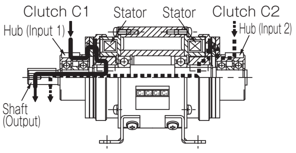


Structure



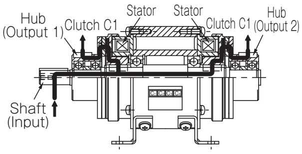
Power transmission

Two clutches, C1 and C2, have a hub shape on the armature side; a V pulley or the like is installed on each. When the hub is used as the input, different force power is connected to the two hubs and they rotate continuously. When current runs to clutch C1, power is transmitted to the shaft via the rotor. When C1 current is shut off and current simultaneously sent to C2, the power switches quickly and the new power is transmitted to the shaft. When the shaft is used as the input, the drive and shaft engage and rotation is continuous. When current flows to the clutches, power is transmitted via the armature to the hub that serves as output.

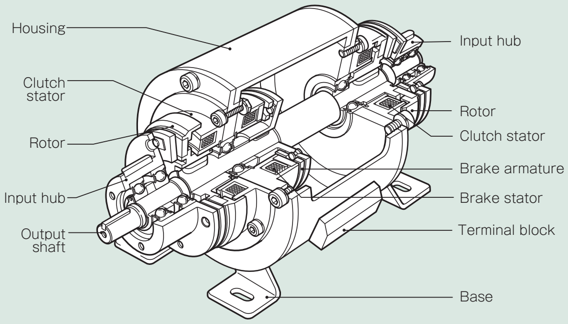


Mounting

Installation of these units and mounting of components and the like is the same as for 121-□-20G type clutch/brake units.

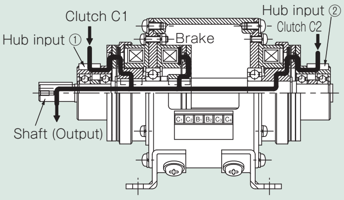


Structure



Power transmission

Different force power is connected to the input hubs of the two clutches C1 and C2 to make them rotate continuously. When current flows to clutch C1, that power is transmitted and the output shaft rotates. When C1 current is shut off and current simultaneously sent to C2, power switches quickly and the new power is transmitted to the shaft. If the brake is supplied with electricity simultaneous with clutch current being shut off, the shaft is instantly stopped.



Mounting

Installation of these units and mounting of components and the like is the same as for 121-□-20G type clutch/brake units.

Customization

Examples of Special Cases

■ Special friction material (lining) specifications

In addition to standard friction materials, high-torque friction materials and long-life friction materials can also be handled. When using non-standard friction materials, the friction torque and total work will differ from catalog specifications tables. Contact Miki Pulley for details.

■ Special voltage specifications

The standard voltage of clutch and brakes is DC 24 V. Special voltages such as DC 12 V, 90 V and 180 V can also be handled.

■ New JIS standard compliance for input and output shafts

Input/output shaft parts other than those of 126-□-4F-N, CBW-□N-□, and CMW-□N-H□H are compliant with old JIS standards. They can also be made compliant with new JIS standards. Contact Miki Pulley for details.

* Please understand that we may not be able to meet all such special specifications, depending on the usage conditions, dimensional restrictions, clutch and brake sizes, mounting restrictions and the like.

■ V pulleys, sprockets, etc.

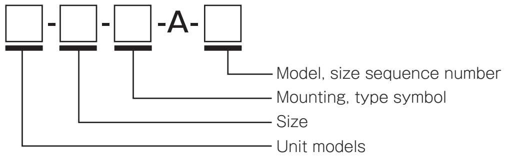
Input and output components that meet your needs, for example, by having V pulleys (including with different pulley diameters), sprockets, or timing pulleys, can be designed and produced.

■ Integrated or unitized products

We can also produce units that combine motors, speed reducers, couplings and the like to meet your needs.

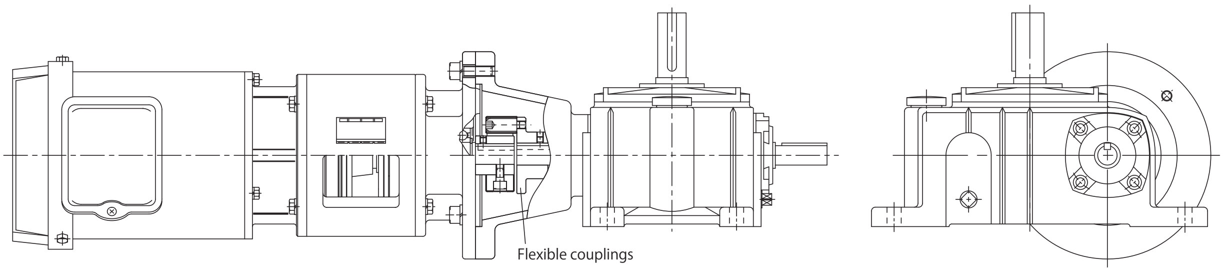
How to Place an Order

After exchanging delivery specifications for designing a product to meet your particular requirements (special production), we will custom manufacture it using the type name at right.

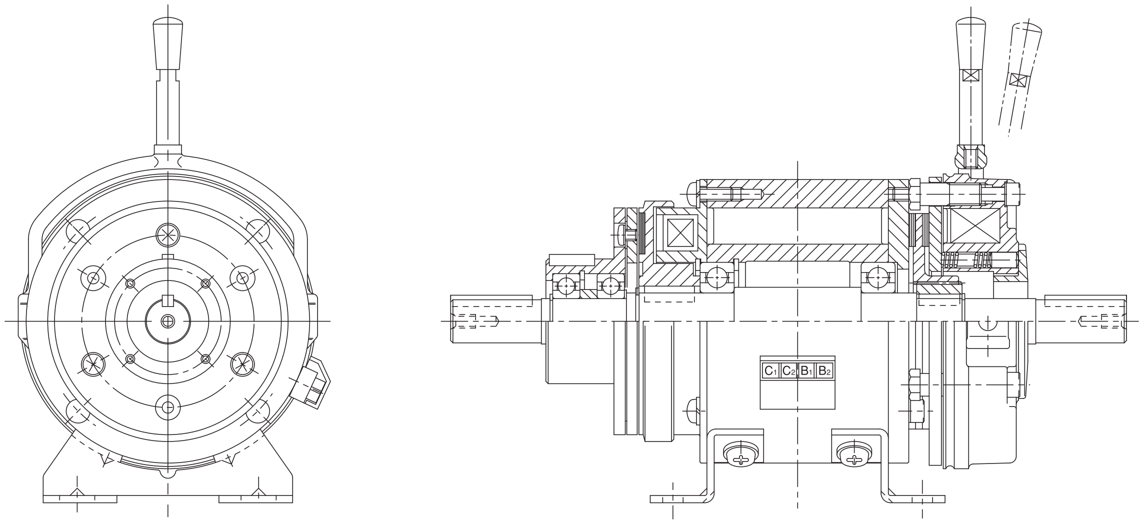


Special Application Examples

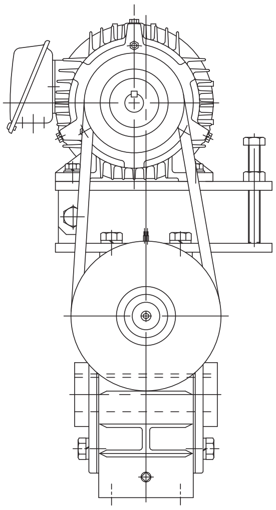
Integrated unit that uses a coupling to connect a 126 model with an above-shaft worm reducer

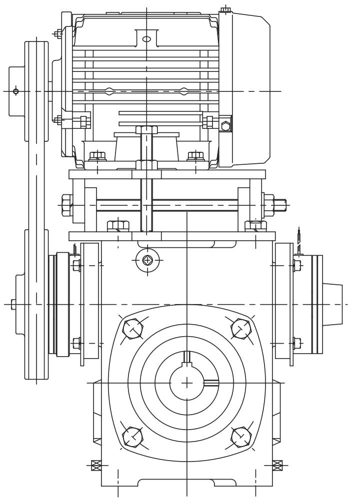


Unit that uses a spring-actuated brake as the brake of a model 121 clutch/brake unit

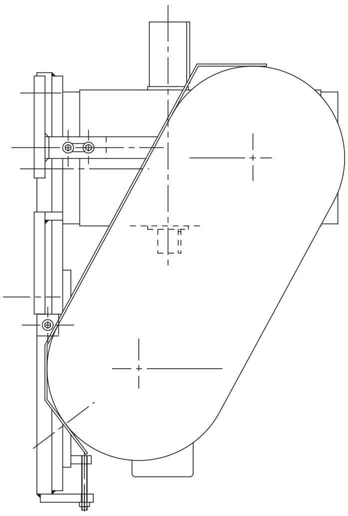


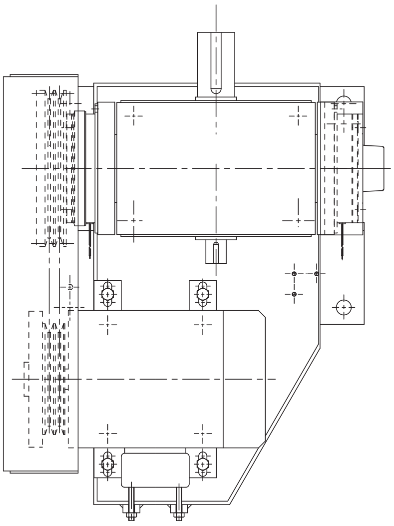
Integrated drive unit that connects a motor and special type of CBW model (hollow-shaft worm reducer) with a belt





Integrated drive unit, covered with a safety cover, that connects a motor and a special CBW model worm reducer with a belt





For details, please visit our website.

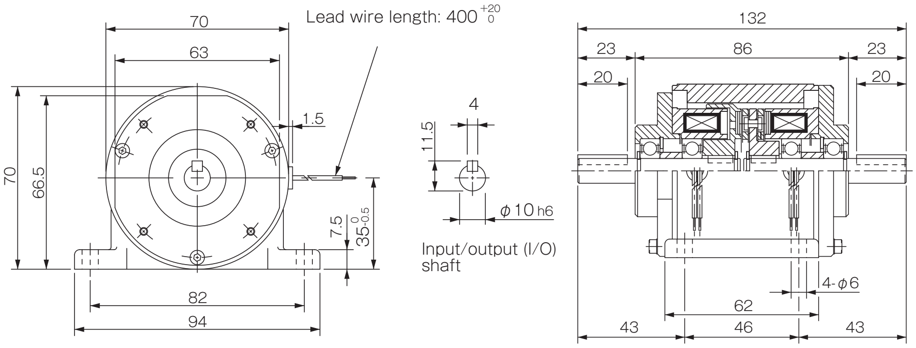
125 Models Clutch/Brake Units

Specifications (125-□-12G)

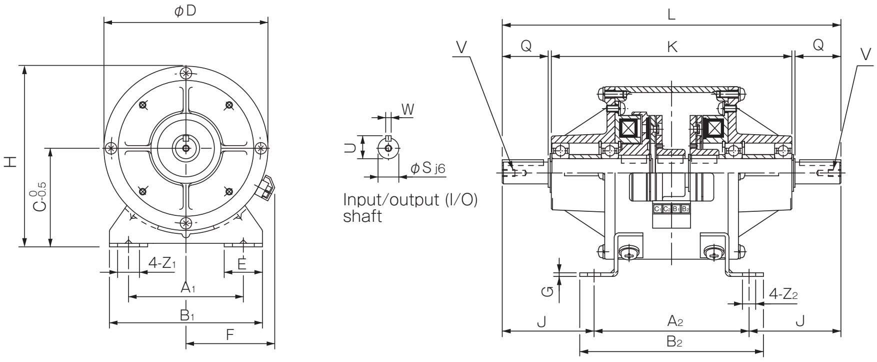
Model	Size	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]	Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
125-05-12G	05	2.4	—	DC24	10	0.42	58	B	3000	2.4×10^{-5}	9×10^6	C:0.012 B:0.010	C:0.031 B:0.023	C:0.040 B:0.012	1.2
125-06-12G	06	5	5.5	DC24	11	0.46	52	B	3000	1.28×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015	2.1
125-08-12G	08	10	11	DC24	15	0.63	38	B	3000	3.70×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025	4.2
125-10-12G	10	20	22	DC24	20	0.83	29	B	3000	1.40×10^{-3}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030	6.8
125-12-12G	12	40	45	DC24	25	1.09	23	B	3000	3.85×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050	12
125-16-12G	16	80	90	DC24	35	1.46	16	B	3000	1.35×10^{-2}	470×10^6	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	22

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

Dimensions (125-05-12G)



Dimensions (125-□-12G)



Unit [mm]

Size	Dimensions of part														Dimensions of shaft				
	A_1	A_2	B_1	B_2	C	D	E	F	G	H	J	K	L	Z_1	Z_2	Q	S	U	V	W
06	65	90	90	105	65	100	27.5	61	2.6	115	48.5	132	187	13.5	6.5	25	11	12.5	M4 × 0.7, length: 8	4
08	80	110	110	130	80	125	32.5	72	3.2	142.5	63	171	236	15.5	9	30	14	16	M4 × 0.7, length: 8	5
10	105	135	140	160	90	150	35	81	3.2	165	80	210	295	20	11.5	40	19	21	M6 × 1, length: 11	5
12	135	160	175	185	112	190	42.5	97	4.5	207	108	270	376	24	11	50	24	27	M6 × 1, length: 11	7
16	155	200	200	230	132	230	45	109	6	247	145	362	490	28	14	60	28	31	M6 × 1, length: 11	7

* The input/output shaft keyways are old JIS standard class 2 while the key is old JIS standard class 1.

* When inserting pulleys or the like onto input/output shafts, use the supplied insertion set.

How to Place an Order

125-06-12G

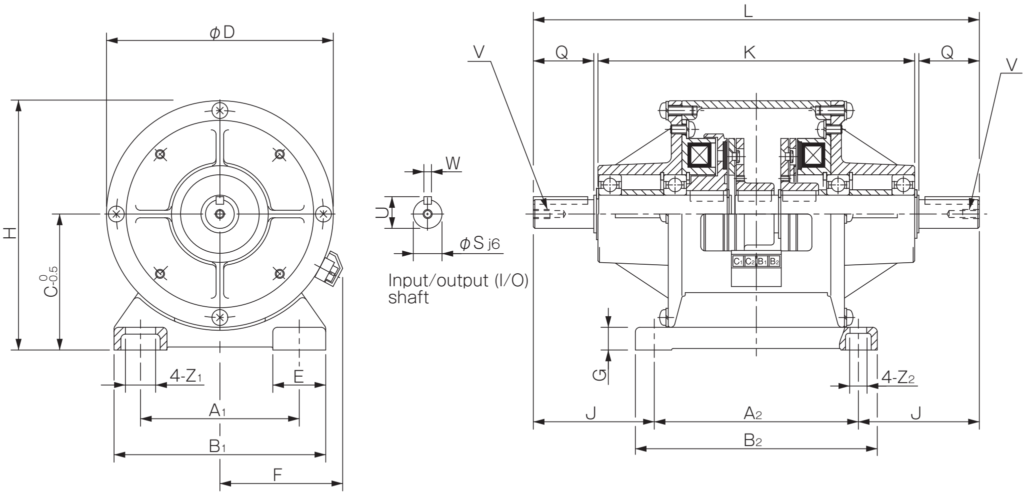
Size

Specifications (125-□-12E) Made to Order

Model	Size	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃) Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]	Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]	Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque rise time t_p [s]	Torque extinction time t_d [s]	Mass [kg]
125-06-12E	06	5	5.5	DC24	11	0.46	52	B	3000	1.28×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015	2.1
125-08-12E	08	10	11	DC24	15	0.63	38	B	3000	3.70×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025	4.2
125-10-12E	10	20	22	DC24	20	0.83	29	B	3000	1.40×10^{-3}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030	6.8
125-12-12E	12	40	45	DC24	25	1.09	23	B	3000	3.85×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050	12
125-16-12E	16	80	90	DC24	35	1.46	16	B	3000	1.35×10^{-2}	470×10^6	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	22
125-20-12E	20	160	175	DC24	45	1.86	13	B	2500	4.08×10^{-2}	10×10^5	C:0.090 B:0.065	C:0.250 B:0.207	C:0.130 B:0.070	49

*The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

Dimensions (125-□-12E) Made to Order



Unit [mm]

Size	Dimensions of part															Dimensions of shaft				
	A_1	A_2	B_1	B_2	C	D	E	F	G	H	J	K	L	Z_1	Z_2	Q	S	U	V	W
06	65	90	90	105	65	100	27.5	61	10	115	48.5	132	187	13.5	6.5	25	11	12.5	M4 × 0.7, length: 8	4
08	80	110	110	130	80	125	32.5	72	12	142.5	63	171	236	15.5	9	30	14	16	M4 × 0.7, length: 8	5
10	105	135	140	160	90	150	35	81	15	165	80	210	295	20	11.5	40	19	21	M6 × 1, length: 11	5
12	135	160	175	185	112	190	42.5	97	15	207	108	270	376	24.5	11	50	24	27	M6 × 1, length: 11	7
16	155	200	200	230	132	230	45	109	18	247	145	362	490	28	14	60	28	31	M6 × 1, length: 11	7
20	195	240	240	270	160	290	47.5	124	20	305	188	448	616	28	14	80	38	41.5	M10 × 1.5, length: 17	10

* The input/output shaft keyways are old JIS standard class 2 while the key is old JIS standard class 1.
* When inserting pulleys or the like onto input/output shafts, use the supplied insertion set.

How to Place an Order

125-06-12E

Size: 06

Base casting (Made to Order): E

125 Models

List of Stand-alone Clutches and Brakes Used

Model	Stand-alone clutch system	Stand-alone braking system	Bearing number	
			Input part	Output part
125-05-12	-	-	6000	6000
125-06-12	101-06-11G 24V R15JIS A15JIS	111-06-12G 24V 15JIS	6202	6202
125-08-12	101-08-11G 24V R20JIS A20JIS	111-08-12G 24V 20JIS	6004	6004
125-10-12	101-10-11G 24V R25JIS A25JIS	111-10-12G 24V 25JIS	6205	6205
125-12-12	101-12-11G 24V R30JIS A30JIS	111-12-12G 24V 30JIS	6206	6206
125-16-12	101-16-11G 24V R40JIS A40JIS	111-16-12G 24V 40JIS	6208	6208
125-20-12	101-20-11G 24V R50JIS A50JIS	111-20-12G 24V 50JIS	6211	6211

Recommended Power Supplies and Accessory Parts

Model	Recommended power supplies	Accessory parts			
		Circuit protector (Varistor), qty. 2	Tightening collar	Screw stock	Hexagonal nut
125-05-12	BEH-10G	NVD07SCD082 or an equivalent	-	-	-
125-06-12	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55 (hex-socket bolt), qty. 1	M4, qty. 1
125-08-12	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55 (hex-socket bolt), qty. 1	M4, qty. 1
125-10-12	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 100, qty. 1	M6, qty. 2
125-12-12	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 100, qty. 1	M6, qty. 2
125-16-12	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 100, qty. 1	M6, qty. 2
125-20-12	BEH-20G	NVD07SCD082 or an equivalent	Qty. 1	M10 × 160, qty. 1	M10, qty. 2

* NVD☐SCD☐ parts are manufactured by KOA Corporation.

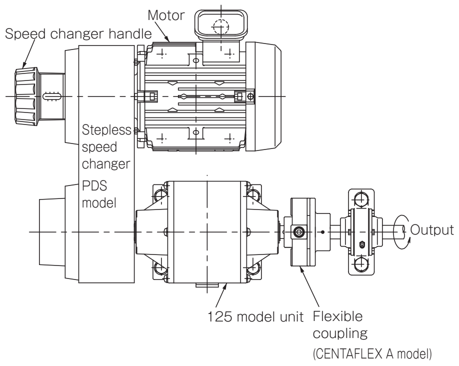
* Varistors need not be used when a BEH model overexcitation electromagnetic power supply is used. For details, refer to the section on power supplies.

Mounting Example

In Combination with Speed Changers

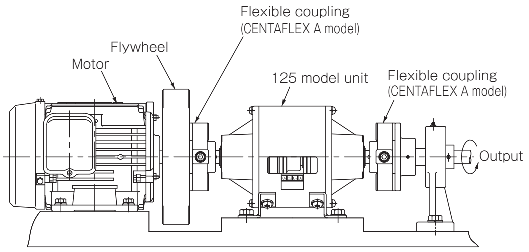
Clutches and brakes are generally used after motors and speed changers. This unit was designed so that it can be used in combination with a Miki Pulley belt-type stepless speed changer.

We provide items precombined into sets. Contact Miki Pulley for details.



Examples of Direct Connection to Motors

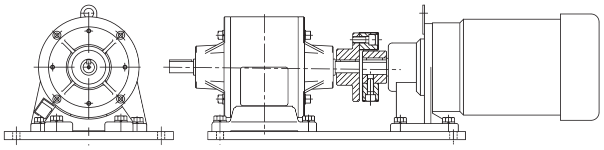
Couplings generally have small inertial moments compared to pulleys, sprockets and the like, so they are often used in combination with clutches and brakes. This unit is often combined with our flexible couplings (CENTAFLEX) in particular. It is very effective to mount it on the motor side in combination with a flywheel.



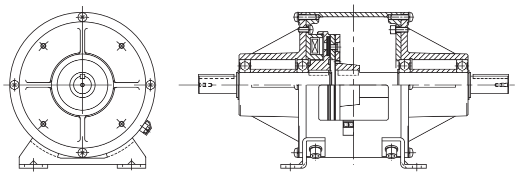
Special Types

In addition to the special application examples shown below, drivers can also be set, and units can be provided with pulleys, sprockets, and the like. Contact Miki Pulley for details.

One-piece Unit Connected to Geared Motor and Coupling



Clutch Unit (No Brake)



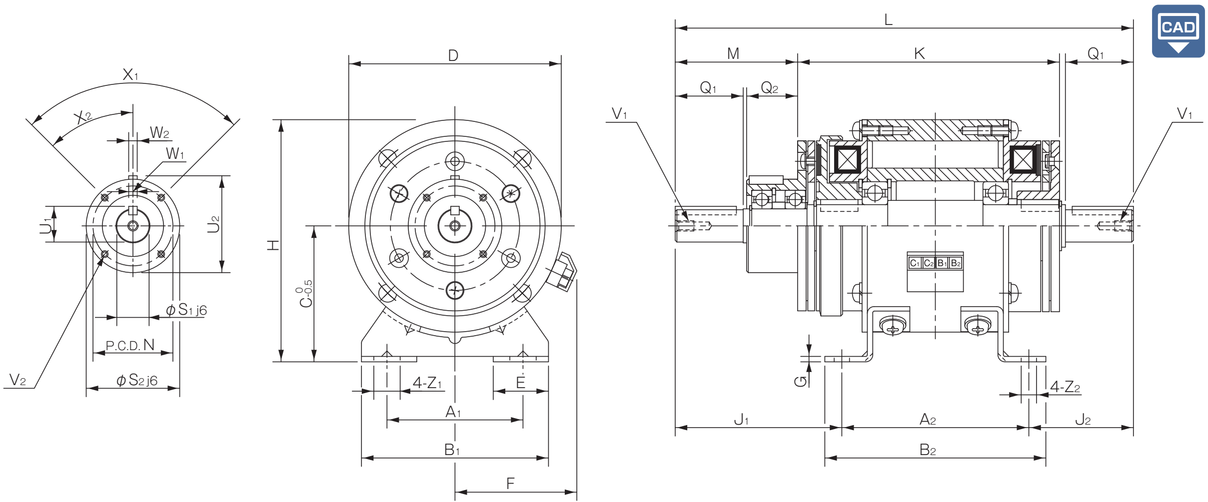
121-□-20G Types Clutch/Brake Units

Specifications

Model	Size	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]	Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
121-06-20G	06	5	5.5	DC24	11	0.46	52	B	3000	1.43×10^{-4}	36×10^{6}	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015	1.5
121-08-20G	08	10	11	DC24	15	0.63	38	B	3000	4.23×10^{-4}	60×10^{6}	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025	2.7
121-10-20G	10	20	22	DC24	20	0.83	29	B	3000	1.42×10^{-3}	130×10^{6}	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030	5.5
121-12-20G	12	40	45	DC24	25	1.09	23	B	3000	4.18×10^{-3}	250×10^{6}	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050	9.6
121-16-20G	16	80	90	DC24	35	1.46	16	B	3000	1.34×10^{-2}	470×10^{6}	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	18.5
121-20-20G	20	160	175	DC24	45	1.88	13	B	2500	4.13×10^{-2}	10×10^{8}	C:0.090 B:0.065	C:0.250 B:0.200	C:0.130 B:0.070	35
121-25-20G	25	320	350	DC24	60	2.50	9.6	B	2000	1.02×10^{-1}	20×10^{8}	C:0.115 B:0.085	C:0.335 B:0.275	C:0.210 B:0.125	64

*The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

Dimensions



Unit [mm]

Size	Dimensions of part																		Dimensions of shaft										
	A_1	A_2	B_1	B_2	C	D	E	F	G	H	J_1	J_2	K	L	M	N	Z_1	Z_2	Q_1	Q_2	S_1	S_2	U_1	U_2	V_1	V_2	X_1	X_2	$W_{1,2}$
06	52.5	75	80	90	55	80	27.5	53	2.6	95	65.5	40.5	105.5	181	47	33	13.5	6.5	25	20	11	38	12.5	39.5	M4 × 0.7, length: 8	3-M4 × 0.7, length: 4	3-120°	60°	4
08	65	90	90	105	65	100	27.5	61	2.6	115	78.5	48.5	126.5	217	57	37	13.5	6.5	30	25	14	45	16	47	M4 × 0.7, length: 8	3-M4 × 0.7, length: 6	3-120°	60°	5
10	80	110	110	130	80	125	32.5	72	3.2	142.5	98	62	154	270	72	47	15.5	9	40	30	19	55	21	57	M6 × 1, length: 11	4-M4 × 0.7, length: 8	4-90°	45°	5
12	105	135	140	160	90	150	35	81	3.2	165	121	73.5	184	330	92	52	20	11.5	50	40	24	64	27	67	M6 × 1, length: 11	4-M4 × 0.7, length: 8	4-90°	45°	7
16	135	160	175	185	112	190	43	97	4.5	207	149	90	221	399	113	62	24.5	11.5	60	50	28	75	31	78	M6 × 1, length: 11	6-M5 × 0.8, length: 8	6-60°	30°	7
20	155	200	200	230	132	230	45	109	6	247	187	117	276	504	142	74.5	28	14	80	60	38	90	41.5	93.5	M10 × 1.5, length: 17	4-M6 × 1, length: 12	4-90°	45°	10
25	195	240	240	270	160	290	47.5	124	20	305	238	154	334	632	183	101.5	28	14	110	70	42	115	45.5	118.5	M10 × 1.5, length: 17	8-M6 × 1, length: 12	8-45°	22.5°	12

* The input/output shaft keyways are old JIS standard class 2 while the key is old JIS standard class 1. Note that the keyway dimensions of the unit hub part do not conform to the old JIS standard. Check them on the dimensions table above.

* When inserting pulleys or the like onto input/output shafts, use the supplied insertion set.

* The 121-25-20G base is a casting.

How to Place an Order

121-06-20G

Size

List of Stand-alone Clutches and Brakes Used

Model	Stand-alone clutch system	Stand-alone braking system	Bearing number	
			Main shaft part	Hub part
121-06-20G	101-06-15G 24V R15JIS A12JIS	111-06-12G 24V 15JIS	6202	6001
121-08-20G	101-08-15G 24V R20JIS A15JIS	111-08-12G 24V 20JIS	6004	6002
121-10-20G	101-10-15G 24V R25JIS A20JIS	111-10-12G 24V 25JIS	6205	6004
121-12-20G	101-12-15G 24V R30JIS A25JIS	111-12-12G 24V 30JIS	6206	6005
121-16-20G	101-16-15G 24V R40JIS A30JIS	111-16-12G 24V 40JIS	6208	6006
121-20-20G	101-20-15G 24V R50JIS A40JIS	111-20-12G 24V 50JIS	6211	6008
121-25-20G	101-25-15G 24V R60JIS A50JIS	111-25-12G 24V 60JIS	6214	6010

Recommended Power Supplies and Accessory Parts

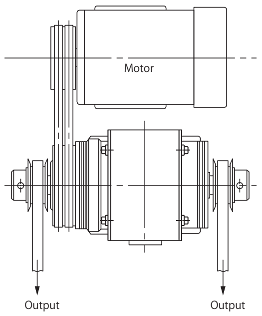
Model	Recommended power supplies	Accessory parts				
		Circuit protector (Varistor), qty. 2	Tightening collar	Screw stock	Presser foot	Hexagonal nut
121-06-20G	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 3	Qty. 1	M4, qty. 3
121-08-20G	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 3	Qty. 1	M4, qty. 3
121-10-20G	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 3	Qty. 1	M4, qty. 3
121-12-20G	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 2/M6 × 100, qty. 1	Qty. 1	M4, qty. 2/M6, qty. 1
121-16-20G	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M5 × 70, qty. 2/M6 × 100, qty. 1	Qty. 1	M5, qty. 2/M6, qty. 1
121-20-20G	BEH-20G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 160, qty. 2/M10 × 220, qty. 1	Qty. 1	M6, qty. 4/M10, qty. 2
121-25-20G	BEH-20G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 160, qty. 2/M10 × 220, qty. 1	Qty. 1	M6, qty. 4/M10, qty. 2

* NVD□SCD□ parts are manufactured by KOA Corporation.
* Varistors need not be used when a BEH model overexcitation electromagnetic power supply is used. For details, refer to the section on power supplies.

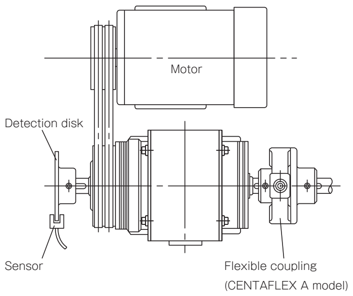
Mounting Example

This clutch/brake unit allows the output shaft to be used in two locations, so both outputs can be used simultaneously, or one can be connected to a load and a rotation detection disk mounted to the other. A variety of transmission paths can be used in layouts.

Example with Two Outputs



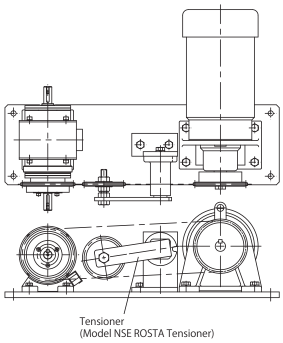
Example with Detection Disk on One Side



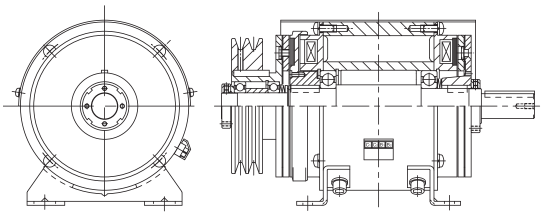
Special Types

In addition to the special application examples shown below, drivers can also be set, and units can be provided with pulleys, sprockets, and the like. Contact Miki Pulley for details.

One-piece Unit Connected by Geared Motor and Sprocket



Clutch/Brake Unit with V Pulley Mounted on Input Side



126 Models Clutch/Brake Units - Motor-coupled Type

Specifications (126-☐-4B)

Model	Size	Motor output [kW] 4-poles	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃) Voltage [V]	Coil (at 20℃) Wattage [W]	Coil (at 20℃) Current [A]	Coil (at 20℃) Resistance [Ω]	Heat resistance class	Rotating part moment of inertia J [kg·m²]	Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]	Mass [kg]
126-06-4B-0.2kW	06	0.2	5	5.5	DC24	11	0.46	52	B	1.28×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015	8.9
126-08-4B-0.4kW	08	0.4	10	11	DC24	15	0.63	38	B	3.70×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025	13
126-10-4B-0.75kW-IE3	10	0.75	20	22	DC24	20	0.83	29	B	1.40×10^{-3}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030	20
126-12-4B-1.5kW-IE3	12	1.5	40	45	DC24	25	1.09	23	B	3.85×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050	41
126-16-4B-2.2kW-IE3	16	2.2	80	90	DC24	35	1.46	16	B	1.35×10^{-2}	470×10^6	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	54
126-16-4B-3.7kW-IE3	16	3.7	80	90	DC24	35	1.46	16	B	1.35×10^{-2}	470×10^6	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	69

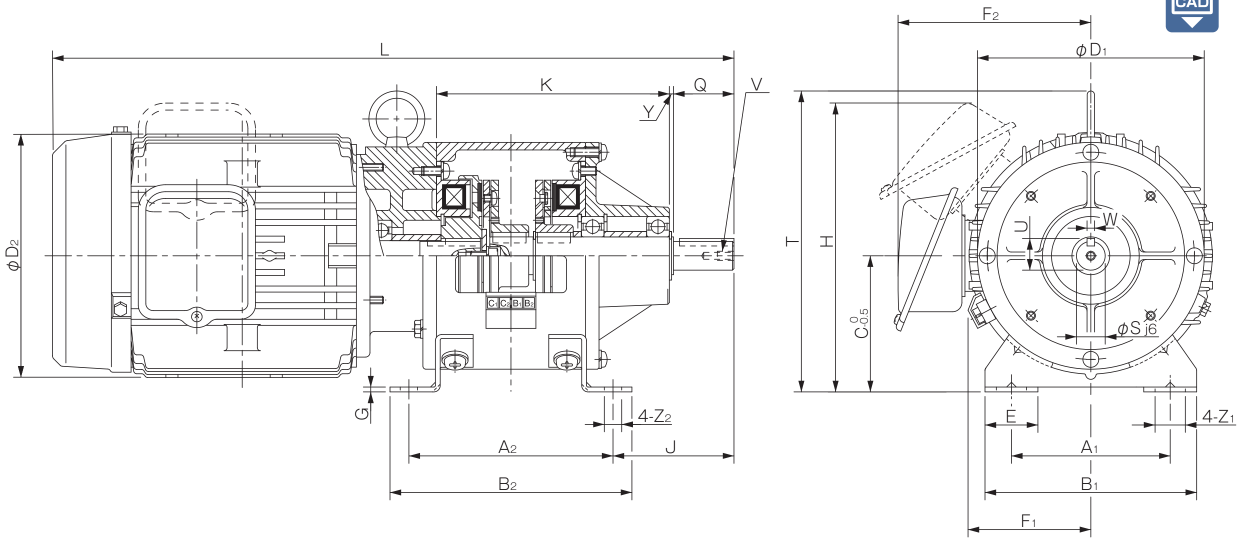
* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

* The power supplies for the motors are 3-phase, 200 V AC at 50 Hz, or 200/220 V AC at 60 Hz.

* If you desire a special voltage (5 Power Supply Specifications), different number of poles, or the like for the induction motor, contact Miki Pulley.

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

Dimensions (126-☐-4B)



Unit [mm]

Model	Dimensions of part																			Dimensions of shaft				
	A_1	A_2	B_1	B_2	C	D_1	D_2	E	F_1	F_2	G	J	K	L	H	T	Y	Z_1	Z_2	Q	S	U	V	W
126-06-4B-0.2kW	65	90	90	105	65	100	130	27.5	61	—	2.6	48.5	102	335	—	—	3	13.5	6.5	25	11	12.5	M4 × 0.7, length: 8	4
126-08-4B-0.4kW	80	110	110	130	80	125	145	32.5	72	126.5	3.2	63	127.5	389	167.5	—	2.5	15.5	9	30	14	16	M4 × 0.7, length: 8	5
126-10-4B-0.75kW-IE3	105	135	140	160	90	150	163	35	81	136	3.2	80	154	462	184	—	3	20	11.5	40	19	21	M6 × 1, length: 11	5
126-12-4B-1.5kW-IE3	135	160	175	185	112	190	182/176	42.5	97	148.5	15	108	194	550.5	—	244.5	3	24.5	11.5	50	24	27	M6 × 1, length: 11	7
126-16-4B-2.2kW-IE3	155	200	200	230	132	230	198/195	45	109	155.5	18	135	256	649.5	—	286	4	28	14	50	24	27	M6 × 1, length: 11	7
126-16-4B-3.7kW-IE3	155	200	200	230	132	230	225/215	45	109	168.5	18	145	256	681	—	295	4	28	14	60	28	31	M6 × 1, length: 11	7

* The output shaft keyways are old JIS standard class 2 while the key is old JIS standard class 1.

* When inserting pulleys or the like onto output shafts, use the supplied insertion set.

* These models are cast basded on a motor output of 1.5 kW or greater.

How to Place an Order

126-06-4B-0.2kW-IE3

Size

Mounting type
B: Base-mounted

Motor output

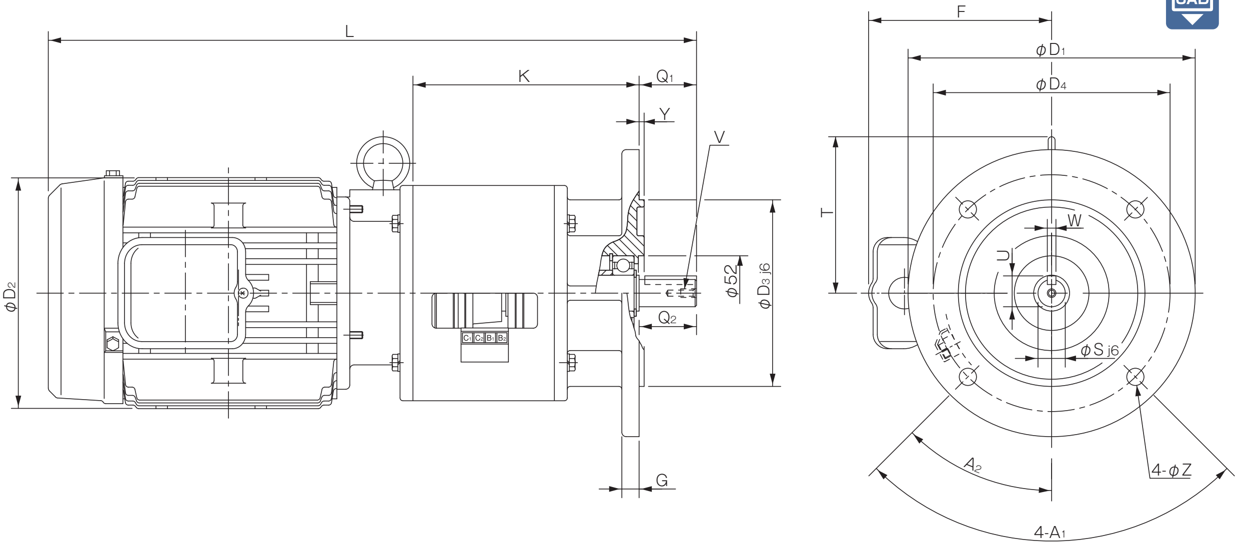
IE code
For motors with an output of 0.75 kW or greater,
use the IE3 designation.

Specifications (126- □ -4F-N)

Model	Size	Motor output [kW] 4-poles	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Rotating part moment of inertia J [kg·m²]	Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]	Mass [kg]
					Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]							
126-06-4F-N-0.2kW	06	0.2	5	5.5	DC24	11	0.46	52	B	1.28×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015	8.9
126-08-4F-N-0.4kW	08	0.4	10	11	DC24	15	0.63	38	B	3.70×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025	13
126-10-4F-N-0.75kW-IE3	10	0.75	20	22	DC24	20	0.83	29	B	1.40×10^{-3}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030	20
126-12-4F-N-1.5kW-IE3	12	1.5	40	45	DC24	25	1.09	23	B	3.85×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050	41
126-16-4F-N-2.2kW-IE3	16	2.2	80	90	DC24	35	1.46	16	B	1.35×10^{-2}	470×10^6	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	54
126-16-4F-N-3.7kW-IE3	16	3.7	80	90	DC24	35	1.46	16	B	1.35×10^{-2}	470×10^6	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	69

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).
* The power supplies for the motors are 3-phase, 200 V AC at 50 Hz, or 200/220 V AC at 60 Hz.
* If you desire a special voltage (5 Power Supply Specifications), different number of poles, or the like for the induction motor, contact Miki Pulley.
* The dynamic friction torque, T_d, is measured at a relative speed of 100 min^{-1}.

Dimensions (126- □ -4F-N)



Unit [mm]

Model	Dimensions of part													Dimensions of shaft					
	A_1	A_2	D_1	D_2	D_3	D_4	F	G	K	L	T	Y	Z	Q_1	Q_2	S	U	V	W
126-06-4F-N-0.2kW	90°	45°	160	130	110	130	—	8	107	335	—	3.5	10	23	25	11	12.5	M4 × 0.7, length: 8	4
126-08-4F-N-0.4kW	90°	45°	160	145	110	130	124	10	130.5	389	—	3.5	10	30	30	14	16	M4 × 0.7, length: 8	5
126-10-4F-N-0.75kW-IE3	90°	45°	200	163	130	165	131	12	157.5	463	—	3.5	12	40	40	19	21.5	M6 × 1, length: 11	6
126-12-4F-N-1.5kW-IE3	90°	45°	200	182/176	130	165	148.5	12	197.5	551	133	3.5	12	50	50	24	27	M6 × 1, length: 11	8
126-16-4F-N-2.2kW-IE3	90°	45°	250	198/195	180	215	155.5	16	260.5	660	154	4	15	60	60	28	31	M6 × 1, length: 11	8
126-16-4F-N-3.7kW-IE3	90°	45°	250	225/215	180	215	168.5	16	260.5	681.5	163	4	15	60	60	28	31	M6 × 1, length: 11	8

* The flange and output shaft dimensions conform to IEC and JEM standard flange motors. (Size 06 has a key and a keyway.)
* When inserting pulleys or the like onto output shafts, use the supplied insertion set.

How to Place an Order

126-06-4F-N-0.2kW-IE3

Size

Mounting type
F: Flange-mount

Flange and output shaft dimension standards
N: Compliant with IEC and JEM flange motor standards

Motor output

IE code
For motors with an output of 0.75 kW or greater, use the IE3 designation.

126 Models

List of Stand-alone Clutches and Brakes Used

Model	Stand-alone clutch system	Stand-alone braking system	Bearing number	
			Input part	Output part
126-06-4□-0.2kW	101-06-11G 24V R11JIS A15JIS	111-06-12G 24V 15JIS	6202	6202
126-08-4□-0.4kW	101-08-11G 24V R14DIN A20JIS	111-08-12G 24V 20JIS	6203	6004
126-10-4□-0.75kW-IE3	101-10-11G 24V R19DIN A25JIS	111-10-12G 24V 25JIS	6204	6205
126-12-4□-1.5kW-IE3	101-12-11G 24V R24DIN A30JIS	111-12-12G 24V 30JIS	6205	6206
126-16-4□-2.2kW-IE3	101-16-11G 24V R28DIN A40JIS	111-16-12G 24V 40JIS	6206	6208
126-16-4□-3.7kW-IE3	101-16-11G 24V R28DIN A40JIS	111-16-12G 24V 40JIS	6306	6208

Recommended Power Supplies and Accessory Parts

Model	Recommended power supplies	Accessory parts			
		Circuit protector (Varistor), qty. 2	Tightening collar	Screw stock	Hexagonal nut
126-06-4□-0.2kW	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55 (hex-socket bolt), qty. 1	M4, qty. 1
126-08-4□-0.4kW	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55 (hex-socket bolt), qty. 1	M4, qty. 1
126-10-4□-0.75kW-IE3	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 100, qty. 1	M6, qty. 2
126-12-4□-1.5kW-IE3	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 100, qty. 1	M6, qty. 2
126-16-4□-2.2kW-IE3	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 100, qty. 1	M6, qty. 2
126-16-4□-3.7kW-IE3	BEH-10G	NVD07SCD082 or an equivalent	Qty. 1	M6 × 100, qty. 1	M6, qty. 2

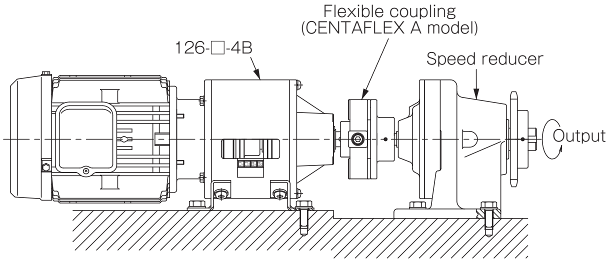
* NVD□SCD□ parts are manufactured by KOA Corporation.
* Varistors need not be used when a BEH model overexcitation electromagnetic power supply is used. For details, refer to the section on power supplies.

Mounting Example

In Combination with Speed Reducers

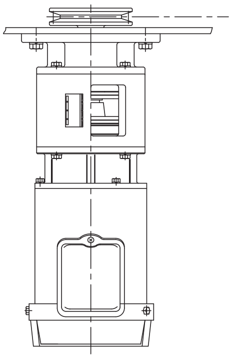
In the example on right, a clutch/brake unit of the motorcoupled type is combined with a speed reducer by a flexible coupling.

Since the motor is directly coupled, the build-up of the rotation shaft is sharp. That makes it desirable in design to keep inertia on the load side as small as possible. We recommend a flexible coupling with low inertia for connecting to the speed reducer.



Example Using Flange-mounted Type Vertically

They can be mounted in any direction, providing layout freedom and saving space.



CBW Models Clutch/Brake Units - Speed Reducer-integrated Type

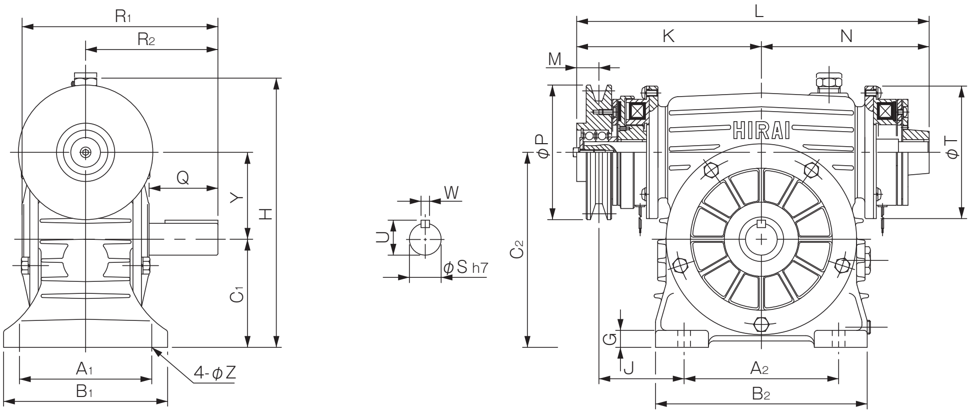
Specifications (CBW-□N-H□)

Model	Size	Dynamic friction Torque T_d [N·m]	Static friction Torque T_s [N·m]	Coil (at 20℃) Voltage [V]	Coil (at 20℃) Wattage [W]	Coil (at 20℃) Current [A]	Coil (at 20℃) Resistance [Ω]	Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]	Total work performed readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]
CBW-06N-H□	06	5	5.5	DC24	11	0.46	52	B	1800	1.66×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015
CBW-08N-H□	08	10	11	DC24	15	0.63	38	B	1800	4.78×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025
CBW-10N-H□	10	20	22	DC24	20	0.83	29	B	1800	1.71×10^{-3}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030
CBW-12N-H□	12	40	45	DC24	25	1.09	23	B	1800	4.53×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

Model	Size	Input part		Speed reducer									Mass [kg]
		Pulley diameter [mm]	Belt type	Model	Output shaft rated values	Speed reduction ratio 1/□						Oil volume [ℓ]	
						10	20	30	40	50	60		
CBW-06N-H□	06	76.2 (3 in.)	A-1	N-1A	Torque [N·m]	45.3	53.4	46.7	54.7	54.2	55.4	0.25	6.5
					O.H.L. [N]	1560	1760	1760	1760	1760	1760		
CBW-08N-H□	08	101.6 (4 in.)	A-1	N-2A	Torque [N·m]	79.8	102	86.9	104	98.5	100	0.5	15
					O.H.L. [N]	1760	2240	2630	2880	3140	3230		
CBW-10N-H□	10	127 (5 in.)	B-1	N-3A	Torque [N·m]	165	180	180	188	187	164	1.0	24
					O.H.L. [N]	2250	2900	3370	3720	4040	4370		
CBW-12N-H□	12	152.4 (6 in.)	B-1	N-4A	Torque [N·m]	292	293	301	302	—	—	2.0	38
					O.H.L. [N]	2780	3640	4210	4680	—	—		

Dimensions (CBW-□N-H□)



Unit [mm]

Model	Dimensions of part																			Dimensions of shaft			
	A_1	A_2	B_1	B_2	C_1	C_2	G	H	J	K	L	M	N	P	R_1	R_2	T	Y	Z	Q	S	U	W
CBW-06N-H□	95	95	117	136	65	115.8	11	157	58	120.5	225	15	104.5	76.2	135	90	80	50.8	9.5	45	20	22.5	6
CBW-08N-H□	115	112	140	165	82	146	15	212	75	149	284	18	135	101.6	160	105	100	64	11	50	25	28	8
CBW-10N-H□	125	146	155	205	102	184	16	255	80.5	174.5	333	21	158.5	127	185	125	125	82	12	65	30	33	8
CBW-12N-H□	150	168	185	245	118	213	20	289	93	203	388	25.5	185	152.4	225	150	150	95	14	75	35	38	10

How to Place an Order

CBW-06N-HR-10

Size

Speed reducer manufacturer
HIRAI REDUCTION GEAR MFG. CO.: H

Speed reduction ratio 1/□: 10, 20, 30, 40, 50, 60
(Size 12: 10, 20, 30, 40)

Output shaft direction
R: Right side of the output shaft as viewed from the input pulley
L: Left side of the output shaft as viewed from the input pulley

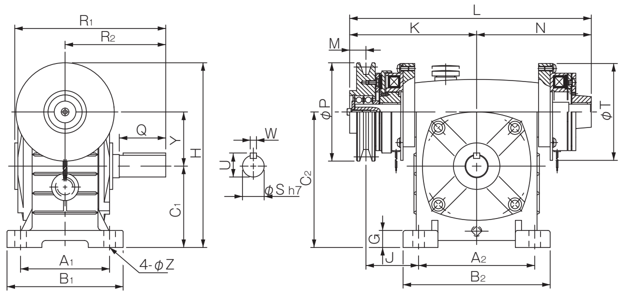
Specifications (CBW-□N-B□)

Model	Size	Dynamic friction torque Td [N·m]	Static friction torque Ts [N·m]	Coil (at 20℃) Voltage [V]	Coil (at 20℃) Wattage [W]	Coil (at 20℃) Current [A]	Coil (at 20℃) Resistance [Ω]	Heat resistance class	Max. rotation speed [mim⁻¹]	Rotating part Moment of inertia J [kg·m²]	Total work performed readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]
CBW-06N-B□-10～30 CBW-06N-B□-40～60	06	5	5.5	DC24	11	0.46	52	B	1800	1.56×10^{-4} 1.76×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015
CBW-08N-B□-10～30 CBW-08N-B□-40～60	08	10	11	DC24	15	0.63	38	B	1800	4.70×10^{-4} 4.85×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025
CBW-10N-B□-10～30 CBW-10N-B□-40～60	10	20	22	DC24	20	0.83	29	B	1800	1.48×10^{-3} 1.61×10^{-3}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030
CBW-12N-B□-10～30 CBW-12N-B□-40～60	12	40	45	DC24	25	1.09	23	B	1800	4.23×10^{-3} 4.35×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050

*The dynamic friction torque, Td, is measured at a relative speed of 100 min⁻¹.

Model	Size	Input part		Speed reducer									
		Pulley diameter [mm]	Belt Model	Model	Output shaft rated values	Speed reduction ratio 1/□						Oil volume [ℓ]	Mass [kg]
						10	20	30	40	50	60		
CBW-06N-B□-10～30	06	76.2 (3 in.)	A-1	N-PR-12	Torque [N·m]	35	38	44	—	—	—	0.3	9
					O.H.L. [N]	950	1313	1548	—	—	—		
CBW-06N-B□-40～60				N-PR-15	Torque [N·m]	—	—	—	64	56	56	0.4	11
					O.H.L. [N]	—	—	—	2450	2450	2450		
CBW-08N-B□-10～30	08	101.6 (4 in.)	A-1	N-PR-15	Torque [N·m]	56	57	72	—	—	—	0.4	11.5
					O.H.L. [N]	1421	1862	2322	—	—	—		
CBW-08N-B□-40～60				N-PR-18	Torque [N·m]	—	—	—	143	136	138	0.7	16.5
					O.H.L. [N]	—	—	—	2646	2646	2646		
CBW-10N-B□-10～30	10	127 (5 in.)	B-1	N-PR-18	Torque [N·m]	120	126	150	—	—	—	0.7	17.5
					O.H.L. [N]	1490	2077	2440	—	—	—		
CBW-10N-B□-40～60				N-PR-22	Torque [N·m]	—	—	—	191	187	167	1.2	23.5
					O.H.L. [N]	—	—	—	3057	3146	3155		
CBW-12N-B□-10～30	12	152.4 (6 in.)	B-1	N-PR-22	Torque [N·m]	166	167	213	—	—	—	1.2	25
					O.H.L. [N]	1715	2528	2871	—	—	—		
CBW-12N-B□-40～60				N-PR-25	Torque [N·m]	—	—	—	373	352	336	2.9	40
					O.H.L. [N]	—	—	—	3665	3783	4126		

Dimensions (CBW-□N-B□)



Unit [mm]

Model	Dimensions of part																			Dimensions of shaft			
	A_1	A_2	B_1	B_2	C_1	C_2	G	H	J	K	L	M	N	P	R_1	R_2	T	Y	Z	Q	S	U	W
CBW-06N-B□-10～30	95	110	130	140	80	130	15	175	56	126	236	15	110	76.2	145	95	80	50	11	40	17	19	5
CBW-06N-B□-40～60	105	120	130	150	90	150	20	200	56	131	246	15	115	76.2	165	110	80	60	11	50	22	24.5	6
CBW-08N-B□-10～30	105	120	130	150	90	150	20	201	59	137	260	18	123	101.6	165	110	100	60	11	50	22	24.5	6
CBW-08N-B□-40～60	115	150	150	190	105	175	25	230	61	154	294	18	140	101.6	195	130	100	70	15	60	28	31	8
CBW-10N-B□-10～30	115	150	150	190	105	175	25	238.5	68	164	312	21	148	127	195	130	125	70	15	60	28	31	8
CBW-10N-B□-40～60	135	180	170	220	120	200	25	265	63	174	332	21	158	127	210	140	125	80	15	65	32	35	10
CBW-12N-B□-10～30	135	180	170	220	120	200	25	276	67.5	179	345	21	166	152.4	210	140	150	80	15	65	32	35	10
CBW-12N-B□-40～60	155	220	190	270	150	250	25	370	76.5	210	405	23.5	195	152.4	260	170	150	100	15	75	38	41	10

How to Place an Order

CBW-06N-BR-10

Size — 06
Speed reducer manufacturer Bellpony Co., Ltd.: B
Output shaft direction — R
R: Right side of the output shaft as viewed from the input pulley
L: Left side of the output shaft as viewed from the input pulley
Speed reduction ratio 1/□: 10, 20, 30, 40, 50, 60

CBW Models

List of Stand-alone Clutches and Brakes Used and Recommended Power Supplies and Accessory Parts (CBW-□N-H□)

Model	Stand-alone clutch system	Stand-alone braking system	Bearing number	Recommended power supplies	Accessory parts
					Circuit protector (Varistor), qty. 2
CBW-06N-H□	101-06-13-A-110	111-06-11G 24V 15JIS	6002	BEH-10G	NVD07SCD082 or an equivalent
CBW-08N-H□	101-08-13-A-102	111-08-11G 24V 17JIS	6003	BEH-10G	NVD07SCD082 or an equivalent
CBW-10N-H□	101-10-13-A-113	111-10-11G 24V 20JIS	6004	BEH-10G	NVD07SCD082 or an equivalent
CBW-12N-H□	101-12-13-A-134	111-12-11G 24V 25JIS	6005	BEH-10G	NVD07SCD082 or an equivalent

* NVD□SCD□ parts are manufactured by KOA Corporation.
* Varistors need not be used when a BEH model overexcitation electromagnetic power supply is used. For details, refer to the section on power supplies.

List of Stand-alone Clutches and Brakes Used and Recommended Power Supplies and Accessory Parts (CBW-□N-B□)

Model	Stand-alone clutch system	Stand-alone braking system	Bearing number	Recommended power supplies	Accessory parts
					Circuit protector (Varistor), qty. 2
CBW-06N-B□-10～30	101-06-13-A-110	111-06-11G 24V 15JIS	6002	BEH-10G	NVD07SCD082 or an equivalent
CBW-06N-B□-40～60	101-06-13-A-110	111-06-11G 24V 15JIS	6002	BEH-10G	NVD07SCD082 or an equivalent
CBW-08N-B□-10～30	101-08-13-A-102	111-08-11G 24V 17JIS	6003	BEH-10G	NVD07SCD082 or an equivalent
CBW-08N-B□-40～60	101-08-13-A-102	111-08-11G 24V 17JIS	6003	BEH-10G	NVD07SCD082 or an equivalent
CBW-10N-B□-10～30	101-10-13-A-113	111-10-11G 24V 20JIS	6004	BEH-10G	NVD07SCD082 or an equivalent
CBW-10N-B□-40～60	101-10-13-A-114	111-10-11G 24V 25JIS	6005	BEH-10G	NVD07SCD082 or an equivalent
CBW-12N-B□-10～30	101-12-13-A-134	111-12-11G 24V 25JIS	6005	BEH-10G	NVD07SCD082 or an equivalent
CBW-12N-B□-40～60	101-12-13-A-135	111-12-11G 24V 30JIS	6006	BEH-10G	NVD07SCD082 or an equivalent

* NVD□SCD□ parts are manufactured by KOA Corporation.
* Varistors need not be used when a BEH model overexcitation electromagnetic power supply is used. For details, refer to the section on power supplies.

Selecting a CBW Worm Reducer

For speed reducers with clutches/brakes, loads start and stop abruptly, so load inertia and the like place large loads on worm wheels. Select a worm reducer based on frequency of use, load inertia, usage time, and the like, with due consideration to safety rates.

- Determining speed reduction ratio I

$$\text{Speed reduction ratio I} = \frac{\text{Speed of output shaft rotation } N_2 \ [\text{min}^{-1}]}{\text{Speed of input shaft rotation } N_1 \ [\text{min}^{-1}]}$$

- Calculating equivalent torque

$$\text{Equivalent torque Te [N•m]} = \text{Load torque Tf [N•m]} \times \text{Load coefficient Sf} \times \text{Frequency coefficient Sh}$$

$$\text{Load torque Tf [N•m]} = \frac{9550 \times \text{kW} \times \text{E}}{N_2}$$

kW: Input Wattage [kW]

E: Speed reducer efficiency [%]/100

* See the speed reducer manufacturer's catalog for the speed reducer efficiency.

N2: Output rotation speed [min^{-1}]

- Load coefficient Sf and frequency coefficient Sh
  Find the equivalent value for conditions such as load type, time, and frequency of use.

Load coefficient Sf

Load type Continuous time	Uniform load	Normal shock	Sharp shock
Up to 2 hrs.	0.80	1.00	1.25
Up to 8 hrs.	1.00	1.25	1.50
Up to 24 hrs.	1.25	1.50	1.75

Frequency coefficient Sh

For sharp starts and stops due to clutch/brake	1.5

- Provisional selection of speed reducer
  Select a speed reducer from the specifications table for which equivalent torque Te ≦ rated output torque T.

- Calculating the equivalent overhang load (O.H.L.)
  O.H.L. refers to the load that acts to bend the shaft when transmitting power using a chain or the like.

$$\text{Equivalent O.H.L.} = \frac{\text{Te} \times \text{K} \times (\text{L} + 0.57 \times \text{Ls})}{\text{R} \times 1.07 \times \text{Ls}}$$

Te: Equivalent torque [N•m]

K: Factor based on type of transmission tool

R: Pitch radius of transmission tool [m]

Ls: Length of standard shaft [mm]

L: Distance from shaft base to load center [mm]

Transmission tool	Chain timing belt	Gear	V belt	Flat belt
K	1.00	1.25	1.50	2.50

Use the specifications to confirm that equivalent O.H.L ≦ rated O.H.L. If this condition is not satisfied, change Te, L or R, or increase the selected output.

Operational Cautions

- Before starting, check that the speed reducer has a good amount of oil.
- Loosen or remove the air vent screw or pin.
- Break in the reducer, guided by the manual from the speed reducer manufacturer.
- Periodically replace the oil. Be careful when doing this to not get any oil whatsoever on the clutch and brake parts.

Recommended speed reducer lubricants table

Ambient temperature [℃]	0 ～ 40
ISO viscosity grade	VG320
Idemitsu Kosan	Daphne Super Gear Oil 320
JX Nippon Oil & Energy	Bonnock 320
Cosmo Oil	Cosmo Gear SE320
Showa Shell Sekiyu	Omara 320
Jomo Oil	Reductus 320
Mobil Oil	Mobilgear 632 (320)

* Check the volume of oil for speed reducers on the specifications table.

CMW Models Clutch/Brake Units - Motor/Speed Reducer-integrated Type

Specifications

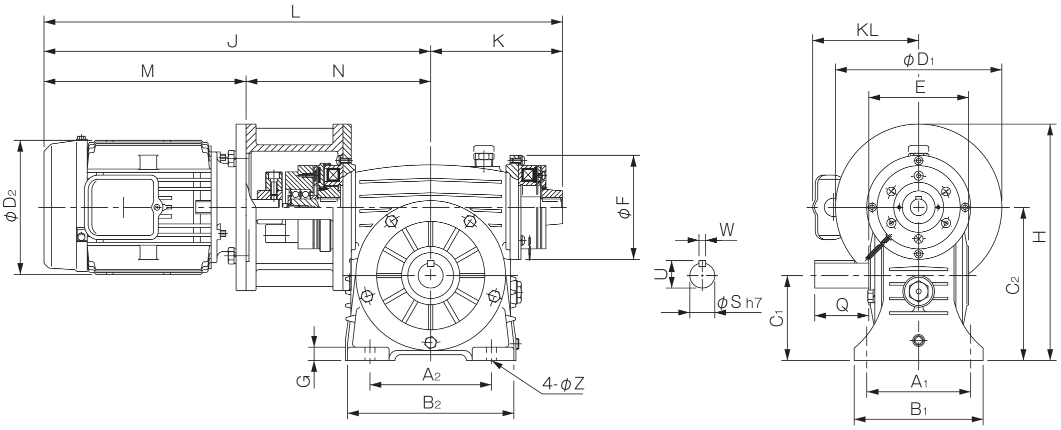
Model	Size	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Rotating part moment of inertia J [kg·m²]	Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]						
CMW-06N-H□H	06	5	5.5	DC24	11	0.46	52	B	1.66×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015
CMW-08N-H□H	08	10	11	DC24	15	0.63	38	B	4.78×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025
CMW-10N-H□H	10	20	22	DC24	20	0.83	29	B	1.71×10^{-3}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030
CMW-12N-H□H	12	40	45	DC24	25	1.09	23	B	4.53×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min^{-1}.

Model	Size	Motor output [kW] 3-phase 4-pole	Speed reducer									Mass [kg]
			Model	Output shaft rated values	Speed reduction ratio 1/□						Oil volume [ℓ]	
					10	20	30	40	50	60		
CMW-06N-H□H	06	0.2	N-2SA	Torque [N·m]	78.2	79.9	85.3	78.6	88.9	76.1	0.5	16
				O.H.L. [N]	1770	2280	2620	2930	3160	3230		
CMW-08N-H□H	08	0.4	N-2A	Torque [N·m]	79.8	102	86.9	104	98.5	100	0.5	32
				O.H.L. [N]	1760	2240	2630	2880	3140	3230		
CMW-10N-H□H	10	0.75	N-3A	Torque [N·m]	165	180	180	188	187	164	1.0	44
				O.H.L. [N]	2250	2900	3370	3720	4040	4370		
CMW-12N-H□H	12	1.5	N-4A	Torque [N·m]	292	293	301	302	—	—	2.0	72
				O.H.L. [N]	2780	3640	4210	4680	—	—		

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).
* The power supplies for the motors are 3-phase, 200 V AC at 50 Hz, or 200/220 V AC at 60 Hz.
* If you desire a special voltage (5 Power Supply Specifications), different number of poles, or the like for the induction motor, contact Miki Pulley.
* Speed reducer is made by Hirai Reduction Gear Manufacturing Co.

Dimensions



Unit [mm]

Model	Dimensions of part																			Dimensions of shaft			
	A_1	A_2	B_1	B_2	C_1	C_2	D_1	D_2	E	F	G	H	J	K	KL	L	M	N	Z	Q	S	U	W
CMW-06N-H□H	105	105	132	157	75	135	160	130	110	86	15	215	375	117	—	492	205	170	12	50	25	28	8
CMW-08N-H□H	115	112	140	165	82	146	160	145	110	100	15	226	412	135	124	547	225	187	11	50	25	28	8
CMW-10N-H□H	125	146	155	200	102	184	200	163	120	125	16	284	465	159	131	636	243	222	12	65	30	33	8
CMW-12N-H□H	150	168	186	245	118	213	210	182/176	150	150	20	318	529	185	148.5	726	274	255	14	75	35	38	10

How to Place an Order

CMW-06N-HRH-10-IE3

Size

IE code
For motors with an output of 0.75 kW or greater, use the IE3 designation.

Speed reduction ratio 1/□: 10, 20, 30, 40, 50, 60
(Size 12: 10, 20, 30, 40)

Output shaft direction
R: Right side of the output shaft as viewed from the motor side
L: Left side of the output shaft as viewed from the motor side

List of Stand-alone Clutches and Brakes Used and Recommended Power Supplies and Accessory Parts (CBW-□N-H□)

Model	Stand-alone clutch system	Stand-alone braking system	Bearing number	Coupling type	Recommended power supplies	Accessory parts
						Circuit protector (Varistor), qty. 2
CMW-06N-H□H	101-06-13G 24V 15JIS	111-06-11G 24V 15JIS	6002	CF-A-001-01-T5	BEH-10G	NVD07SCD082 or an equivalent
CMW-08N-H□H	101-08-13G 24V 17JIS	111-08-11G 24V 17JIS	6003	CF-A-002-01-1360-14N	BEH-10G	NVD07SCD082 or an equivalent
CMW-10N-H□H	101-10-13G 24V 20JIS	111-10-11G 24V 20JIS	6004	CF-A-002-01-1360-19N	BEH-10G	NVD07SCD082 or an equivalent
CMW-12N-H□H	101-12-13G 24V 25JIS	111-12-11G 24V 25JIS	6005	CF-A-004-01-1360-24N	BEH-10G	NVD07SCD082 or an equivalent

* NVD□SCD□ parts are manufactured by KOA Corporation.
* Varistors need not be used when a BEH model overexcitation electromagnetic power supply is used. For details, refer to the section on power supplies.

Selecting a CMW Worm Reducer

For speed reducers with clutches/brakes, loads start and stop abruptly, so load inertia and the like place large loads on worm wheels. Select a worm reducer based on frequency of use, load inertia, usage time, and the like, with due consideration to safety rates.

- Determining speed reduction ratio I

$$\text{Speed reduction ratio I} = \frac{\text{Speed of output shaft rotation } N_2\ [\text{min}^{-1}]}{\text{Speed of input shaft rotation } N_1\ [\text{min}^{-1}]}$$

- Calculating equivalent torque

$$\text{Equivalent torque Te [N•m]} = \text{Load torque Tf [N•m]} \times \text{Load coefficient Sf} \times \text{Frequency coefficient Sh}$$

$$\text{Load torque Tf [N•m]} = \frac{9550 \times kW \times E}{N_2}$$

kW: Input Wattage [kW]
E: Speed reducer efficiency [%]/100
* See the speed reducer manufacturer's catalog for the speed reducer efficiency.
N_2: Output rotation speed [min^{-1}]

- Load coefficient Sf and frequency coefficient Sh
  Find the equivalent value for conditions such as load type, time, and frequency of use.

■ Load coefficient Sf

Load type	Uniform load	Normal shock	Sharp shock
Continuous time			
Up to 2 hrs.	0.80	1.00	1.25
Up to 8 hrs.	1.00	1.25	1.50
Up to 24 hrs.	1.25	1.50	1.75

■ Frequency coefficient Sh

For sharp starts and stops due to clutch/brake	1.5

- Provisional selection of speed reducer
  Select a speed reducer from the specifications table for which equivalent torque Te ≦ rated output torque T.

- Calculating the equivalent overhang load (O.H.L.)
  O.H.L. refers to the load that acts to bend the shaft when transmitting power using a chain or the like.

$$\text{Equivalent O.H.L.} = \frac{Te \times K \times (L+0.57 \times Ls)}{R \times 1.07 \times Ls}$$

Te: Equivalent torque [N•m]
K: Factor based on type of transmission tool
R: Pitch radius of transmission tool [m]
Ls: Length of standard shaft [mm]
L: Distance from shaft base to load center [mm]

Transmission tool	Chain timing belt	Gear	V belt	Flat belt
K	1.00	1.25	1.50	2.50

Use the specifications to confirm that equivalent O.H.L ≦ rated O.H.L. If this condition is not satisfied, change Te, L or R, or increase the selected output.

Operational Cautions

- Before starting, check that the speed reducer has a good amount of oil.
- Loosen or remove the air vent screw or pin.
- Break in the reducer, guided by the manual from the speed reducer manufacturer.
- Periodically replace the oil. Be careful when doing this to not get any oil whatsoever on the clutch and brake parts.

■ Recommended speed reducer lubricants table

Ambient temperature [℃]	0 ～ 40
ISO viscosity grade	VG320
Idemitsu Kosan	Daphne Super Gear Oil 320
JX Nippon Oil & Energy	Bonnock 320
Cosmo Oil	Cosmo Gear SE320
Showa Shell Sekiyu	Omara 320
Jomo Oil	Reductus 320
Mobil Oil	Mobilgear 632 (320)

■ List of speed reducer oil volumes

Speed reducer type	Oil volume [ℓ]
N-2SA	0.5
N-2A	0.5
N-3A	1.0
N-4A	2.0

121- □ -10G Types Double Clutch Units

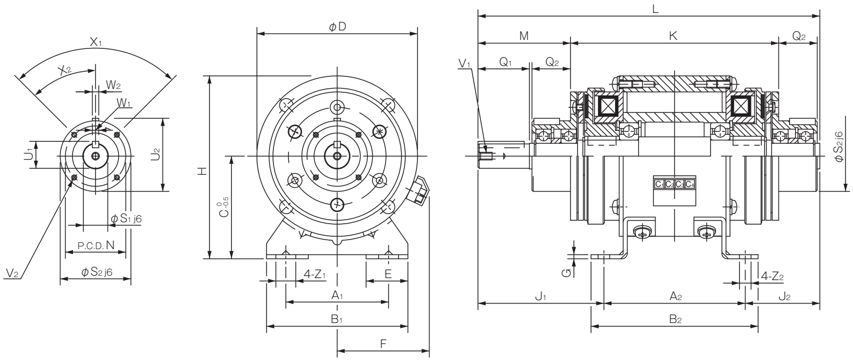
Specifications

Model	Size	Dynamic friction torque T_d [N·m]	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]		Total work performed until readjustment of the air gap E_T [J]	Armature pull-in time t_a [s]	Torque build-up time t_p [s]	Torque decaying time t_d [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]			For hub input	For shaft input					
121-06-10G	06	5	5.5	DC24	11	0.46	52	B	3000	1.55×10^{-4}	1.05×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015	1.7
121-08-10G	08	10	11	DC24	15	0.63	38	B	3000	4.75×10^{-4}	3.00×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025	3.1
121-10-10G	10	20	22	DC24	20	0.83	29	B	3000	1.44×10^{-3}	9.45×10^{-4}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030	6.5
121-12-10G	12	40	45	DC24	25	1.09	23	B	3000	4.50×10^{-3}	2.75×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050	10.5
121-16-10G	16	80	90	DC24	35	1.46	16	B	3000	1.34×10^{-2}	9.05×10^{-3}	470×10^6	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	21
121-20-10G	20	160	175	DC24	45	1.88	13	B	2500	4.18×10^{-2}	2.65×10^{-2}	10×10^8	C:0.090 B:0.065	C:0.250 B:0.200	C:0.130 B:0.070	38.5
121-25-10G	25	320	350	DC24	60	2.50	9.6	B	2000	9.80×10^{-2}	7.45×10^{-2}	20×10^8	C:0.115 B:0.085	C:0.335 B:0.275	C:0.210 B:0.125	70

* The dynamic friction torque, T_d, is measured at a relative speed of 100 min⁻¹.

* The rotating part moment of inertia for shaft input is the value with one armature type-5.

Dimensions



CAD

Unit [mm]

Size	Dimensions of part																
	A_1	A_2	B_1	B_2	C	D	E	F	G	H	J_1	J_2	K	L	M	N	Z_1	Z_2
06	52.5	75	80	90	55	80	27.5	53	2.6	95	65.5	40.5	111.5	181	47	33	13.5	6.5
08	65	90	90	105	65	100	27.5	61	2.6	115	78.5	48.5	133	217	57	37	13.5	6.5
10	80	110	110	130	80	125	32.5	72	3.2	142.5	98	58	162	266	72	47	15.5	9
12	105	135	140	160	90	150	35	81	3.2	165	121	71	193	327	92	52	20	11.5
16	135	160	175	185	112	190	42.5	97	4.5	207	149	87.5	232	397	113	62	24.5	11.5
20	155	200	200	230	132	230	45	109	6	247	187	105	290	492	142	74.5	28	14
25	195	240	240	270	160	290	47.5	124	20	305	238	125	350	603	183	101.5	28	14

Size	Dimensions of shaft									
	Q_1	Q_2	S_1	S_2	U_1	U_2	V_1	V_2	X_1	X_2	$W_{1,2}$
06	25	20	11	38	12.5	39.5	M4 × 0.7, length: 8	3-M4 × 0.7, length: 4	3-120°	60°	4
08	30	25	14	45	16	47	M4 × 0.7, length: 8	3-M4 × 0.7, length: 6	3-120°	60°	5
10	40	30	19	55	21	57	M6 × 1, length: 11	4-M4 × 0.7, length: 8	4-90°	45°	5
12	50	40	24	64	27	67	M6 × 1, length: 11	4-M4 × 0.7, length: 8	4-90°	45°	7
16	60	50	28	75	31	78	M6 × 1, length: 11	6-M5 × 0.8, length: 8	6-60°	30°	7
20	80	60	38	90	41.5	93.5	M10 × 1.5, length: 17	4-M6 × 1, length: 12	4-90°	45°	10
25	110	70	42	115	45.5	118.5	M10 × 1.5, length: 17	8-M6 × 1, length: 12	8-45°	22.5°	12

* The input/output keyways are old JIS standard class 2 while the key is old JIS standard class 1. Note that the keyway dimensions of the unit hub part do not conform to the old JIS standard. Check them on the dimensions table above.

* When inserting pulleys or the like onto input/output shafts, use the supplied insertion set.

* The 121-25-10G base is a casting.

How to Place an Order

121-06-10G

Size

List of Stand-alone Clutches Used

Model	Stand-alone clutch system	Bearing number	
		Main shaft part	Hub part
121-06-10G	101-06-15G 24V R15JIS A12JIS	6202	6001
121-08-10G	101-08-15G 24V R20JIS A15JIS	6004	6002
121-10-10G	101-10-15G 24V R25JIS A20JIS	6205	6004
121-12-10G	101-12-15G 24V R30JIS A25JIS	6206	6005
121-16-10G	101-16-15G 24V R40JIS A30JIS	6208	6006
121-20-10G	101-20-15G 24V R50JIS A40JIS	6211	6008
121-25-10G	101-25-15G 24V R60JIS A50JIS	6214	6010

Recommended Power Supplies and Accessory Parts

Model	Recommended power supplies	Accessory parts				
		Circuit protector (Varistor), qty. 2	Tightening collar	Screw stock	Presser foot	Hexagonal nut
121-06-10G	BES-20-10	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 3	Qty. 1	M4, qty. 3
121-08-10G	BES-20-10	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 3	Qty. 1	M4, qty. 3
121-10-10G	BES-20-10	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 3	Qty. 1	M4, qty. 3
121-12-10G	BES-20-16	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 2/M6 × 100, qty. 1	Qty. 1	M4, qty. 2/M6, qty. 1
121-16-10G	BES-20-16	NVD07SCD082 or an equivalent	Qty. 1	M5 × 70, qty. 2/M6 × 100, qty. 1	Qty. 1	M5, qty. 2/M6, qty. 1
121-20-10G	BES-20-20	NVD07SCD082 or an equivalent	Qty. 1	M6 × 160, qty. 2/M10 × 220, qty. 1	Qty. 1	M6, qty. 4/M10, qty. 2
121-25-10G	BES-40-25	NVD07SCD082 or an equivalent	Qty. 1	M6 × 160, qty. 2/M10 × 220, qty. 1	Qty. 1	M6, qty. 4/M10, qty. 2

* NVD□SCD□ parts are manufactured by KOA Corporation.

* Recommended BES model power supplies are required for each clutch. Varistors need not be used when a BES model is used. For details, refer to the section on power supplies.

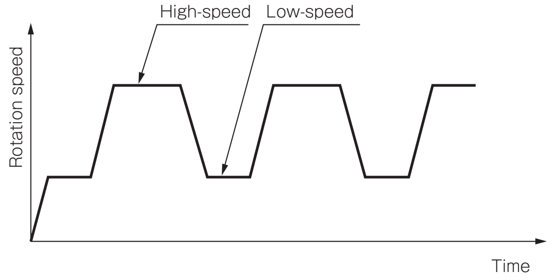
Mounting Example

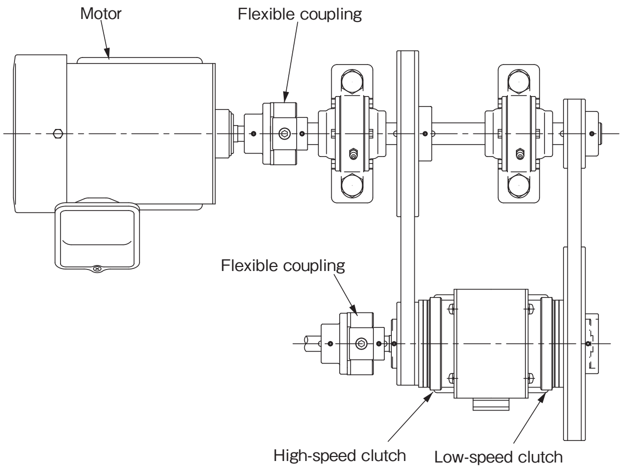
Example When Used in Two-step Speed Change

In two-step speed changing, two hubs are linked respectively to high-speed and low-speed power; by switching the clutches, the output shaft is made to rotate at high speed or low speed.

Caution

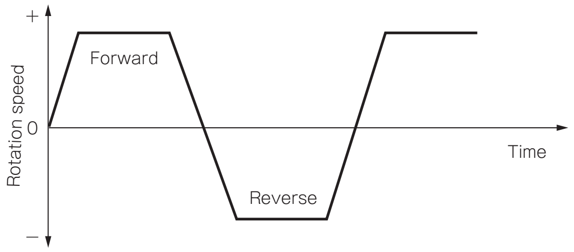
Conversely, when using the shaft as the input, one of the clutches is made to rotate at very high speed at some speed change ratios, so the bearings and the like may be damaged.

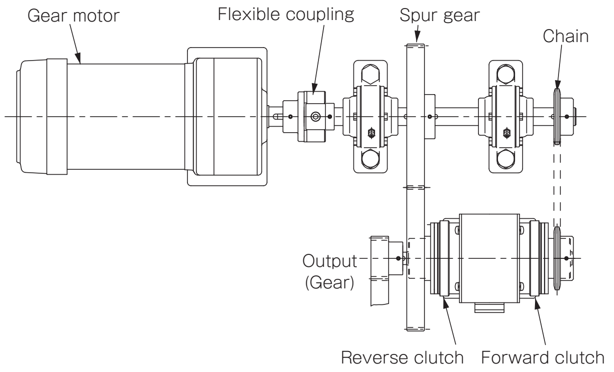




Example When Used in Forward/Reverse Operation

This unit does not have a brake, so forward/reverse operation is effective at relatively low speeds and light loads. In the example depicted, forward/reverse rotation is obtained from the drive-side rotation shaft with a chain and spur gear, and engages the individual hubs. By switching the clutches, the output shaft goes back and forth between forward and reverse rotation. There is also a method of forward/reverse rotation that uses two motors.





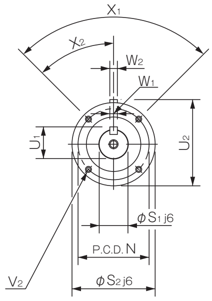
122 Models Double Clutch/Brake Units

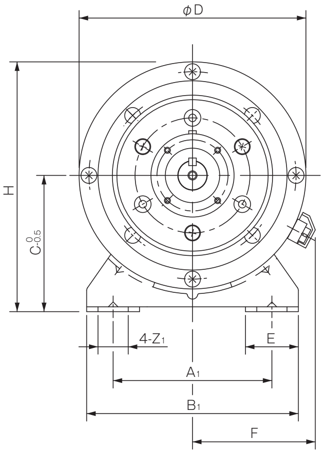
Specifications

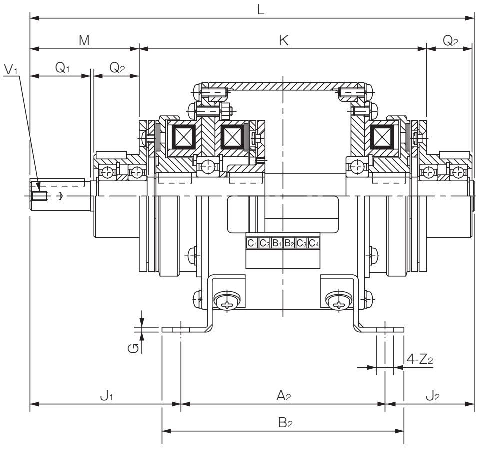
Model	Size	Dynamic friction torque Td [N·m]	Static friction torque Ts [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]	Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
122-06-20G	06	5	5.5	DC24	11	0.46	52	B	3000	2.19×10^{-4}	36×10^6	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015	4
122-08-20G	08	10	11	DC24	15	0.63	38	B	3000	6.55×10^{-4}	60×10^6	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025	6
122-10-20G	10	20	22	DC24	20	0.83	29	B	3000	2.12×10^{-3}	130×10^6	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030	9
122-12-20G	12	40	45	DC24	25	1.09	23	B	3000	6.35×10^{-3}	250×10^6	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050	17
122-16-20G	16	80	90	DC24	35	1.46	16	B	3000	1.99×10^{-2}	470×10^6	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	29
122-20-20G	20	160	175	DC24	45	1.88	13	B	2500	6.15×10^{-2}	10×10^8	C:0.090 B:0.065	C:0.250 B:0.200	C:0.130 B:0.070	58

* The dynamic friction torque, Td, is measured at a relative speed of 100 min⁻¹.

Dimensions







Unit [mm]

Size	Dimensions of part																	
	A1	A2	B1	B2	C	D	E	F	G	H	J1	J2	K	L	M	N	Z1	Z2
06	65	90	90	105	65	100	27.5	61	2.6	115	73	48	142	211	47	33	13.5	6.5
08	80	110	110	130	80	125	32.5	72	3.2	142.5	83	53	162	246	57	37	15.5	9
10	105	135	140	160	90	150	35	81	3.2	165	100	59	190	294	72	47	20	11.5
12	135	160	175	185	112	190	42.5	97	4.5	207	124	74	222	358	93	52	24.5	11.5
16	155	200	200	230	132	230	45	109	6	247	150.5	89.5	272	440	114.5	62	28	14
20	195	240	240	270	160	290	47.5	124	20	305	197	114	348	551	143	74.5	28	14

Size	Dimensions of shaft										
	Q1	Q2	S1	S2	U1	U2	V1	V2	X1	X2	W1,2
06	25	20	11	38	12.5	39.5	M4 × 0.7, length: 8	3-M4 × 0.7, length: 4	3-120°	60°	4
08	30	25	14	45	16	47	M4 × 0.7, length: 8	3-M4 × 0.7, length: 6	3-120°	60°	5
10	40	30	19	55	21	57	M6 × 1, length: 11	4-M4 × 0.7, length: 8	4-90°	45°	5
12	50	40	24	64	27	67	M6 × 1, length: 11	4-M4 × 0.7, length: 8	4-90°	45°	7
16	60	50	28	75	31	78	M6 × 1, length: 11	6-M5 × 0.8, length: 8	6-60°	30°	7
20	80	60	38	90	41.5	93.5	M10 × 1.5, length: 17	4-M6 × 1, length: 12	4-90°	45°	10

* The output keyways are old JIS standard class 2 while the key is old JIS standard class 1. Note that the keyway dimensions of the unit hub part do not conform to the old JIS standard. Check them on the dimensions table above.

* When inserting pulleys or the like onto output shafts, use the supplied insertion set.

* The 122-20-20G base is a casting.

How to Place an Order

122-06-20G

Size

List of Stand-alone Clutches and Brakes Used

Model	Stand-alone clutch system	Stand-alone braking system	Bearing number	
			Main shaft part	Hub part
122-06-20G	101-06-15G 24V R15JIS A12JIS	111-06-12G 24V 15JIS	6202	6001
122-08-20G	101-08-15G 24V R20JIS A15JIS	111-08-12G 24V 20JIS	6004	6002
122-10-20G	101-10-15G 24V R25JIS A20JIS	111-10-12G 24V 25JIS	6205	6004
122-12-20G	101-12-15G 24V R30JIS A25JIS	111-12-12G 24V 30JIS	6206	6005
122-16-20G	101-16-15G 24V R40JIS A30JIS	111-16-12G 24V 40JIS	6208	6006
122-20-20G	101-20-15G 24V R50JIS A40JIS	111-20-12G 24V 55JIS	6211	6008

Recommended Power Supplies and Accessory Parts

Model	Recommended power supplies	Accessory parts				
		Circuit protector (Varistor), qty. 3	Tightening collar	Screw stock	Presser foot	Hexagonal nut
122-06-20G	BES-20-10	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 3	Qty. 1	M4, qty. 3
122-08-20G	BES-20-10	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 3	Qty. 1	M4, qty. 3
122-10-20G	BES-20-10	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 2/M6 × 100, qty. 1	Qty. 1	M4, qty. 2/M6, qty. 2
122-12-20G	BES-20-16	NVD07SCD082 or an equivalent	Qty. 1	M4 × 55, qty. 2/M6 × 100, qty. 1	Qty. 1	M4, qty. 2/M6, qty. 2
122-16-20G	BES-20-16	NVD07SCD082 or an equivalent	Qty. 1	M5 × 70, qty. 2/M6 × 100, qty. 1	Qty. 1	M5, qty. 2/M6, qty. 2
122-20-20G	BES-20-20	NVD07SCD082 or an equivalent	Qty. 1	M6 × 160, qty. 2/M10 × 220, qty. 1	Qty. 1	M6, qty. 2/M10, qty. 2

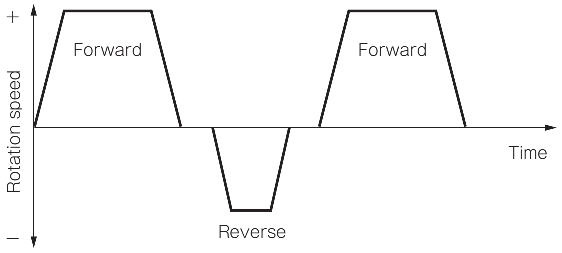
* NVD□SCD□ parts are manufactured by KOA Corporation.

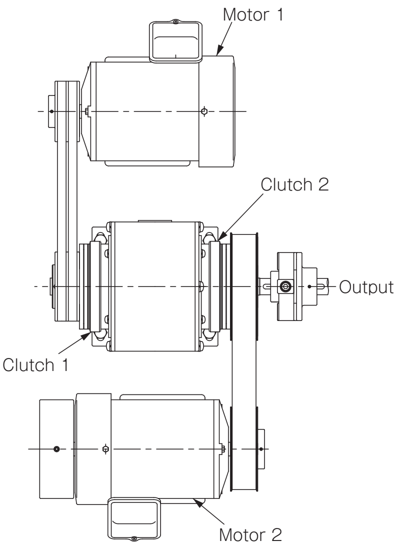
* Recommended BES power supplies are available for each clutch/brake. Varistors need not be used when a BES model is used. For details, refer to the section on power supplies.

Mounting Example

Example When Used in Forward/Reverse Operation

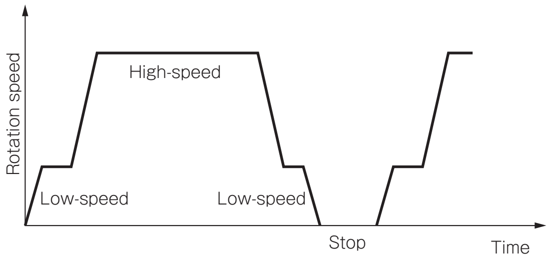
This is an example of forward/reverse rotation using two motors. The motor rotates continuously, forward and reverse operation are achieved by switching clutches, and any load can be stopped during that period.

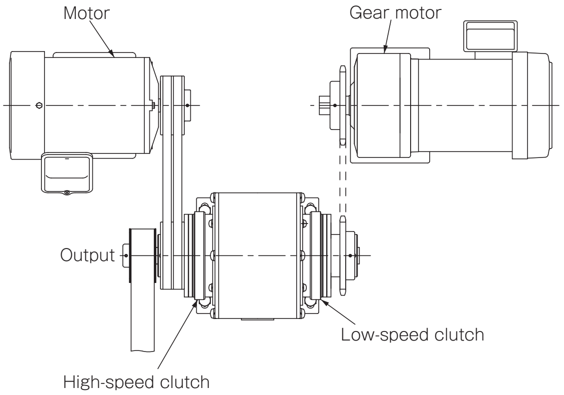




Example When Used in Two-step Speed Change/Stop

High-precision stopping at a predetermined position, winding control on winders, and the like can be controlled simply and with high precision by using this unit to perform a series of operations: slow, fast, slow, stop.





ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

The Selection Process

Key Issues for Selection

Because of their good controllability, clutches and brakes are often used for complex controls rather than simple on/off operations.

If a size is chosen based solely on torque, problems can unexpectedly result.

When choosing a size, many factors must be considered, including load properties and the layout of the mechanism that incorporates the clutch or brake. In this section on selecting sizes, we explain how to make selections for a variety of situations, and also give calculation examples and data needed for selections.

Motors and clutches/brakes

- Relationship between motor output and torque

Motor size is expressed as output, but clutches and brakes are expressed as torque. The following relationship obtains between this torque and motor output.

$$T_M = \frac{9550 \cdot P}{n_r} \eta \ [\mathrm{N \cdot m}] \quad \cdots\cdots\cdots\cdots (1)$$

P: Motor output [kW]

n_r: Rotation speed of clutch/brake shaft [min^{-1}]

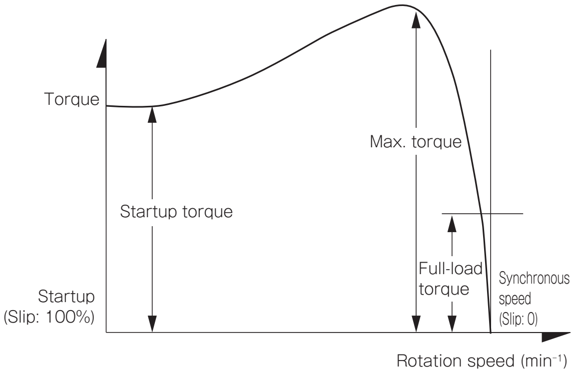
η : Transmission efficiency from motor to clutch/brake

- Variance of characteristics

Motors have different torque characteristics from clutches and brakes. That requires that the various characteristics be factored in when using a motor as the drive source and starting and stopping loads with a clutch/brake.

Motor characteristics

Motors can generate torque of 200% of total load torque or more at startup, pass through maximum torque while accelerating, and drive the load near the full load torque that enables stable operation. If load increases during rotation, the motor can lower its own rotation speed and drive the load at a rotation speed that generates high torque. The figure below shows the relationship between motor torque and rotation speed characteristics.



Clutch/brake torque characteristics

The clutch/brake characteristics are determined by the upper limits of engaging and braking torque, as described in the section on torque characteristics. Load torque beyond that causes slipping at the frictional surface.

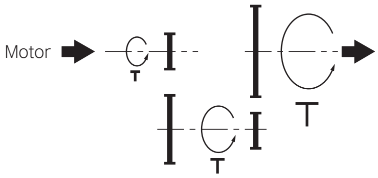
Knowing these differences in characteristics from the beginning enables you to select the clutch/brake suited for your load conditions. A clutch/brake that has a torque value that is 200 to 250% of the full load torque of the motor will normally be suited to a wide range of applications, factoring in reasonable safety considerations when selecting it.

Relationship between torque and rotation speed

- Torque and rotation speed are inversely proportional

Shafts within machinery that are rotating the fastest can be made to rotate with little force, but decelerated slow-rotating shafts require large amounts of force to make them rotate.

In other words, torque and rotation speed are inversely proportional. This is very important for the selection of clutches and brakes. The size and service life of a clutch or brake can change depending on how fast the shaft it is used on is rotating.



- In combination with speed changers

If you are using the clutch/brake within a mechanism that can change rotation speed, such as a stepless speed changer, you must select a clutch/brake that does not fall short on torque at low speeds and that satisfies needs for response and service life at high speeds.

Ascertaining load properties

Clutch and brake engaging time, wear life, and the like will vary with the properties of the load being engaged or braked. For that reason, if the load is not ascertained as accurately as possible, even slight changes in load conditions can mean the system will not work adequately.

As it happens, such load properties are quite diverse, and thus difficult to ascertain. Often, users today will determine them empirically.

- Importance of safety factor

When determining the size of the clutch or brake, determine the required torque by multiplying by an empirically derived factor. Once the drive part has been determined, we use an empirical factor K based on the type of drive source used.

If this factor is too small, slipping and other problems can occur when conditions deteriorate; if it is too large, the load on the driver increases, which can cause driver problems when overloads occur.

Types of drivers	Motor/ turbine	Gasoline engine	Diesel engine (1 or 2 cylinder gasoline engine)
Factor K	2 ～ 2.5	2.5 ～ 2.8	2.8 ～ 3.4

- Load torque and moment of inertia

Load torque comes from resistance from the machinery and from resistance applied after engagement (cutting resistance, etc.).

Load torque is generally difficult to determine and is therefore sometimes ignored during size selection. For clutches, however, this can lead to inadequate torque, so it requires attention.

Moment of inertia is also called the flywheel effect. It is a quantity that represents the difficulty of getting an object to move or the difficulty of stopping it.

When designing a mechanism, the work of the clutch and brake are lessened by making the load on the clutch as small as possible while making the brake load somewhat larger. If the moment of inertia is made as small as possible, response and service life are improved.

And since the clutch and brake have inertia of their own, that inertia must be added to calculations.

Selection

Simple Selection Graph

This selection graph applies to cases in which the drive source is a motor, load is relatively light, and frequency is low. The clutch/brake size can be determined easily when the motor used is appropriate to the load, the mechanism between motor and clutch/brake is not complex, and there is no high-inertia body to assist drive.

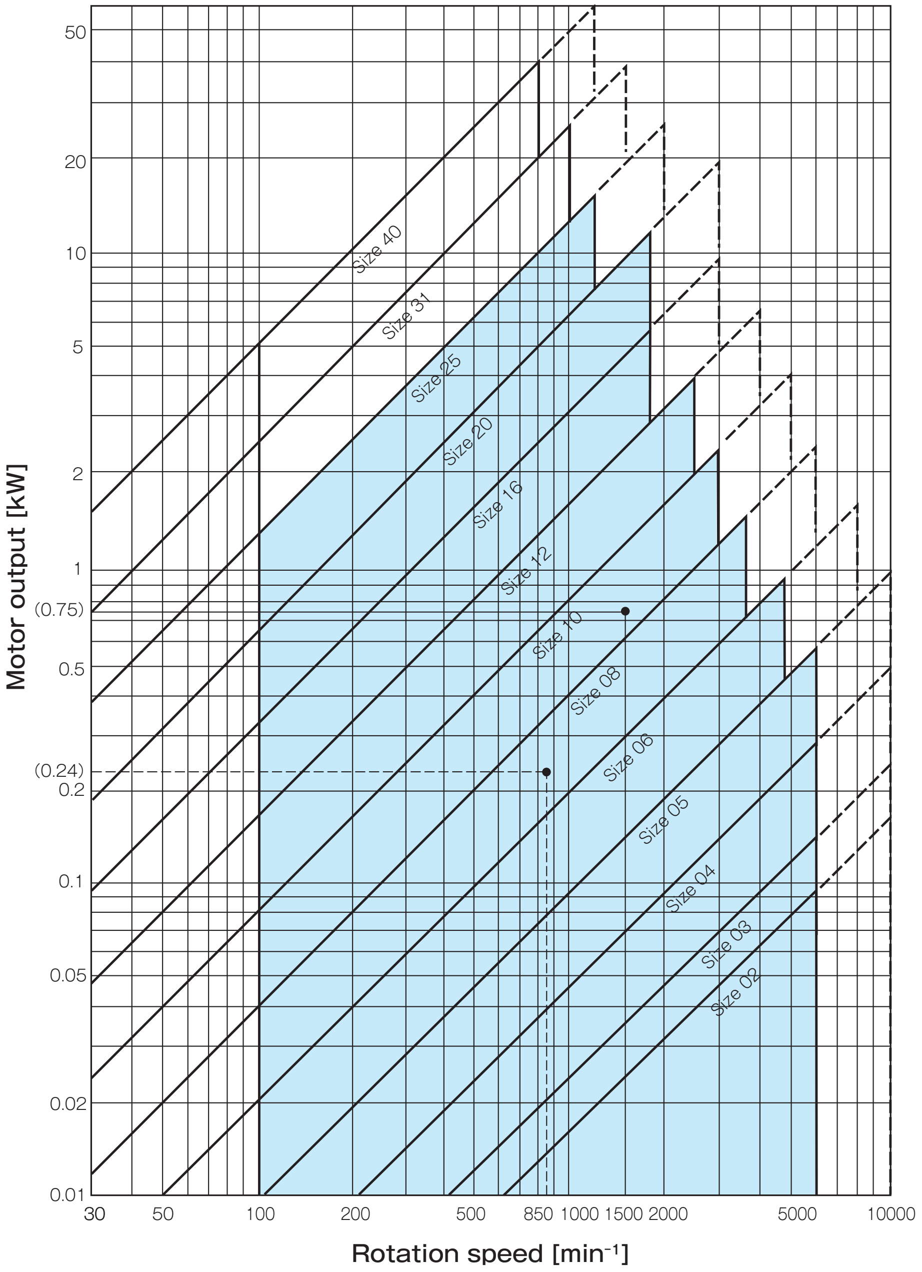
This table is for a safety factor K of 2.5 (ordinary use). You can use this table to select a clutch/brake with other factors. For the vertical axis [kW], use the value obtained by multiplying the motor output by K/2.5.

Selection example

- If the motor output is 0.75 kW and the clutch/brake rotation speed is 1500 min^{-1}, select the size at their intersection, which is size 10.
- To get K = 1.5 when the motor output is 0.4 kW and the clutch/brake rotation speed is 850 min^{-1}:

$$0.4\,[\text{kW}] \times \frac{1.5}{2.5} = 0.24\,[\text{kW}]$$

Find 0.24 kW on the vertical axis of the table and find the intersection with 850 min^{-1}. The size to select is size 08.



* Select the size in the 🟦 area. Inside the dotted line area on the right, the amount of energy, heat dissipation, friction or the like may not satisfy requirements, so check them.
Within the bold line under 100 min^{-1}, use the equation to check the required torque.

* Contact Miki Pulley regarding sizes 31 and 40.

ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

Consideration of Torque

Total load torque of motor (T_M)

The total load torque translated to the clutch/brake mounting shaft is:

$$T_M = \frac{9550 \cdot P}{n_r} \eta \ [\mathrm{N \bullet m}] \quad \cdots\cdots (1)$$

P: Motor output [kW]
n_r: Rotation speed of clutch/brake shaft [min^{-1}]
η : Transmission efficiency from motor to clutch/brake

Load torque (T_ℓ)

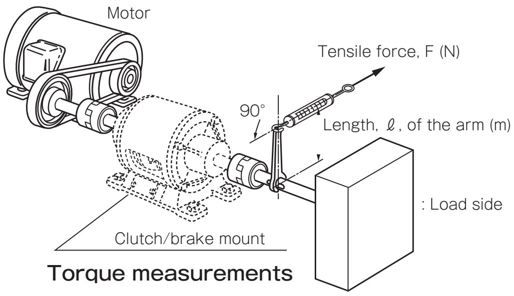
Load torque is difficult to determine through calculations, so it is either determined empirically or by direct measurement.

- When determined from motor capacity
  To select a motor correctly for a load, the T_M of Eq. (1) is used as the load torque.

$$T_\ell = T_M \ [\mathrm{N \bullet m}] \quad \cdots\cdots (2)$$

- When measured and then determined
  The load can be actually measured to find an accurate T_ℓ . It can be measured using a torque wrench, or, as in the figure below, the shaft where the clutch or brake will be mounted can be rotated and the value found as the product of the force F to start the load rotating and the length of the arm ℓ .

$$T_\ell = \ell \bullet F \ [\mathrm{N \bullet m}] \quad \cdots\cdots (3)$$



Torque measurements

- Sign of load torque
  Load torque in the equation is shown with a plus or minus sign. For a clutch, it is applied in the direction that opposes rotation, so it is subtracted from clutch torque T_d; for a brake, it is applied in the direction that assists braking, so it is added to brake torque T_d. (In the rare cases in which it works the opposite way, change the signs when calculating.) In the equation, it is expressed as $\pm T_\ell$. Use the value as appropriate.

Acceleration/deceleration torque (T_a)

- The torque required to accelerate a load is:

$$T_a = \frac{J \bullet n_r}{9.55 t_{ae}} \ [\mathrm{N \bullet m}] \quad \cdots\cdots (4)$$

t_{ae}: Actual engagement time (acceleration time) of clutch [s]
J: Total moment of inertia engaged by the clutch [$\mathrm{kg \cdot m^2}$]

- The torque required to decelerate a load is:

$$T_a = \frac{J \bullet n_r}{9.55 t_{ab}} \ [\mathrm{N \bullet m}] \quad \cdots\cdots (5)$$

t_{ab}: Actual braking time (deceleration time) of brake [s]
J: Total moment of inertia braked by the brake [$\mathrm{kg \cdot m^2}$]

Required torque (T)

Torque required to drive (brake) a load may be as follows, depending on conditions.

- When J and T_ℓ are applied while engaged

$$T = (T_a \pm T_\ell) K \ [\mathrm{N \bullet m}] \quad \cdots\cdots (6)$$

K is a factor based on load conditions, which has been empirically found to have values like the following. The sign of T_ℓ is positive for a clutch, since T_ℓ works in the direction that opposes driving, and negative for a brake, since it works in the direction that assists braking.

- When T_ℓ is nearly all that is applied

$$T = T_\ell \bullet K \ [\mathrm{N \bullet m}] \quad \cdots\cdots (7)$$

- When J is nearly all that is applied

$$T = T_a \bullet K \ [\mathrm{N \bullet m}] \quad \cdots\cdots (8)$$

- For stationary engagement
  When engaging the clutch while stationary and then accelerating the load with the driver, the required torque so that the clutch does not slip when accelerating is:

$$T = \left\{ \frac{J_\ell}{J_d + J_\ell} (T_M - T_\ell) + T_\ell \right\} K \ [\mathrm{N \bullet m}] \quad \cdots\cdots (9)$$

J_d: Total drive-side J from clutch [$\mathrm{kg \bullet m^2}$]
J_ℓ : Total load-side J from clutch [$\mathrm{kg \bullet m^2}$]

Safety factor based on load conditions: K

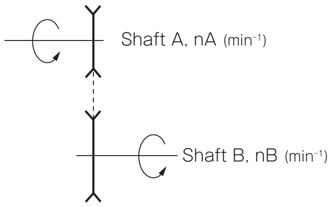
Usage conditions		Factor K
Light load	Low-frequency use of small inertial body	1.5
	High-frequency use of relatively small inertial body	2～2.2
	Ordinary use of normal inertial body	
	High-frequency use	2.2～2.4
Normal load	Low-frequency use of small inertial body	2～2.4
	Ordinary use	2.4～2.6
	Driving large inertial body	2.7～3.2
Heavy load	Operation with shock (large load fluctuation)	3.5～4.5

Translation of torque to other shafts

For the torque of shaft B to be translated to shaft A:

$$T_A = T_B \bullet \frac{n_B}{n_A} \ [\mathrm{N \bullet m}] \quad \cdots\cdots (10)$$

T_A: Torque of shaft A, T_B: Torque of shaft B [N•m]
n_A: Rotation speed of shaft A, n_B: Rotation speed of shaft B [min^{-1}]



Consideration of Energy

Engaging or braking energy (E_e, E_b)

The energy when a clutch or brake engages or brakes once is:

- For acceleration, engaging energy E_e is:

$$E_e = \frac{J \cdot n_r^2}{182} \cdot \frac{T_d}{T_d - T_\ell}\ [J] \tag{11}$$

- For deceleration, braking energy E_b is:

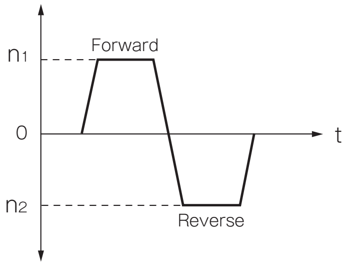
$$E_b = \frac{J \cdot n_r^2}{182} \cdot \frac{T_d}{T_d + T_\ell}\ [J] \tag{12}$$

- Forward/reverse rotation

The engaging energy of the clutch when using the clutch to switch rotation direction is:

$$E_e = \frac{J}{182}\left\{(n_1^2 + 2 \cdot n_1 \cdot n_2)\frac{T_d}{T_d + T_\ell} + n_2^2\frac{T_d}{T_d - T_\ell}\right\}\ [J] \tag{13}$$

n_1: Forward rotation speed [min^{-1}]
n_2: Reverse rotation speed [min^{-1}]



- Energy when using slip

$$E_e = \frac{2\,\pi}{60} \cdot n \cdot t \cdot T_d\ [J] \tag{14}$$

$$E_b = \frac{2\,\pi}{60} \cdot n \cdot t \cdot T_d\ [J] \tag{15}$$

t: Slip time [s]
n: Rotation speed that forces slip [min^{-1}]
T_d: Dynamic friction torque at n [min^{-1}] [N•m]

If the clutch or brake slips as it is being used, unwanted situations such as heat generation can occur, so perform adequate checks.

- Allowable work

Allowable work $E_{ea\ell}$ and $E_{ba\ell}$ are the values under ideal conditions, so the values of E_e and E_b must be sufficiently smaller than the values of $E_{ea\ell}$ and $E_{ba\ell}$.

$$E_e \ll E_{ea\ell} \tag{16}$$

$$E_b \ll E_{ba\ell} \tag{17}$$

* For the values of $E_{ea\ell}$ and $E_{ba\ell}$, see the page on heat dissipation characteristics (P.325).

Energy rate

Since clutches and brakes turn on and off at relatively high frequencies, it is important to investigate whether accumulated heat can be dissipated.

- Engaging energy rate (P_e)

$$P_e = \frac{E_e \cdot S}{60} \ll P_{ea\ell}\ [W] \tag{18}$$

- Braking energy rate (P_b)

$$P_b = \frac{E_b \cdot S}{60} \ll P_{ba\ell}\ [W] \tag{19}$$

S: Frequency of operation [RPM]

Allowable energy rates $P_{ea\ell}$ and $P_{ba\ell}$ are the values under ideal conditions, so E_e, E_b and S must be set so these rates are sufficiently small.

* For the values of $E_{ea\ell}$ and $E_{ba\ell}$, see the page on heat dissipation characteristics (P.325).

Frequency of engaging/braking (S_a)

The allowable operating frequency S_a determined by heat dissipation is:

$$S_a \ll \frac{60P_{ea\ell}}{E_e}\ [RPM] \tag{20}$$

$$S_a \ll \frac{60P_{ba\ell}}{E_b}\ [RPM] \tag{21}$$

This allowable frequency reflects only thermal considerations; in actual use, operating time should also be considered.

Consideration of Operating Time

Total engagement/braking time (t_{te}, t_{tb})

The time the load is engaged or braked by the clutch or brake is the sum of the operating time of the clutch or brake itself and the accelerating/deceleration time.

- Total engagement time

$$t_{te} = t_{id} + t_a + t_{ae}\ [s] \tag{22}$$

t_{id}: Initial delay time [s]
t_a: Armature pull-in time [s]
t_{ae}: Actual clutch engagement time (acceleration time) [s]

- Total braking time

$$t_{tb} = t_{id} + t_a + t_{ab}\ [s] \tag{23}$$

t_{id}: Initial delay time [s]
t_a: Armature pull-in time [s]
t_{ab}: Actual braking time (deceleration time) of brake [s]

t_{ae} and t_{ab} are found using the following equations based on operating conditions.

- When accelerating/decelerating

Actual engagement time is:

$$t_{ae} = \frac{J \cdot n_r}{9.55(T_d - T_\ell)}\ [s] \tag{24}$$

Actual braking time is:

$$t_{ab} = \frac{J \cdot n_r}{9.55(T_d + T_\ell)}\ [s] \tag{25}$$

- During forward/reverse rotation

The actual engagement time (acceleration time) when switching from forward to reverse with a clutch is:

$$t_{ae} = \frac{J}{9.55}\left(\frac{n^1}{T_d - T_\ell} + \frac{n^2}{T_d + T_\ell}\right)\ [s] \tag{26}$$

n_1: Forward rotation speed [min^{-1}]
n_2: Reverse rotation speed [min^{-1}]

ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

■ Engaging/braking time when engaging/braking is completed during the torque rise process

In this case, it is the sum of the armature pull-in time t_a and t_{ae}' or t_a and t_{ab}'.

- Total engagement time

$$t_{te} = t_{id} + t_a + t_{ae}' \text{ [s]} \quad \cdots\cdots(27)$$

$$t_{ae}' = \sqrt{\frac{J\cdot n_r}{4.77}\cdot\frac{t_{ap}}{0.8\cdot T_d}} \text{ [s]} \quad \cdots\cdots(28)$$

- Total braking time

$$t_{tb} = t_{id} + t_a + t_{ab}' \text{ [s]} \quad \cdots\cdots(29)$$

$$t_{ab}' = \sqrt{\frac{J\cdot n_r}{4.77}\cdot\frac{t_{ap}}{0.8\cdot T_d}} \text{ [s]} \quad \cdots\cdots(30)$$

These are when $T_\ell = 0$. Generally, the above equation is used only when load torque (T_ℓ) is very small. When, for calculated values, $t_{ae}' > t_{ap}$ and $t_{ab}' > t_{ap}$, use equations (22) to (26).

Consideration of Number of Operations

The amount of work that a clutch or brake can do before the air gap is adjusted is predetermined. When used beyond that point, the air gap must be adjusted. The number of operations that can be done before air gap adjustment is:

- For a clutch

$$L_e = \frac{E_T}{E_e} \text{ [operations]} \quad \cdots\cdots(31)$$

E_T: Total work performed until readjustment of the air gap

- For brakes

$$L_b = \frac{E_T}{E_b} \text{ [operations]} \quad \cdots\cdots(32)$$

Consideration of Stopping Precision

Finding stopping precision by calculating is very difficult, since friction energy, control system fluctuations and the like are involved. Generally, it is found empirically with the following equation, and that is then used as a guide.

■ Stopping angle (θ)

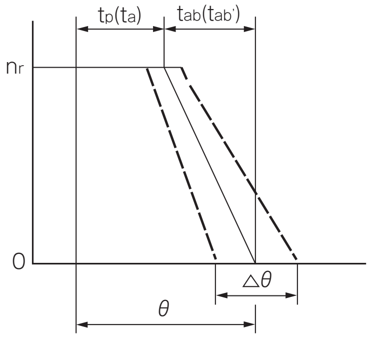
$$\theta = 6n_r(t_{id} + t_p + \frac{1}{2}t_{ab}) \text{ [°]} \quad \cdots\cdots(33)$$

$$\text{Or, } \theta = 6n_r(t_{id} + t_a + \frac{2}{3}t_{ab}') \text{ [°]} \quad \cdots\cdots(34)$$

■ Stopping precision (△θ)

$$\triangle\theta = \pm 0.15\ \theta \text{ [°]} \quad \cdots\cdots(35)$$

When there are factors that disrupt braking such as load fluctuation, use a value between 0.2 and 0.25 as the constant in Eq. (35) for safety reasons. Note that the stopping angle and stopping precision do not include divergences due to control system delays, or backlash from chains, gears, or the like.



Total Work Performed Until Readjustment of the Air Gap E_T

Electromagnetic Micro Clutches & Micro Brakes 102/112 Models

Size	Total work E_T [J]
02	2×10^6
03	3×10^6
04	6×10^6
05	9×10^6

CYT Models

Size	Total work E_T [J]
025	1×10^6
03	1.5×10^6
04	2×10^6

Electromagnetic Clutch/Brake (Units) 101/CS/111 Models

Size	Total work E_T [J]
06	36×10^6
08	60×10^6
10	130×10^6
12	250×10^6
16	470×10^6
20	10×10^8
25	20×10^8

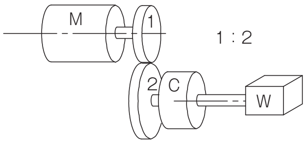
* Also applies to all unit models (except models 180).

CSZ and BSZ Models

Size	Total work E_T [J]
05	9×10^6
06	29×10^6
08	60×10^6

Selection Example 1

Clutches used for intermittent transport of loads



Selection of a clutch to use to intermittently transport loads as follows, as the figure illustrates.

Usage conditions

Output of motor used	P	0.4 kW (standard 3-phase, 4P)
Clutch operation frequency	S	20 [RPM]
Moment of inertia of load	J_A	0.0208 [kg·m²]
Load torque	T_ℓ	Unknown [N•m]
Clutch mounting shaft rotation speed	n	750 [min⁻¹]
Transmission rate	η	90%

■ Consideration of Torque

We find the required torque for engagement from the above operating conditions.
First, we find the load torque. Based on Eq. (1), load torque T_ℓ (assuming the motor was selected correctly) is:

$$T_\ell = \frac{9550 \times 0.4}{750} \times 0.9 = 4.58\ [\mathrm{N \cdot m}]$$

Next, according to Eq. (4), the acceleration torque T_a is:

$$T_a = \frac{0.0208 \times 750}{9.55 \times 0.5} = 3.27\ [\mathrm{N \cdot m}]$$

The acceleration time is given as a condition, but in the above equation is it projected as $t_{ae} = 0.5$ [s] based on the operation frequency.
Thus, the required torque (T), according to Eq. (6), is:

$$T = (4.58 + 3.27) \times 2 = 15.7\ [\mathrm{N \cdot m}]$$

Here, the sign of the load torque T_ℓ is +. The factor K for load conditions was empirically set at 2 for general use with ordinary loads.
From the above, the clutch is size 10, which is a clutch that has torque (20 N•m) above the required torque of 15.7 [N•m].

■ Consideration of Energy

Having determined the model, we find the total load moment of inertia from the self-inertia J of that type and the load moment of inertia.
With the model as 101-10-13, the moment of inertia J of the rotor is 0.000678 [kg•m²]. Thus, the total moment of inertia J_{Total}' is:

$$J_{Total}' = 0.0208 + 0.000678 = 0.02148\ [\mathrm{kg \cdot m^2}]$$

We find the engaging energy E_e for a single operation. From Eq. (11)

$$E_e = \frac{0.02148 \times 750^2}{182} \times \frac{20}{(20 - 4.58)} = 86.1\ [\mathrm{J}]$$

Here, the sign of the load torque T_ℓ is -. This engaging energy E_e is sufficiently below the allowable energy $E_{ea\ell}$.

$$E_e \ll E_{ea\ell}$$

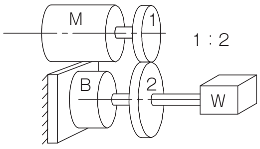
Next, we find the energy rate. From Eq. (18)

$$P_e = \frac{86.1 \times 20}{60} = 28.7\ [\mathrm{W}]$$

This value is sufficiently below the allowable energy rate $P_{ea\ell}$.
Thus, this clutch is suited to the operating conditions, and model 101-10-13 is selected.

Selection Example 2

Brakes that stop momentum when motor goes off



Selection of a brake to stop the momentum of a load when a motor is turned off as follows, as the figure illustrates.

Usage conditions

Output of motor used	P	0.75kW (standard 3-phase, 4P)
Motor rotation speed	n_1	1800 [min⁻¹]
Moment of inertia of motor	J_M	0.00205 [kg·m²]
Moment of inertia of V pulley (motor side)	J_1	0.00075 [kg·m²]
Moment of inertia of V pulley (brake side)	J_2	0.00243 [kg·m²]
Moment of inertia of load	J_A	0.05 [kg·m²]
Load torque	T_ℓ	5.0 [N•m]
Brake mounting shaft rotation speed	n	900 [min⁻¹]
Stopping time	t	Within 0.5 [s]

■ Consideration of Torque

From the above operating conditions, find the total moment of inertia translated to the brake shaft.

$$J_{Total} = \left(\frac{1800}{900}\right)^2 \times (0.00205 + 0.00075) + 0.00243 + 0.05 = 0.06363\ [\mathrm{kg \cdot m^2}]$$

We find the deceleration torque. The deceleration time also includes the operating time of the brake itself, so calculate it as 1/2 of the given stopping time. From Eq. (5)

$$T_a = \frac{0.06363 \times 900}{9.55 \times 0.25} = 24.0\ [\mathrm{N \cdot m}]$$

The required torque from Eq. (6) is:

$$T = (24.0 - 5.0) \times 2.4 = 45.6\ [\mathrm{N \cdot m}]$$

Here, the sign of the load torque T_ℓ is -. The factor K for load conditions was empirically set at 2.4 for general use with ordinary loads. From the above, size 12, which has brake torque (40 N•m) equivalent to the required torque of 45.6 [N•m], was provisionally selected

■ Consideration of Energy

Having determined the model, we find the total load moment of inertia from the self-inertia J of that type and the load moment of inertia.
With the model as 111-12-11, the moment of inertia J of the armature is 0.00181 [kg•m²]. Thus, the total moment of inertia J_{Total}' is:

$$J_{Total}' = 0.06363 + 0.00181 = 0.06544\ [\mathrm{kg \cdot m^2}]$$

Find the braking energy E_b for a single operation. From Eq. (12)

$$E_b = \frac{0.06544 \times 900^2}{182} \times \frac{40}{(40 + 5)} = 258.9\ [\mathrm{J}]$$

Here, the sign of the load torque T_ℓ is +. This braking energy E_b is sufficiently below the allowable energy $E_{ba\ell}$.

$$E_b \ll E_{ba\ell}$$

ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

■ Consideration of Operating Time

We find the braking time. From Eq. (25)

$$t_{ab} = \frac{0.06544 \times 900}{9.55 \times (40 + 5)} = 0.137\ [s]$$

Here, the sign of the load torque T_ℓ is +.

From the specifications table, the armature pull-in time t_a for size 12 is 0.027 [s]. If the initial delay time t_{id} of relays and the like is 0.050 [s],

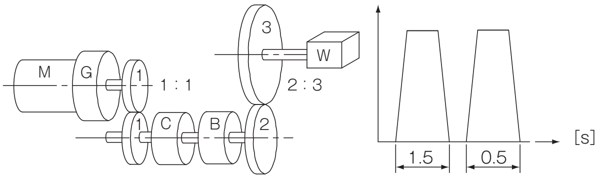
$$t_{tb} = 0.050 + 0.027 + 0.137 = 0.214\ [s]$$

from Eq. (23):

This value satisfies the requirement of being at or below 0.5 [s]. Thus, this brake is suited to the operating conditions, and model 111-12-11 is selected.

Selection Example 3

Clutches and brakes that drive loads



Selection of a clutch and brake to drive the load as follows, as the figure illustrates.

Usage conditions

Operation frequency	S	30 [RPM]
Required service life operations [*1]	L	810 × 10^4 (operations) or more
Moment of inertia of V pulley A	J_1	0.00195 [kg·m²]
Moment of inertia of V pulley B	J_2	0.01668 [kg·m²]
Moment of inertia of load	J_A	0.5075 [kg·m²]
Load torque	T_ℓ	22.0 [N•m]
Clutch/brake mounting shaft rotation speed	n	150 [min⁻¹]
Load shaft rotation speed	n_2	100 [min⁻¹]
Engagement time	t_1	Within 0.3 [s]
Stopping time	t_2	Within 0.3 [s]

*1: Desired use is 15 hours per day without adjustment for at least 1 year.
L = 30 × 60 min × 15 hr × 300 days = 8.1 million operations

■ Consideration of Torque

From the above operating conditions, load torque is translated to the clutch/brake shaft. From Eq. (10)

$$T_\ell = 22.0 \times \frac{2}{3} = 14.7\ [N•m]$$

All of the moment of inertia of the rotating parts is translated to the clutch/brake shaft.

$$J_{Total} = J_{11} + (J_2 + J_A) \times \left(\frac{2}{3}\right)^2$$

$$= 0.00195 + (0.01668 + 0.5075) \times \left(\frac{2}{3}\right)^2$$

$$= 0.2349\ [kg•m^2]$$

The acceleration time also includes the operating time of the clutch/brake itself, so calculate it as 1/2 of the given engagement time of 0.3 [s].
From Eq. (4):

$$T_a = \frac{0.2349 \times 150}{9.55 \times 0.15} = 24.6\ [N•m]$$

The required torque T from Eq. (6) is:

$$T = (24.5 \pm 14.7) \times K\ [N•m]$$

If the factor K for load conditions is empirically set at 2 for general use with ordinary loads, for the clutch we get:

$$T = (24.5 + 14.7) \times 2 = 78.4\ [N•m]$$

And for the brake, we get:

$$T = (24.5 - 14.7) \times 2 = 19.6\ [N•m]$$

Based on the above, we select a size 16 clutch (torque 80N•m) and size 10 brake (torque 20N•m).

■ Consideration of Energy

Next, having determined the model, we find the total load moment of inertia from the self-inertia J of that type and the load moment of inertia.
If the clutch model is 101-16-15, the moment of inertia of the rotor is 0.0063 [kg•m²]; if the brake model is 111-10-11, the moment of inertia of the armature is 0.000663 [kg•m²].
Thus, the total moment of inertia $J_{Total'}$ is:

$$J_{Total'} = 0.2349 + 0.0063 + 0.000663$$

$$= 0.2419\ [kg•m^2]$$

We find the engaging energy of the clutch E_e for a single operation. From Eq. (11)

$$E_e = \frac{0.2419 \times 150^2}{182} \times \frac{80}{(80 - 14.7)} = 36.6\ [J]$$

We find the braking energy E_b of the brake for a single operation. From Eq. (12)

$$E\ b = \frac{0.2419 \times 150^2}{182} \times \frac{20}{(20 + 14.7)} = 17.2\ [J]$$

This value satisfies the allowable energy and the energy per minute of the selected model.

■ Consideration of Number of Operations

Next, we find the number of operations. From the specifications tables for the different models, the total energy of sizes 16 and 10 is, respectively, 470 × 10^6 [J] and 130 × 10^6 [J], so from Eqs. (31) and (32), for the clutch we get:

$$L = \frac{470 \times 10^6}{36.6} = 1284 \times 10^4\ [times]$$

And for the brake, we get:

$$L = \frac{130 \times 10^6}{17.2} = 756 \times 10^4\ [times]$$

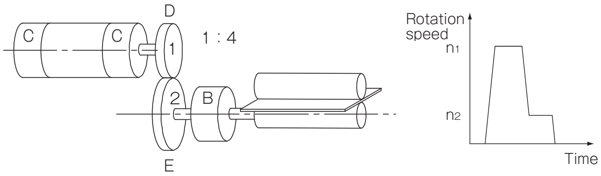
Since the requirement for number of operations in service life is roughly 8.1 million, a size 10 brake cannot satisfy the requirements. When we therefore consider the situation again with a 111-12-11 model brake, we find (leaving out intermediate calculations):

$$L = \frac{250 \times 10^6}{22.0} = 1136 \times 10^4\ [times]$$

This satisfies the requirements. Thus, we select a 101-16-15 model clutch and a 111-12-11 model brake.

Selection Example 4

Clutches and brakes used in two-step speed change/stopping mechanisms



As the figure illustrates, a selection that includes the stopping precision of the clutch and brake that drive the load is as follows.

Usage conditions

Max. input rotation speed	n_1	1500 [min^{-1}]
Min. input rotation speed	n_2	200 [min^{-1}]
Roll shaft rotation speed	n_3	50 [min^{-1}]
Operation frequency	S	12 [RPM]
Required service life operations *1	L	130 × 10^4 (operations) or more
Moment of inertia of pulley D	J_1	0.000025 [kg·m^2]
Moment of inertia of pulley E	J_2	0.005375 [kg·m^2]
Moment of inertia of roll	J_A	0.0133 [kg·m^2]
Load torque of roll	T_ℓ	8.0 [N•m]
Roll diameter	R	60 [mm]

* 1: Desired use is 6 hours per day without adjustment for at least 1 year.
L = 12 × 60 min × 6 hr × 300 days = 1.3 million operations

■ Consideration of Brake

- Consideration of energy

From the above operating conditions, we find the total moment of inertia translated to the feed roll shaft. If the moment of inertia of the rotating parts of clutch/brake unit model 121-08-10 is 0.000475 [kg•m²] and the moment of inertia of the armature of brake model 111-12-12 is 0.00181 [kg•m²],

$$J_{Total} = 0.0133 \times 2 + 0.00181 + 0.005375$$
$$+ \ (0.000025 + 0.000475) \times \left(\frac{4}{1}\right)^2$$
$$= 0.04179\ [\mathrm{kg•m^2}]$$

Find the braking energy E_b for a single operation. From Eq. (12):

$$E\ b = \frac{0.04179 \times 50^2}{182} \times \frac{40}{(40 + 8)} = 0.48\ [\mathrm{J}]$$

Here, the sign of the load torque T_ℓ is +. This value satisfies the allowable energy and the energy per minute of the selected model.

- Consideration of number of operations

Next, we find the number of operations. The total energy of size 12 is 250 × 10^6 [J], so from Eq. (32):

$$L = \frac{250 \times 10^6}{0.48} = 52083 \times 104\ [\mathrm{times}]$$

This value adequately satisfies the requirements.

■ Consideration of Operating Time

We find the braking time.

We can use either Eq. (25) or Eq. (30), but we use Eq. (30) because the braking time is then shorter. Here, the torque increase time t_{ap} of the brake is 0.063 [s], so from Eq. (30), braking time t_{ab}' is:

$$t_{ab}' = \sqrt{\frac{0.04179 \times 50}{4.77} \times \frac{0.063}{(0.8 \times 40)}}$$
$$= 0.0294\ [\mathrm{S}]$$

- Consideration of stopping precision

If the initial delay time t_{id} of relays and the like is 0.050 [s], from Eq. (34), the stopping angle is:

$$\theta = 6 \times 50 \times \left(0.050 + 0.027 + \frac{2}{3} \times 0.0294\right)$$
$$= 28.98\ [°]$$

From Eq. (35), the stopping precision is:

$$\triangle\theta = \pm\ 0.15 \times 28.98 = \pm\ 4.35\ [°]$$

Converting from roll diameter to length on the circumference, we get ± 2.3 [mm].

■ Consideration of Clutch

- Consideration of energy

From the above operating conditions, we find the total moment of inertia translated to the clutch shaft.

$$J_{Total}' = 0.000475 + 0.000025 +$$
$$(0.00181 + 0.0133 \times 2 + 0.005375 \times \left(\frac{1}{4}\right)^2$$
$$= 0.0026\ [\mathrm{kg•m^2}]$$

Load torque translates to the clutch shaft using Eq. (10).

$$T_\ell = 8.0 \times \frac{1}{4} = 2.0\ [\mathrm{N•m}]$$

Calculating for the clutch on the high-speed side, the engaging energy E_e for one operation, from Eq. (11), is:

$$E_e = \frac{0.0026 \times 1500^2}{182} \times \frac{10}{(10 - 2)} = 40.2\ [\mathrm{J}]$$

This value satisfies the allowable energy of the selected model.

Next, we find the engaging energy rate P_e. From Eq. (18):

$$P_e = \frac{40.2 \times 12}{60} = 8.04\ [\mathrm{W}]$$

This value is sufficiently small for the allowable energy rate $P_{ea\ell}$.

- Consideration of number of operations

We find the number of operations. From Eq. (31):

$$L = \frac{60 \times 10^6}{40.2} = 149 \times 10^4\ [\mathrm{times}]$$

Since the number of operations over one year is roughly 1.3 million, this meets the requirement.

Next, calculating for the clutch on the low-speed side, the engaging energy E_e for one operation, from Eq. (12), is:

$$E_e = \frac{0.0026 \times (1500 - 200)^2}{182} \times \frac{10}{(10 + 2)}$$
$$= 20.1\ [\mathrm{J}]$$

This clutch decelerates the load from 1500 (min^{-1}) to 200 (min^{-1}), so it does similar work to the brake. Thus, the sign of the load torque T_ℓ is +. Also, since this value is smaller than the value for the clutch on the high-speed side, it clearly satisfies the requirement for number of operations during the service life.

The above shows that both clutch and brake satisfy conditions.

ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

Accessories

Different models and types of clutches and brakes have different accessories. Consult these tables.
Note that we may change accessories as circumstances dictate.

Micro Sizes

Model	Varistor		Screw type		Disc spring washer		Shim [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.
102-02-□1/□5	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–
112-02-□1/□2	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–
102/112-02-□3	NVD07SCD082 or an equivalent	1	M2 × 3	2	–	–	–	–
CYT-025-33B φ 6	NVD07SCD082 or an equivalent	1	M2.5 × 4	3	–	–	6.3 × 8.7 × 0.1t	3

Model	Varistor		Screw type		Disc spring washer		Shim [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.
102-03-□1/□5	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–
112-03-□1/□2	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–
102/112-03-□3	NVD07SCD082 or an equivalent	1	M2.5 × 4	3	–	–	–	–
CYT-03-33□ φ 6	NVD07SCD082 or an equivalent	1	M2.5 × 4	3	–	–	6.3 × 8.7 × 0.1t	3
CYT-03-33□ φ 8	NVD07SCD082 or an equivalent	1	M2.5 × 4	3	–	–	8.3 × 11.7 × 0.1t	3

Model	Varistor		Screw type		Disc spring washer		Shim [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.
102-04-□1/□5	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–
112-04-□1/□2	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–
102/112-04-□3	NVD07SCD082 or an equivalent	1	M3 × 6	3	–	–	–	–
CYT-04-33□ φ 8	NVD07SCD082 or an equivalent	1	M3 × 6	3	–	–	8.3 × 11.7 × 0.1t	3
CYT-04-33□ φ 10	NVD07SCD082 or an equivalent	1	M3 × 6	3	–	–	10.3 × 13.7 × 0.1t	3

Model	Varistor		Screw type		Disc spring washer		Shim [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.
102-05-□1/□5	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–
112-05-□1/□2	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–
102/112-05-□3	NVD07SCD082 or an equivalent	1	M3 × 6	3	M3	3	–	–
CSZ/BSZ-05-□	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–

* Only the screws supplied with 102/112-05-□3 are hex-socket low-head bolts. All others are Phillips pan-head machine screws.

Standard Sizes

Model	Varistor		Low head bolt		Disc spring washer		Shim 1 [mm]		Shim 2 [mm]		Collar [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.
101/CS-06-□1	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–	–	–	–	–
101/CS-06-□3 φ 12	NVD07SCD082 or an equivalent	1	M3 × 6	3	M3	3	12.3 × 15.7 × 0.1t	3	–	–	–	–
101-06-13 φ 15	NVD07SCD082 or an equivalent	1	M3 × 6	3	M3	3	15.3 × 20.7 × 0.1t	3	–	–	–	–
101/CS-06-□5 φ 12	NVD07SCD082 or an equivalent	1	–	–	–	–	12.3 × 15.7 × 0.1t	5	12.3 × 15.7 × 0.5t	1	12.2 × 18 × 5.5	1
111-06-11 φ 12/ φ 15	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–	–	–	–	–
111-06-12 φ 12	NVD07SCD082 or an equivalent	1	–	–	–	–	12.3 × 15.7 × 0.1t	3	–	–	–	–
111-06-12 φ 15	NVD07SCD082 or an equivalent	1	–	–	–	–	15.3 × 20.7 × 0.1t	3	–	–	–	–
111-06-13	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–	–	–	–	–
CSZ/BSZ-06-□	NVD07SCD082 or an equivalent	1	M3 × 6	3	M3	3	–	–	–	–	–	–

Model	Varistor		Low head bolt		Disc spring washer		Shim 1 [mm]		Shim 2 [mm]		Collar [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.
101/CS-08-□1	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–	–	–	–	–
101/CS-08-□3 φ 15	NVD07SCD082 or an equivalent	1	M4 × 8	3	M4	3	15.3 × 20.7 × 0.1t	3	–	–	–	–
101-08-13 φ 20	NVD07SCD082 or an equivalent	1	M4 × 8	3	M4	3	20.3 × 27.7 × 0.1t	3	–	–	–	–
101/CS-08-□5 φ 15	NVD07SCD082 or an equivalent	1	–	–	–	–	15.3 × 20.7 × 0.1t	5	15.3 × 20.7 × 0.5t	1	15.2 × 22 × 5.5	1
111-08-11 φ 15/ φ 20	NVD07SCD082 or an equivalent	1	–	–	–	–	15.3 × 20.7 × 0.5t	1	–	–	–	–
111-08-12 φ 15	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–	–	–	–	–
111-08-12 φ 20	NVD07SCD082 or an equivalent	1	–	–	–	–	15.3 × 20.7 × 0.1t	3	–	–	–	–
111-08-13	NVD07SCD082 or an equivalent	1	M4 × 8	3	M4	3	20.3 × 27.7 × 0.1t	3	–	–	–	–
CSZ/BSZ-08-□	NVD07SCD082 or an equivalent	1	–	–	–	–	–	–	–	–	–	–

Standard Sizes

Model	Varistor		Low head bolt		Disc spring washer		Shim 1 [mm]		Shim 2 [mm]		Collar [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.
101/CS-10-□1	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
101/CS-10-□3 ϕ 20	NVD07SCD082 or an equivalent	1	M5 × 10	3	M5	3	20.3 × 27.7 × 0.1t	3	—	—	—	—
101-10-13 ϕ 25	NVD07SCD082 or an equivalent	1	M5 × 10	3	M5	3	25.3 × 34.7 × 0.1t	3	—	—	—	—
101/CS-10-□5 ϕ 20	NVD07SCD082 or an equivalent	1	—	—	—	—	20.3 × 27.7 × 0.1t	5	20.3 × 27.7 × 0.5t	2	20.2 × 28 × 5.9	1
111-10-11 ϕ 20/ ϕ 25	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
111-10-12 ϕ 20	NVD07SCD082 or an equivalent	1	—	—	—	—	20.3 × 27.7 × 0.1t	3	—	—	—	—
111-10-12 ϕ 25	NVD07SCD082 or an equivalent	1	—	—	—	—	25.3 × 34.7 × 0.1t	3	—	—	—	—
111-10-13	NVD07SCD082 or an equivalent	1	M5 × 10	3	M5	3	—	—	—	—	—	—

Model	Varistor		Low head bolt		Disc spring washer		Shim 1 [mm]		Shim 2 [mm]		Collar [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.
101/CS-12-□1	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
101-12-13 ϕ 25	NVD07SCD082 or an equivalent	1	M6 × 10	3	M6	3	25.3 × 34.7 × 0.1t	3	—	—	—	—
101-12-13 ϕ 30	NVD07SCD082 or an equivalent	1	M6 × 10	3	M6	3	30.3 × 39.7 × 0.1t	3	—	—	—	—
CS-12-33 ϕ 25	NVD07SCD082 or an equivalent	1	M6 × 10	3	M6	3	25.3 × 31.7 × 0.1t	3	—	—	—	—
101/CS-12-□5 ϕ 25	NVD07SCD082 or an equivalent	1	—	—	—	—	25.3 × 31.7 × 0.1t	5	25.3 × 31.7 × 0.5t	2	25.2 × 32 × 7.5	1
111-12-11 ϕ 25/ ϕ 30	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
111-12-12 ϕ 25	NVD07SCD082 or an equivalent	1	—	—	—	—	25.3 × 31.7 × 0.1t	3	—	—	—	—
111-12-12 ϕ 30	NVD07SCD082 or an equivalent	1	—	—	—	—	30.3 × 39.7 × 0.1t	3	—	—	—	—
111-12-13	NVD07SCD082 or an equivalent	1	M6 × 10	3	M6	3	—	—	—	—	—	—

Model	Varistor		Low head bolt		Disc spring washer		Shim 1 [mm]		Shim 2 [mm]		Collar [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.
101/CS-16-□1	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
101-16-13 ϕ 30	NVD07SCD082 or an equivalent	1	M8 × 15	3	M8	3	30.3 × 41.7 × 0.1t	3	—	—	—	—
101-16-13 ϕ 40	NVD07SCD082 or an equivalent	1	M8 × 15	3	M8	3	40.3 × 51.7 × 0.1t	3	—	—	—	—
CS-16-33 ϕ 30	NVD07SCD082 or an equivalent	1	M8 × 15	3	M8	3	30.3 × 39.7 × 0.1t	3	—	—	—	—
101/CS-16-□5 ϕ 30	NVD07SCD082 or an equivalent	1	—	—	—	—	30.3 × 39.7 × 0.1t	5	30.3 × 39.7 × 0.5t	2	30.2 × 40 × 11.2	1
111-16-11 ϕ 30/ ϕ 40	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
111-16-12 ϕ 30	NVD07SCD082 or an equivalent	1	—	—	—	—	30.3 × 39.7 × 0.1t	3	—	—	—	—
111-16-12 ϕ 40	NVD07SCD082 or an equivalent	1	—	—	—	—	40.3 × 51.7 × 0.1t	3	—	—	—	—
111-16-13	NVD07SCD082 or an equivalent	1	M8 × 15	3	M8	3	—	—	—	—	—	—

Model	Varistor		Low head bolt		Disc spring washer		Shim 1 [mm]		Shim 2 [mm]		Collar [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.
101-20-11	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
101-20-13 ϕ 40	NVD07SCD082 or an equivalent	1	M10 × 18	3	M10	3	40.3 × 51.7 × 0.1t	3	—	—	—	—
101-20-13 ϕ 50	NVD07SCD082 or an equivalent	1	M10 × 18	3	M10	3	50.3 × 67.7 × 0.1t	3	—	—	—	—
CS-20-33 ϕ 40	NVD07SCD082 or an equivalent	1	M10 × 18	3	M10	3	40.3 × 51.7 × 0.1t	5	—	—	—	—
101-20-15 ϕ 40	NVD07SCD082 or an equivalent	1	—	—	—	—	40.3 × 51.7 × 0.1t	5	40.3 × 51.7 × 0.5t	2	40.2 × 50 × 11.7	1
111-20-11 ϕ 40/ ϕ 50	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
111-20-12 ϕ 40	NVD07SCD082 or an equivalent	1	—	—	—	—	40.3 × 51.7 × 0.1t	3	—	—	—	—
111-20-12 ϕ 50	NVD07SCD082 or an equivalent	1	—	—	—	—	50.3 × 67.7 × 0.1t	3	—	—	—	—
111-20-13	NVD07SCD082 or an equivalent	1	M10 × 18	3	M10	3	—	—	—	—	—	—

Model	Varistor		Low head bolt		Disc spring washer		Shim 1 [mm]		Shim 2 [mm]		Collar [mm]	
	Model	Qty.	Standards	Qty.	Standards	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.	Internal dia. × External dia. × Thickness	Qty.
101-25-11	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
101-25-13 ϕ 50	NVD07SCD082 or an equivalent	1	M12 × 22	4	M12	4	50.3 × 67.7 × 0.1t	3	—	—	—	—
101-25-13 ϕ 60	NVD07SCD082 or an equivalent	1	M12 × 22	4	M12	4	60.3 × 84.7 × 0.1t	3	—	—	—	—
CS-25-33 ϕ 50	NVD07SCD082 or an equivalent	1	M12 × 22	4	M12	4	50.3 × 67.7 × 0.1t	5	—	—	—	—
101-25-15 ϕ 50	NVD07SCD082 or an equivalent	1	—	—	—	—	50.3 × 67.7 × 0.1t	5	50.3 × 67.7 × 0.5t	2	50.2 × 60 × 12.2	1
111-25-11 ϕ 50/ ϕ 60	NVD07SCD082 or an equivalent	1	—	—	—	—	—	—	—	—	—	—
111-25-12 ϕ 50	NVD07SCD082 or an equivalent	1	—	—	—	—	50.3 × 67.7 × 0.1t	3	—	—	—	—
111-25-12 ϕ 60	NVD07SCD082 or an equivalent	1	—	—	—	—	60.3 × 84.7 × 0.1t	3	—	—	—	—
111-25-13	NVD07SCD082 or an equivalent	1	M12 × 22	4	M12	4	—	—	—	—	—	—

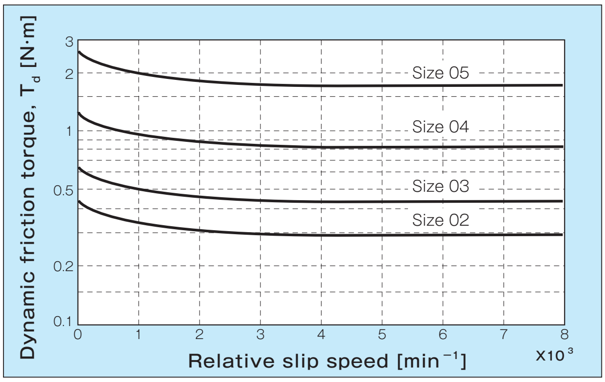
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

Torque Characteristics

Static and Dynamic Friction Torque Characteristics

Clutches and brakes transmit torque as they slip at certain relative speeds in the engaging/braking process. Then, the relative speed gradually decreases until the clutch is fully engaged. The torque that can be transmitted when this engaging/braking is complete is called the dynamic friction torque at that relative speed.

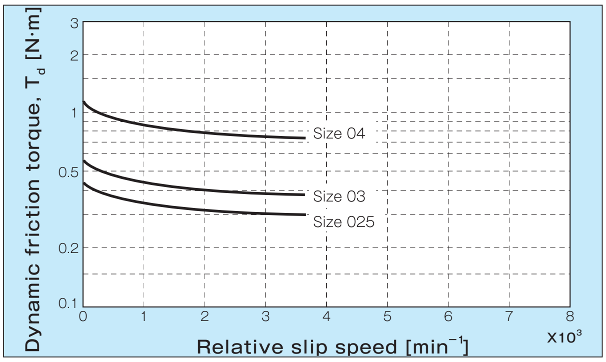
Static friction torque is a nearly predetermined value, while dynamic friction torque varies somewhat with relative speed.



Dynamic friction torque characteristics (micro size models 102 and 112)

Dynamic Friction Torque Characteristics

The figure at right shows the relationship between relative slip speed and dynamic friction torque. As the figure shows, the difference between static friction torque and dynamic friction torque is small, so the effects in actual use are diminished. Note that the specifications present the values when the relative slip speed is 100 min^{-1}.

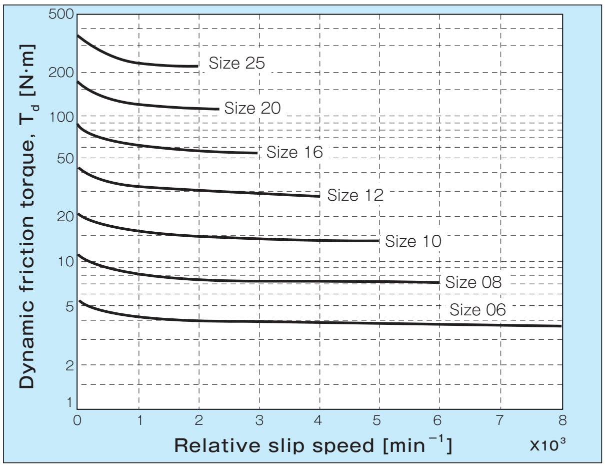


Dynamic friction torque characteristics (micro size CYT models)

Initial Torque Characteristics

The frictional surfaces of clutches and brakes that use friction will not be fully broken during initial use, so they may not always reach rated torque. This is referred to as the initial torque state. The initial torque value will be 60 to 70% of indicated torque; after a little breaking in, the indicated value will be reached. Check these values if you require the indicated torque right from the initial use. Breaking in may take longer when the equipment is used with light loads or at low speeds.

Residual torque (torque remaining after current is shut off) also exists. Due to the action of the disc spring, residual torque persists for a very short time, so special circuits for reverse excitation or the like are not necessary in normal use.



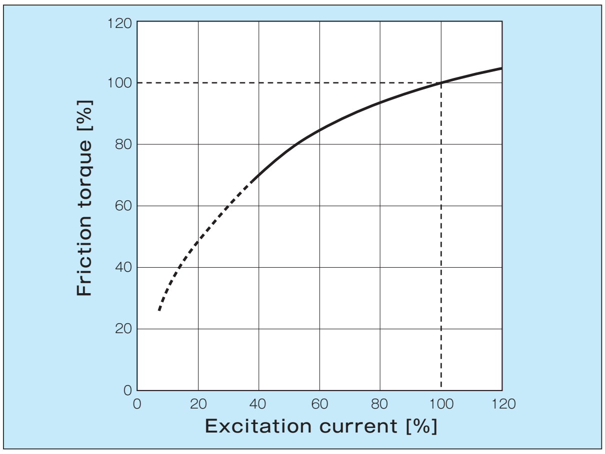
Dynamic torque characteristics (standard size models 101, 111, CS etc.)

Torque-Current Characteristics

The size of the friction torque, when the friction coefficient is μ , the average radius of the frictional surface is r, and the pull-in force is P, is given by:

$$T = \mu \times r \times P$$

Here, μ and r are predetermined, but pull-in force P varies with the size of the current supplied. Since current is proportional to voltage, friction torque changes when the voltage applied to the coil changes. The figure at right shows the relationship between friction torque and excitation current. Near the rated current value, torque increases and decreases nearly proportionally to current. As current is increased beyond the rated value, magnetic flux in the magnetic circuit reaches saturation. Further increases do not increase torque but merely increase the amount of heat generated. Conversely, as current is decreased, torque decreases. However, as the minimum current required to attract the armature is neared, torque becomes unstable; when decreased further, the armature can no longer be attracted, and torque is extinguished. (To generate torque below the armature pull-in current value, appropriate measures must be taken.) Note that this characteristics chart is at the prescribed air gap; if the air gap value changes, the characteristics curve will also change.



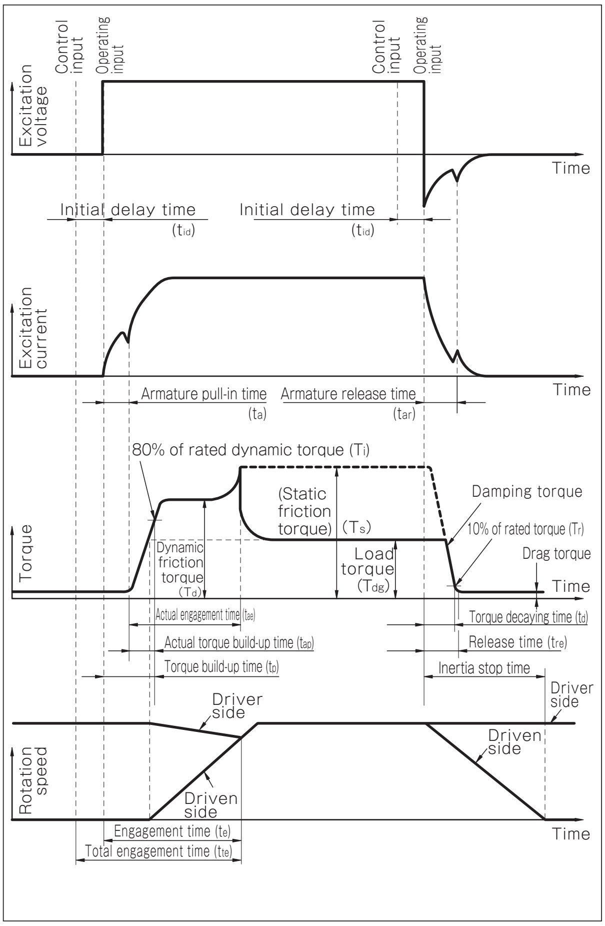
Torque-current characteristics

Operating Characteristics

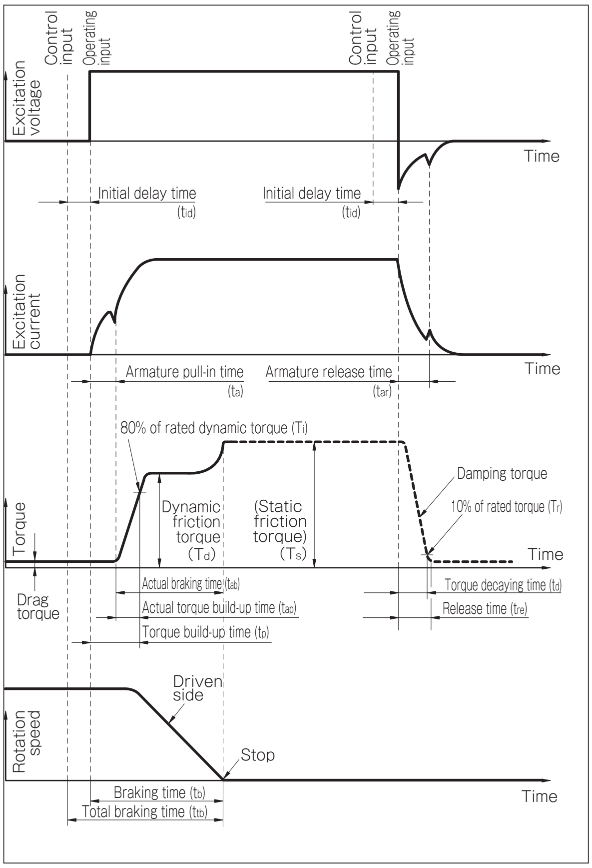
Transient Characteristics When Clutch/ Brake Are Actuated

The figure below illustrates transient phenomena of current and torque when clutches and brakes engage (brake) and release. These are generally called dynamic characteristics. When a voltage is applied to the clutch/brake, current increases according to a time constant determined by the coil. Once current has increased to a certain value, the armature is pulled in and the generation of friction torque begins. Thereafter, as current increases, friction torque also increases to reach the rated value. At the time of release, current decreases in the same way as when engaging (braking), the armature starts its withdrawal with the release action of the disc spring, and torque is extinguished.

Clutch operating characteristics



Brake operating characteristics



t_a: Armature pull-in time
(The time from when current flow first starts until the armature is pulled in and torque begins to be generated)

t_{ap}: Actual torque build-up time
(The time from when torque first begins to be generated until it reaches 80% of rated torque)

t_p: Torque build-up time
(The time from when current flow first starts until torque reaches 80% of rated torque)

t_d: Torque decaying time
(The time from when current flow is shut off until torque decreases to 10% of rated torque)

t_{id}: Initial delay time
(The time from the arrival of operational input at the clutch and brake until the actuation input or release input arrives at the clutch or brake body)

t_{ae}: Actual engagement time
(The time from when the clutch begins generating torque until engagement is complete)

t_{ab}: Actual braking time
(The time from when the brakes begins generating torque until braking is complete)

ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

Operating Characteristics

Control Circuit System and Operation Times

The standard voltage is DC 24 V. If there is no DC power supply, the direct current obtained by stepping down and rectifying (full-wave rectification) the AC power supply is used. (See page on power supplies.) The clutch or brake is normally turned on or off on the DC side. The operation times in that case are shown in the table below. Performing these command operations on the DC side provides fast response, but a very large surge current is generated when the current is shut off. This surge current can burn contacts within the control circuit or damage the coil insulation. For this reason, circuit protectors are used to absorb surges.

When switching is performed on the AC side, the torque decaying time lengthens. When the torque decaying time lengthens, one clutch or brake operation may interfere with the next. Accordingly, a time lag should be designed in. The torque build-up time is the same as when the command operation is performed on the DC side.

The electromagnetic clutch/brake operation times below are values using transformer stepdown/single-phase full-wave rectification.

■ Micro sizes

Clutch operation time

Clutch size	Operating time [s]			
	t_a	t_{ap}	t_p	t_d
102-02	0.009	0.010	0.019	0.017
102-03	0.009	0.013	0.022	0.020
102-04	0.011	0.017	0.028	0.030
102-05	0.012	0.019	0.031	0.040
CYT-025	0.014	0.014	0.028	0.030
CYT-03	0.015	0.015	0.030	0.040
CYT-04	0.030	0.010	0.040	0.040

Brake operating time

Brake size	Operating time [s]			
	t_a	t_{ap}	t_p	t_d
112-02	0.004	0.006	0.010	0.010
112-03	0.005	0.007	0.012	0.008
112-04	0.007	0.009	0.016	0.010
112-05	0.010	0.013	0.023	0.012

■ Standard sizes

Clutch operation time

Clutch size	Operating time [s]			
	t_a	t_{ap}	t_p	t_d
101-06	0.020	0.021	0.041	0.020
101-08	0.023	0.028	0.051	0.030
101-10	0.025	0.038	0.063	0.050
101-12	0.040	0.075	0.115	0.065
101-16	0.050	0.110	0.160	0.085
101-20	0.090	0.160	0.250	0.130
101-25	0.115	0.220	0.335	0.210

* The above values are suitable for CS and CSZ models as well as for the various clutch/brake unit models.

Brake operating time

Brake size	Operating time [s]			
	t_a	t_{ap}	t_p	t_d
111-06	0.015	0.018	0.033	0.015
111-08	0.016	0.026	0.042	0.025
111-10	0.018	0.038	0.056	0.030
111-12	0.027	0.063	0.090	0.050
111-16	0.035	0.092	0.127	0.055
111-20	0.065	0.135	0.200	0.070
111-25	0.085	0.190	0.275	0.125

* The above values are suitable for BSZ models as well as for the various clutch/brake unit models.

To Shorten the Engagement/Braking Time

Current obeys a predetermined time constant, but when a particularly fast build-up time is required, the operation characteristics can be changed by using an excitation method, such as overexcitation. The overexcitation method applies an overvoltage to the coil to speed up the rise. Operation times in the case of overexcitation are shown in the table below.

For details, refer to the section on power supplies.

Operation times for overexcitation of clutch (using a BEH power supply)

Clutch size	Operating time [s]			
	t_a	t_{ap}	t_p	t_d
101-06	0.008	0.005	0.013	0.005
101-08	0.009	0.008	0.017	0.008
101-10	0.010	0.010	0.020	0.011
101-12	0.013	0.012	0.025	0.018
101-16	0.018	0.016	0.034	0.023
101-20	0.027	0.020	0.047	0.037
101-25	0.045	0.026	0.071	0.045

* The above values are suitable for CS and CSZ models as well as for the various clutch/brake unit models.

Operation times for overexcitation of brake (using a BEH power supply)

Brake size	Operating time [s]			
	t_a	t_{ap}	t_p	t_d
111-06	0.005	0.007	0.012	0.004
111-08	0.005	0.007	0.012	0.005
111-10	0.007	0.008	0.015	0.007
111-12	0.009	0.009	0.018	0.007
111-16	0.014	0.010	0.024	0.011
111-20	0.015	0.025	0.040	0.020
111-25	0.021	0.034	0.055	0.038

* The above values are suitable for BSZ models as well as for the various clutch/brake unit models.

t_a Armature pull-in time: The time from when current flow first starts until the armature is pulled in and torque begins to be generated.

t_{ap} Actual torque build-up time: The time from when torque first begins to be generated until it reaches 80% of rated torque.

t_p Torque build-up time: The time from when current flow first starts until torque reaches 80% of rated torque.

t_d Torque decaying time: The time from when current flow is shut off until torque decreases to 10% of rated torque.

Limit on Number of Operations

There are some limits for command operations that turn clutches and brakes on and off per unit time. Due to their size, micro sizes are particularly prone to being unable to externally dissipate heat at some energization frequencies, and may malfunction or be damaged. That limit is expressed as an energization rate. For that limit, being energized for 0.5 seconds over a one second period is treated as 50%. Operations must be designed so that the energization rate does not exceed the following rates shown for each model. These limits may not apply, however, if the clutch or brake is effectively cooled.

Models	Energization rate
102 Models	80%
CYT Models	50%
112 Models	80%
101/CS Models	100%
CSZ Models	100%
111 Models	100%
BSZ Models	100%

Furthermore, in the case of overexcitation intended to speed up the build-up by applying overvoltage to the coil, a voltage higher than the normal excitation voltage is applied, so care is required even with standard sizes. Ascertain your operating conditions and the like and then check these issues for your particular situation.

Heat Radiation Characteristics

Allowable Energy ($E_{ea\ell}$ or $E_{ba\ell}$)

When loads are accelerated or decelerated by a clutch/brake, heat will be generated by sliding friction. This is because frictional energy is converted to heat, so the amount of heat will vary with the conditions of use.

Clutches and brakes dissipate this heat externally as they work, but if they cannot dissipate all the heat, they accumulate it internally and the temperatures of the components rise. If temperatures exceed allowable values, malfunctions and damage result.

The limit for friction work undergone due to this heat is called allowable energy. The allowable energy is predetermined for each size. Heat dissipation is affected by the mounting situation, rotation speed, atmosphere, and the like.

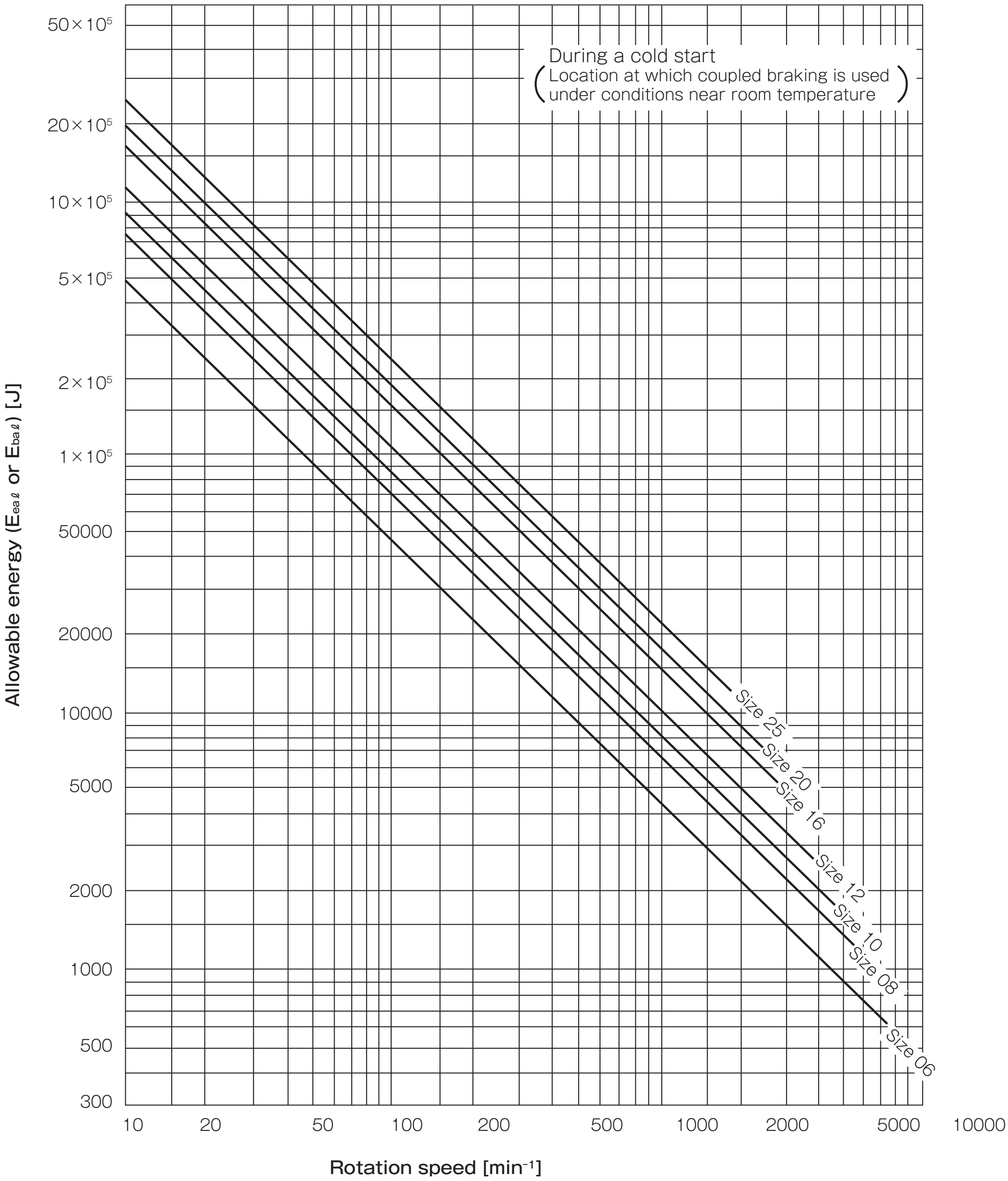
When large loads are accelerated or decelerated, violent slipping occurs, and the frictional surface generates larges amounts of heat. The frictional material and armature can be damaged by even a single engagement.

The table at right shows the allowable energy (allowable friction energy) for each size of micro clutches and micro brakes. Even if frequency is low, use the device at a value that is sufficiently smaller than the table value if you have a single engagement whose amount of energy is high.

Use standard sizes below the limit lines of the figure below.

Allowable energy of micro clutches and micro brakes

Model size	Allowable (engagement/braking) energy ($E_{ea\ell}$ or $E_{ba\ell}$) [J]
102/112-02	1500
102/112-03	2300
102/112-04	4500
102/112-05	9000
CYT-025	800
CYT-03	900
CYT-04	1900



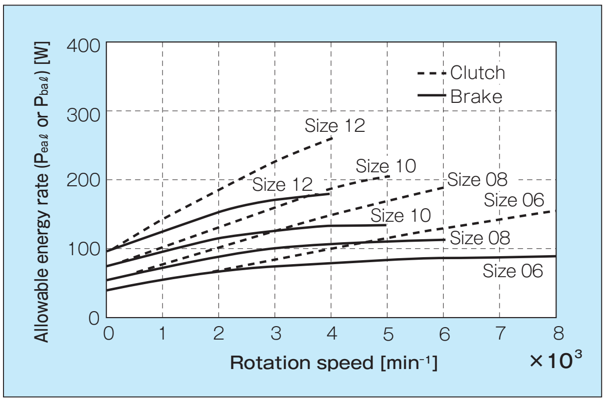
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

Heat Radiation Characteristics

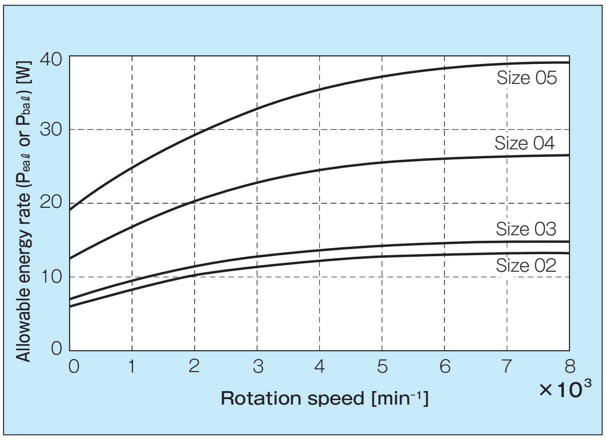
Allowable Energy Rate ($P_{ea\ell}$ or $P_{ba\ell}$)

High frequency of engagement and/or braking must take heat dissipation fully into account. The maximum energy amount per unit time is called the allowable energy rate. It is predetermined for each size as shown in the figure. In actual use, use a value that is sufficiently smaller than the allowable value to allow for changes in conditions and the like.

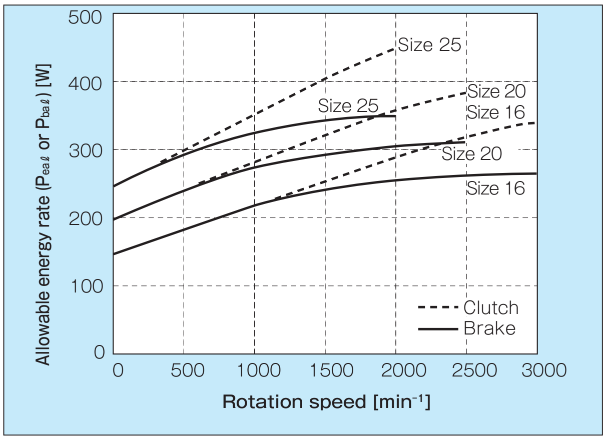
The figure shows values for wall-mounted devices. For devices mounted on shafts such as bearing-mounted models, use 80% of the allowable values in the figures.



Standard sizes



Micro sizes (excludes CYT models)



Standard sizes

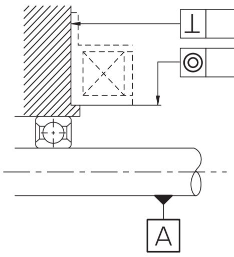
Items Checked for Design Purposes

What is the best way to ensure that the design allows clutches and brakes used in machinery and equipment to perform and function adequately? We describe here approaches to design that we feel are useful in improving machinery reliability.

Mounting Stators and Rotors

Flange-mounted stators (models □-□-1□)

These stators must be correctly positioned with respect to the rotation shaft before mounting. The inner and outer circumferences of the stators have grades for fit. The surface on which the stator is mounted should be positioned relative to the rotation shaft and the allowable values for concentricity and perpendicularity of the diameter should not be exceeded.

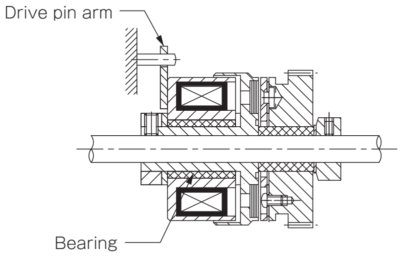


Unit [mm]

Size	Concentricity (T.I.R.)	Perpendicularity (T.I.R.)
02	0.05	0.03
03	0.05	0.04
04	0.06	0.04
05	0.06	0.05
06	0.08	0.05
08	0.08	0.05
10	0.1	0.05
12	0.1	0.07
16	0.12	0.08
20	0.12	0.13
25	0.14	0.13

Bearing-mounted stators (models □-□-3□)

This stator is subject to a slight amount of rotation force from the built-in bearing or the slide bearing. The drive pin arm should therefore be held to the machinery's stationary parts to prevent drag turning.



Magnetic shield of stator

Installing clutches and brakes in combination can lead to instability of clutch/brake operation due to their magnetic effects on each other. Also, if there are instruments or machinery in the vicinity of the clutch or brake, adverse effects such as noise or malfunction may result.

In such cases, measures to block magnetism are advised. The method generally used is to adopt non-magnetic materials for the surface on which the stator is mounted and for the shaft.

Lead wire protection

Damage to the covering of the leads can cause shorts, breaks or other problems. Keep protection of these coverings in mind from the design stage.

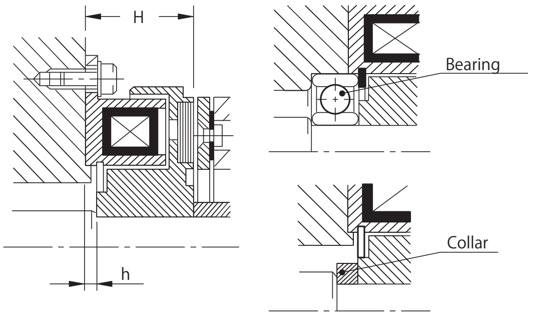
Rotor mounting

The rotor is part of the magnetic circuit. Machining other than bore drilling can lower performance, so it should be avoided.

Consult Miki Pulley if you are creating a rotor bore with a non-standard diameter not shown in the dimensions table.

Relationship between rotor and stator (models □-□-1□)

In flange-mounted clutches, the positional relationship between rotor and stator is important. If the dimension H in the figure below is too small, the rotor and stator will touch; if H is too large, the pull-in force will decline. The table below lists allowable values for each size. Design your setup so that these values are not exceeded. The allowable value for h should conform to the normal JIS allowable value.



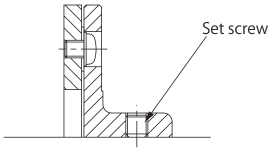
Unit [mm]

Clutch size	H		h
	Reference value	Tolerance	Reference value
102-02	18.0	±0.2	1.6
102-03	22.2	±0.2	2.0
102-04	25.4	±0.2	2.0
102-05	28.1	±0.2	2.0
101-06	24.0	±0.2	2.0
101-08	26.5	±0.2	2.5
101-10	30.0	±0.3	3.0
101-12	33.5	±0.3	3.5
101-16	37.5	±0.3	3.5
101-20	44.0	±0.4	4.0
101-25	51.0	±0.4	4.0

Armature Mounting Methods

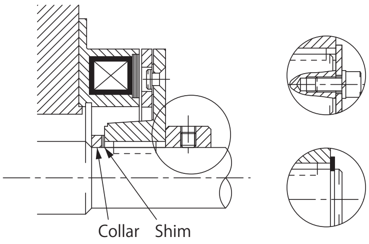
Mounting armature type-1

Securely fasten the armature with the provided hex-socket-head set screw. If you are concerned that it might be loosened by vibration or high-frequency operations, apply adhesive to the threads, which is effective in stopping loosening.



Mounting armature type-2

Since the boss is hidden on the inside of the stator, secure it firmly using a C-shaped snap ring, collar, or the like, as shown in the figure below.



Mounting armature type-5

For size 05 and smaller micro sizes, insert the armature directly onto the shaft. As when assembling armature type-2, firmly press the end face of the armature with a C-shaped snap ring, collar or the like.

ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

■ Armature type-3 mounting

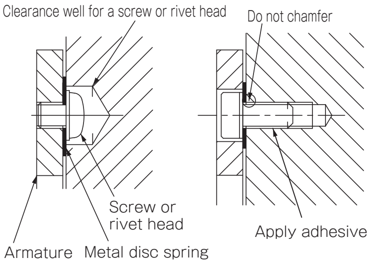
Machine in the screw bores and clearance well for screw and/or rivet heads in the mounting surface. Mount the armature using the supplied special hex-socket-head bolts and disc spring washers, applying a small amount of adhesive to the threads to prevent loosening. (Note that any excess adhesive will seep into the disc spring, impeding operation.)

The mounting screw bores should not be beveled; simply removing burr is sufficient. The hex-socket-head bolts supplied are special low-head bolts. For sizes 04 and smaller, Phillips-head round head screws that meet JIS standards are supplied. Use disc spring washers like that depicted in the figure below. Their fastening effect is diminished if used facing backwards.

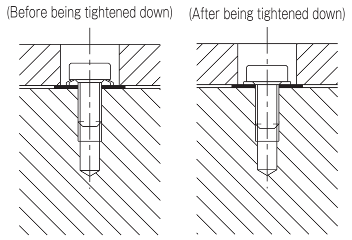
Assemble armature type-3 correctly so that the concentricity and perpendicularity relative to the rotation shaft do not exceed the allowable values.

Unit [mm]

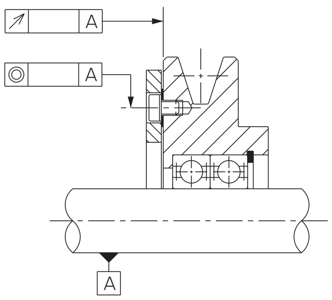
Size	Surface runout (T.I.R.)	Concentricity (T.I.R.)
02	0.1	0.02
03	0.1	0.03
04	0.1	0.04
05	0.1	0.04
06	0.16	0.04
08	0.16	0.05
10	0.16	0.05
12	0.16	0.06
16	0.16	0.07
20	0.24	0.11
25	0.24	0.11



Armature type-3 mounting

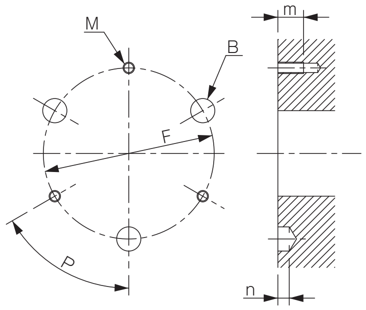


How to use washers



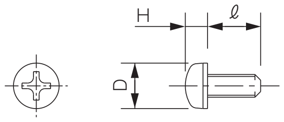
Mounting precision

Armature type-3 mounting dimensions

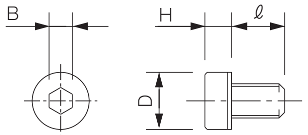


Clutch/ brake size	Mounting pitch diameter		Mounting angle		Mounting screw bore			Clearance well for screw/rivet head	
	F (P.C.D.)	Tolerance	P [°]	Tolerance [′]	No. of bores-M (nominal)	Pitch	Effective thread depth m (MIN)	No. of bores-Bore diameter B	Spot facing depth n (MIN)
02	19.5	±0.05	90	±5	2-M2	0.4	4	2-5	2.5
03	23	±0.05	60	±5	3-M2.5	0.45	5	3-6	3
04	30	±0.05	60	±5	3-M3	0.5	7	3-6	3.5
05	38	±0.05	60	±5	3-M3	0.5	7	3-7	3.5
06	46	±0.05	60	±5	3-M3	0.5	7	3-7	3.5
08	60	±0.05	60	±5	3-M4	0.7	9	3-8.5	3.5
10	76	±0.05	60	±5	3-M5	0.8	11	3-10.5	4
12	95	±0.05	60	±5	3-M6	1.0	11	3-12.5	4
16	120	±0.05	60	±5	3-M8	1.25	16	3-15.5	4.5
20	158	±0.05	60	±5	3-M10	1.5	18	3-19	5.5
25	210	±0.1	45	±5	4-M12	1.75	22	4-22	6

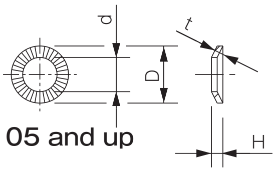
Armature type-3 mounting components



Size 02 to 04



Size 05 and up



Size 05 and up

Clutch/ brake size	Special hex-socket-head bolt (* Phillips-head round head screw)					Disc spring washer			
	Nominal × pitch	ϕD	H	B	ℓ	ϕD	ϕd	H	t
02	* M2 × 0.4	3.5	1.3	—	3	—	—	—	—
03	* M2.5 × 0.45	4.5	1.7	—	4	—	—	—	—
04	* M3 × 0.5	5.5	2.0	—	6	—	—	—	—
05	M3 × 0.5	5.5	2.0	2.0	6	6	3.2	0.55	0.36
06	M3 × 0.5	5.5	2.0	2.0	6	6	3.2	0.55	0.36
08	M4 × 0.7	7	2.8	2.5	8	7	4.25	0.7	0.5
10	M5 × 0.8	8.5	3.5	3.0	10	8.5	5.25	0.85	0.6
12	M6 × 1.0	10	4.0	4.0	10	10	6.4	1.0	0.7
16	M8 × 1.25	13	5.0	5.0	15	13	8.4	1.2	0.8
20	M10 × 1.5	16	6.0	6.0	18	16	10.6	1.9	1.5
25	M12 × 1.75	18	7.0	8.0	22	18	12.6	2.2	1.8

* Sizes 02, 03, and 04 do not use disc spring washers.

Air Gap Design and Adjustment

Set the air gap "a" (below figure) between the frictional surfaces so that when released the gap becomes the control value. Handling will be easier if the device is designed to facilitate this adjustment.

We recommend designs with both collars and shims as shown below to accomplish this. (We always have shims available; please contact Miki Pulley for details.)

■ Setting air gap "a"

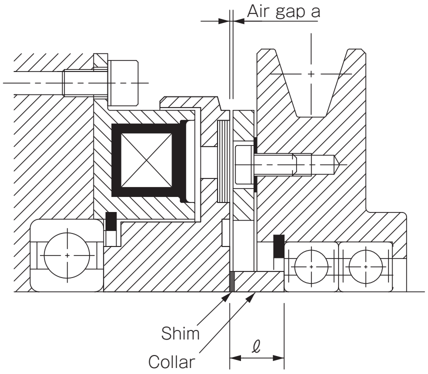
Prepare a collar that is slightly shorter than the length ℓ needed to maintain air gap "a", and then adjust the remaining gap with shims to achieve the control value for "a". The collar length at this time is roughly the value given by the following equation.

$$L \fallingdotseq \ell - 2a \text{ [mm]}$$

Here, L: Collar length.
ℓ: Length required to maintain air gap "a"
a: Control air gap value

Based on the value of L found with this equation, prepare a collar of a length that is easy to machine. Using a design like this that employs shims will enable you to adjust the air gap after long periods of use by simply removing the necessary number of shims.

Air gap setting



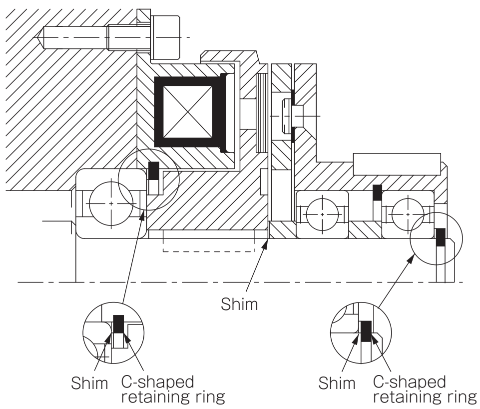
* Use the section on technical documentation to check the shim dimensions.

■ Eliminating axial play

If there is any axial play between the clutch or brake and the components used in combination with it after assembly, the performance of the clutch or brake could be impaired. Design to keep play extremely small. Many types of shims are available for keeping the axial play to a very slight amount. They match the shaft diameters and bearing outer diameters dimensions used most.

If C-shaped retaining rings are also used, a secure lock can be achieved while preserving the spring effect of the retaining ring.

How to use shims

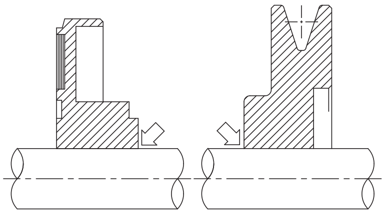


Fitting Tolerances

Clutches and brakes must be able to do large amounts of work instantly while also performing precise control. That means that the precision of all components must be appropriately unified so they do not cause wear or generate vibration. Fitting tolerances (grades) must also be determined so that they match the conditions of use.

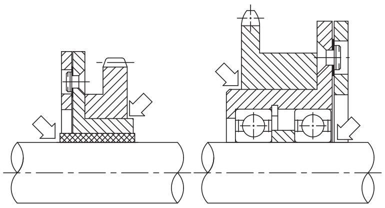
■ Fitting tolerance for rotor, armatures type-1 and type-2, V pulley, and shaft

The reference bore tolerance is H7 class. CYT models, however, have a special bore diameter tolerance (shown in the dimensions table). The table below shows dimensional tolerances for the shaft to be used.



Load conditions	Shaft tolerance		Remark
Shaft with ø10 or below	h6	h7	h5 if accuracy is required
Light/normal loads and fluctuating loads	h6		For motor shaft, h6 or j6 For clutch/brake unit shafts, j6
	js6	js7	
	j6	j7	
Heavy loads and shock loads	k6	k7	
	m6		

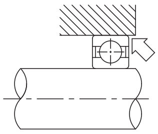
■ Fitting tolerances for armature type-5 and sprockets, or the like, and for armature type-5 and shafts



Micro size Standard size

Clutch/brake size	Armature type-5		Bore tolerance for sprockets, etc.	Shaft tolerance
	Boss tolerance	Bore tolerance		
02 ～ 05	h7	H7	H7	h7 h8
06 or over	j6	As given in table below	H7	As given in table above

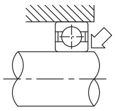
■ Tolerances for fitting ball bearing to housings

Load conditions		Bore tolerance	Remark
Rotating outer ring load	Heavy loads	N7	
	Normal load and fluctuating loads	M7	
Directionally unstable loads	Heavy shock loads		
	Heavy loads and normal loads	K7	
	Normal loads and light loads	J7	
Rotating inner ring load	Shock loads		
	Ordinary loads	H7	When clutch/brake is not subject to shock

* Applicable to steel or iron housings. For light alloy housings, the fit must be stiffer.

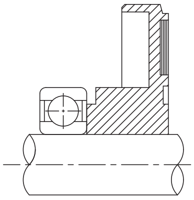
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

■ Tolerances for fitting ball bearings to shafts

Load conditions		Bore tolerance		Remark
Rotating outer ring load		h6		When precision is required, h5
Dimensionally unstable loads and rotating inner ring loads	Light loads, normal loads and fluctuating loads	ø18 or below	h5	
		ø100 or below	j6	
	Heavy loads and shock loads	ø18 or below	j5	
		ø100 or below	k5	

■ Fitting tolerances for bearings and other components

If bearings are mounted on the same part of the shaft as rotors, V pulleys or other components, give priority to the bearing when determining the grade of the shaft by using the tolerance for fitting ball bearings to shafts.



Bore Diameters and Keyways

■ Bore diameters

Standard bore diameters are determined for each size (shown in the dimensions table) and available for selection. If you wish to use a non-standard bore diameter, pilot bores are provided on 101 and 111 type rotors and armatures type-1 and type-2. Adhere to the drilling ranges and cautions noted below. The ranges of bore diameters that can be drilled are shown in the table below.

- Make the fitting tolerance of the bore H7 class.
- Pay sufficient attention to concentricity and perpendicularity when drilling bores.
- The outer circumference of the rotor can become misshapen if force is applied, so do not chuck it.
- Completely remove all cutting oil, cleaning oil, and the like from the bore and dry it before mounting the piece on machinery.

■ Keys and keyways

Keyways of rotors and armatures are made to Miki Pulley standards, which are based on JIS standards. (See the page on standard bore drilling standards for clutches and brakes.) CYT models, however, use special keyway tolerances (shown in the dimensions table).
Use JIS standard keys and keyways on the shafts to be used. (Refer to the pages on technical documentation extracted from JIS B 1301-1996) Follow this standard also for rotor and armature hub.

Bore diameter processing ranges for rotors, armature type-1, and armature type-2.

Unit [mm]

Clutch/brake size		Bore diameter																						
		5	6	8	(8.5)	10	12	(12.5)	15	17	(18.5)	20	(24)	25	28	30	32	35	40	48	50	60	70	75
02	Rotor (R)	●																						
	Armature (A)	●																						
03	Rotor (R)		●																					
	Armature (A)		●																					
04	Rotor (R)			●		●																		
	Armature (A)			●		●																		
05	Rotor (R)					●			●															
	Armature (A)					●			●															
06	Rotor (R)				▨	▨	●	▨	●	▨														
	Armature (A)				▨	▨	●	▨	●	▨														
08	Rotor (R)				▨	▨	▨	▨	●	▨	▨	●	▨											
	Armature (A)				▨	▨	▨	▨	●	▨	▨	●	▨											
10	Rotor (R)							▨	▨	▨	▨	●	▨	●	▨									
	Armature (A)							▨	▨	▨	▨	●	▨	●	▨									
12	Rotor (R)							▨	▨	▨	▨	▨	▨	●	▨	●	▨	▨						
	Armature (A)							▨	▨	▨	▨	▨	▨	●	▨	●	▨							
16	Rotor (R)										▨	▨	▨	▨	▨	●	▨	▨	●	▨	▨			
	Armature (A)										▨	▨	▨	▨	▨	●	▨	▨	●	▨				
20	Rotor (R)												▨	▨	▨	▨	▨	▨	●	▨	●	▨		
	Armature (A)												▨	▨	▨	▨	▨	▨	●	▨	●	▨		
25	Rotor (R)												▨	▨	▨	▨	▨	▨	▨	▨	●	●	▨	▨
	Armature (A)												▨	▨	▨	▨	▨	▨	▨	▨	●	●	▨	▨

* The ● mark indicates a standard bore diameter. ▨ is the range of bore diameters that can be drilled in products with pilot bores.
* If a bore diameter is given in parentheses, the bore is a pilot bore. (The final bore has not been drilled.)
* The above table does not apply to CYT, CS, CSZ, and BSZ models.

Environment for Mounting Parts

Take the environment where the clutch or brake will be used into account in your design.

■ Temperature

Clutches and brakes are heat resistance class B. Their operating temperature range is -10 to 40°C. If used at higher temperatures, heat generated by actual engagement and braking work cannot be dissipated and the coil and/or frictional parts may be damaged. The devices may be used at temperatures below -10°C if the heat generated by the clutch or brake keeps the devices at -10°C or above. However, moisture may adhere through condensation if stationary for longer periods of time or if used at low frequency, potentially leading to decreased performance. Use in extreme environments of -20°C and below may lead to problems. Consult Miki Pulley for details.

■ Humidity and dripping

As with temperature, water droplets adhering to the frictional surfaces will temporarily decrease frictional force until the surface dries, so place a cover on the equipment or otherwise protect it. The adherence of moisture can cause rust.

■ Infiltration of dust, oils, and other foreign matter

The infiltration of foreign matter into the frictional surface is undesirable. Infiltration of oils markedly degrades frictional force. Dust, especially if it contains metal particles, can cause problems by damaging the frictional surface and rotating parts. Chemical infiltration can cause corrosion, in addition to the rust described above.
In such environments, consider the use of a protective cover.

■ Ventilation

Since clutches and brakes convert frictional energy into heat and dissipate it externally, it is preferable to install them in well ventilated locations. Forced air cooling (with a fan or the like) can be used effectively to increase the allowable energy. If you are using the equipment in a poorly ventilated location, consider temperatures carefully.

Max. Rotation Speed

The max. rotation speeds of clutches and brakes are shown in the specifications table. This value is determined by the circumferential speed of the frictional surface, so when used beyond the max. rotation speed, not only will the indicated torque not be generated, abnormal wear, heat damage, and the like may occur.

Ball Bearings

Ball bearings are widely used in combination with clutches and brakes, with deep groove ball bearings the most widely used among them.
Since it is undesirable to get oils on the frictional surfaces of dry-style clutches and brakes, use double-sealed bearings that do not require the addition of oil. Non-contact style double-sealed bearings that use rubber seals not only do not require the addition of oil, they are also excellent at keeping out dust. Metal double-sealed bearings can also be used for compact bearings and some hard-to-obtain bearings.

Mechanical Strength of Components

Clutches and brakes have excellent operational characteristics, so they are able to instantly engage or brake loads. For that reason, machinery components may experience impact forces. Be sure to build sufficient strength into your design. (Note that an overly safe design may increase load torque or affect the precision of engagement/braking.)

Vibration and Rattle

The structural components of clutches and brakes are adequately balanced so vibration does not occur. Mounting rattle can occur, however, after repeated shocks, and that can produce vibration noise. Use a design without rattle.

Corrosion Prevention

Clutches and brakes are treated to prevent corrosion, but rust may occur if storage conditions are poor or if the device is used in certain environments. Moderate rust does not present a problem for use, but we advise that you care for the equipment so that it does not rust.

Sparking

Sparks may be produced during clutch or brake use. This is because of friction between the armature and the magnetic part of the frictional surface. Adequate checks are required when using this equipment in volatile atmospheres.

Designing for Maintenance

Clutches and brakes require virtually nothing in the way of maintenance over the long term.
However, you can get even longer use out of them by proper maintenance of the air gap of the frictional parts and the ball bearings used. We recommend that you design structures so they can be easily disassembled and reassembled.
For details, refer to the operating manual.

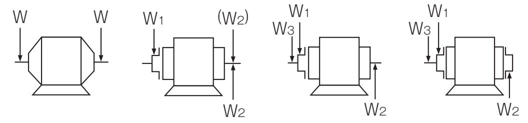
Use of Micro Clutches

When using bearing-mounted micro clutches (in which the bearings are oil-impregnated metal), energization rate, temperature and the like may sometimes be restricted. Consult Miki Pulley for details.

Overhang Load of Unit

The table below shows the allowable values for radial load that can be applied to the shaft of the unit. Allowable values will vary somewhat on through-shaft structure units due to the directions in which input and output loads act. (The values shown are for the most demanding conditions. The load point is the center point of the shaft.)

Unit [N]



Size	125-□-12 126-□-4B	121-□-20G		121-□-10G 122-□-20G
05	250	—	—	—
06	320	300 (320)	140	140
08	480	450 (500)	250	250
10	700	700 (800)	450	450
12	900	900 (1000)	700	700
16	1300	1400 (1600)	1000	1000
20	1800	2000 (2500)	1800	1800
25	—	2900 (3600)	2600	2600

* Numbers in parentheses are for loads in the same direction.

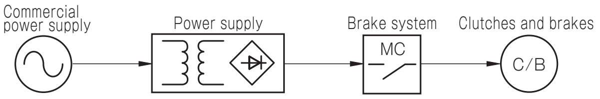
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES

Control Circuits

Basic Structure of Electrical Circuits

When designing the electrical circuitry that controls clutches and brakes, the selection of the control method and control equipment is very important. The correct selection of these and designing the circuit both stabilize the operating characteristics of clutches and brakes and increase the reliability of machinery.

A DC 24 V (standard specification) power supply is needed to operate clutches and brakes. For this, either a DC power supply can be used, or an AC power supply can be stepped down and rectified. We have a variety of power supply devices dedicated for clutches and brakes available. For details, refer to the page on power supplies.



Standard wiring

Selecting Components for Power Supplies

Transformers

Match the primary side to the supply voltage. On the secondary side, use something with sufficient capacity to be able to apply the rated voltage to the clutch (brake) coil.

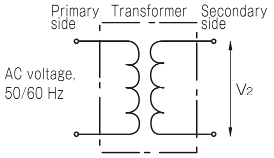
As a guideline, select a transformer that has a capacity 1.25 times the rated capacity of the clutch (brake) at 20° C. Note that the secondary-side output voltage must be set according to the rectifier's voltage drop or the transformer's impedance drop. These can be found in simplified terms, from Eqs. (1) and (2) below.

$$V_2 = \frac{V + 1.4}{0.9} \ [V] \cdots\cdots\cdots\cdots (1)$$

Eq. (1) is from the single-phase full-wave rectification system.

$$P \geqq W_{CB} \times 1.25 \ [VA] \qquad (2)$$

V_2: Transformer secondary voltage [V]
V: DC voltage [V]
P: Transformer capacity [VA]
W_{CB}: Clutch (brake) capacity [VA]



Rectifiers

There are several different rectification systems. Miki Pulley uses single-phase full-wave rectification (the bridge system). For a system to be selected, the maximum rated value of the rectifier must not be exceeded. The rated maximum can be found in simplified terms using the following Eq. (3).

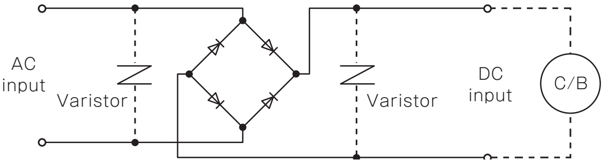
- Determining withstand voltage V_{RM} in the reverse direction

$$V_{RM} = V_L \cdot \sqrt{2} \cdot K \cdots\cdots\cdots\cdots (3)$$

V_L: AC input voltage [V]
K: Safety factor (make the factor between 2 and 3)

Note that if a surge voltage at or above the withstand voltage may find its way in from outside, the rectifier must be protected.

- Determining the average rectification current
  Select a rectifier that has an average rectification current value of 1.5 or more times the rated current of the clutch (or brake) used. Note that when large currents flow, temperature rise becomes a problem. Take measures to give the device a heat dissipation effect and to suppress extreme temperature rises.



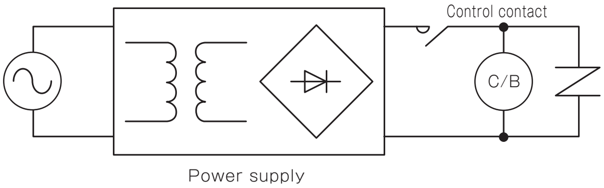
Single-phase full-wave rectified

Relays (control contacts)

Since electromagnetic clutches and brakes have internal electromagnetic coils, they must be used under the conditions of the DC inductive load of the relay you will use.

This is because contacts are heavily worn by surge voltage generated during electromagnetic clutch or brake control.

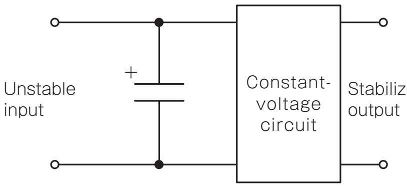
If relay service life, operational frequency, and the like are problems in use, the design must be contactless. For details, see the page on controlling electromagnetic clutches and brakes using power supplies.



DC switching

Points to note on control circuit structure

- Control of clutches and brakes
  When controlling the clutch or brake on the AC side, armature release time lengthens and high-frequency operation becomes impossible. Install control contacts on the DC side.
- Voltage supplied to the clutch or brake
  When designing a power supply circuit, keep fluctuation of the excitation voltage to within ± 10% of the rated voltage of the clutch or brake.
- Smoothing of excitation voltage
  Normally, the power supply for the clutch or brake is a single-phase full-wave rectifier. When high precision is required, however, better results are obtained by smoothing.



Stabilized power supply circuit

- Protection of control contacts
  If a protective circuit is placed in the clutch/brake, the control contacts will be protected, but the protective effect will be greater if CR absorbers are used between contacts, as shown in the figure. C (capacitor) and R (resistor) are roughly as follows.
  Capacitor C [μ F]: Ratio to contact current is:

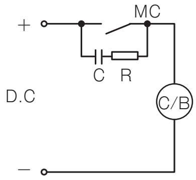
$$\frac{C\,[\,\mu\ F]}{I\ [A]} = \frac{0.5 \text{ to } 1}{1}$$

Withstand voltage: 600 [V]

Resistance R[Ω]: Ratio to contact voltage is:

$$\frac{R\,[\,\Omega\,]}{E\ [V]} \pm 1$$

Capacity = 1 [W]

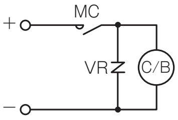
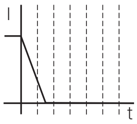
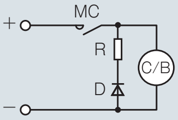
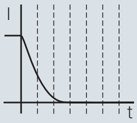
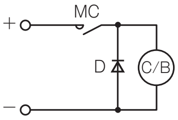
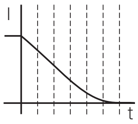
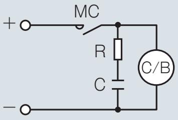
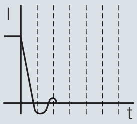


Relay protector circuit

■ Discharge circuits

When a DC excitation current flows in an electromagnetic clutch or brake, energy accumulates in the coil. If current is then shut off, a surge voltage is generated between the coil terminals by the accumulated energy. This surge voltage may reach 1000 V or more depending on the shutoff speed, shutoff current, and other factors, so it can cause damage to the coil insulation, burn the contacts in switches, and more. Appropriate discharge circuits must therefore be installed to prevent such problems.

Different types of discharge circuits have differing armature discharge times and effectiveness in suppressing surge voltages. The table below shows the characteristics of some discharge circuits.
While different discharge circuits have many advantages and disadvantages, the type we recommend are varistors.

	Circuit diagram	Current decay	Characteristics
Varistor			Very effective in keeping surge voltage small without adding delay to the armature release time.
Resistors + diodes			Can lower power consumption in the power supply part and reduce resistor capacity. The armature release time becomes somewhat longer, so care is required in high frequency use.
Diodes			Good at suppressing surge voltage, but armature release is delayed, so clutch and brake are more prone to interfere with each other, making diodes unsuitable for high frequency use.
Resistors + capacitors			Have a short armature release time, but require capacitors with high pressure resistance.

Commercial Power Supply Specifications

Model	Rectification method	Frequency [Hz]	AC input voltage AC [V]	DC output voltage DC [V]	Wattage [W]	Applicable clutch/ brake size
BES-20-05	Single-phase, full-wave	50/60	200	24	50	02 ～ 05
BES-20-10	Single-phase, full-wave	50/60	200	24	50	06 ～ 10
BES-20-16	Single-phase, full-wave	50/60	200	24	50	12 ～ 16
BES-20-20	Single-phase, full-wave	50/60	200	24	50	20
BES-40-25	Single-phase, full-wave	50/60	200	24	100	25
BES-20-05-1	Single-phase, full-wave	50/60	100	24	50	02 ～ 05
BES-20-10-1	Single-phase, full-wave	50/60	100	24	50	06 ～ 10
BES-20-16-1	Single-phase, full-wave	50/60	100	24	50	12 ～ 16
BES-20-20-1	Single-phase, full-wave	50/60	100	24	50	20
BES-40-25-1	Single-phase, full-wave	50/60	100	24	100	25

SPRING-ACTUATED BRAKES

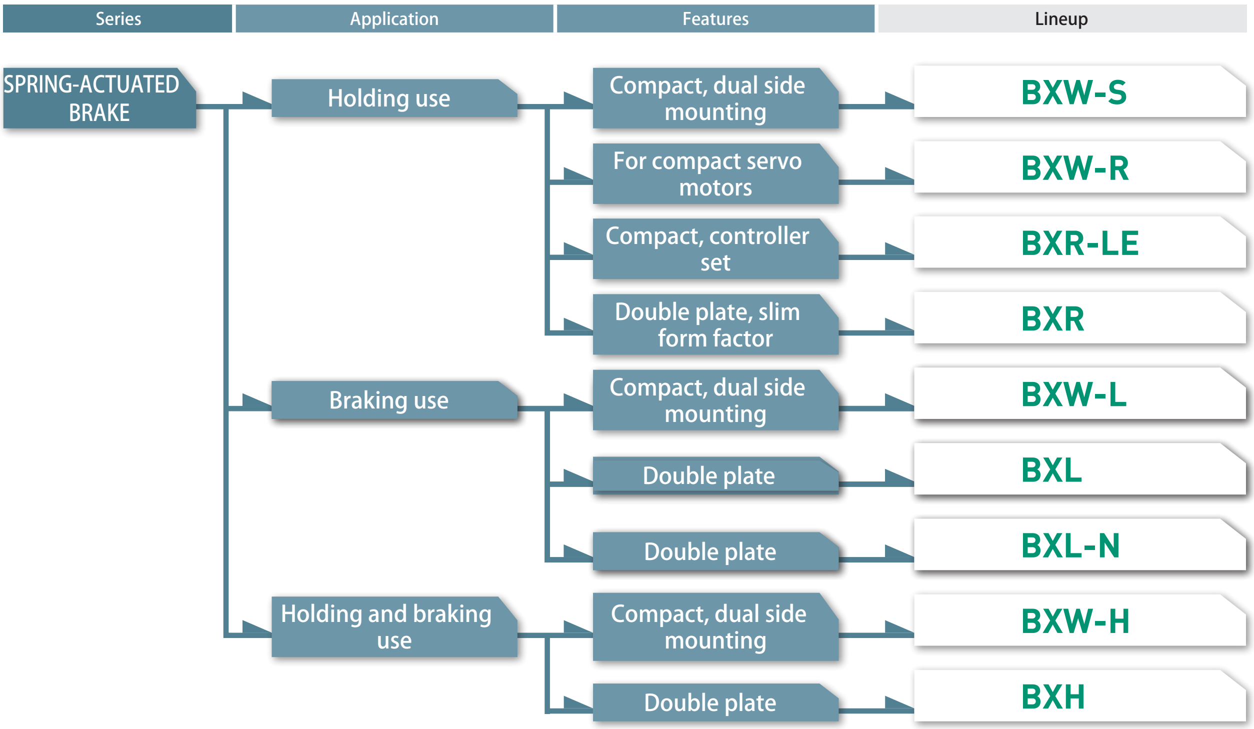
Application	Motors, articulated robots, actuators, machine tools, forklifts, aerial vehicles, hoists, electric carts, electric shutters, medical equipment, wind turbine generators

Provides Excellent Performance in Emergency Braking When Power Goes Out and in Long-term Holding

These are electromagnetic brakes actuated by the force of springs when not energized. These standard brakes boast a variety of advantages, including quiet operation, long service life, slim form factors, high torque in a compact package, stable braking force, and the ability to release manually. We can create custom designs for you based on these standard products.

RoHS
Some exceptions apply

Available Models



Series	Application	Features	Lineup
SPRING-ACTUATED BRAKE	Holding use	Compact, dual side mounting	BXW-S
		For compact servo motors	BXW-R
		Compact, controller set	BXR-LE
		Double plate, slim form factor	BXR
	Braking use	Compact, dual side mounting	BXW-L
		Double plate	BXL
		Double plate	BXL-N
	Holding and braking use	Compact, dual side mounting	BXW-H
		Double plate	BXH

For details on selection, see P.360 to 365.

Model Selection

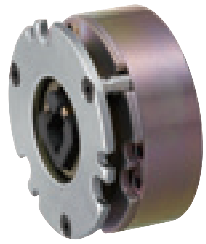
Models/ Type	Mounting method	Torque [N·m] (0.01 / 0.1 / 1 / 10 / 100 / 1000)	Release lever	Dust cover	Slim	Quiet mechanism: Reduced aperiodic noise	Quiet mechanism: Reduced armature pull-in noise	Quiet mechanism: Reduced braking noise
BXW-L/H/S	Stator/ flange	0.12 ～ 5.20	Option	Option	Customization	Std.	Customization	Customization
BXW-R	Stator	0.30 ～ 2.50	—	—	Customization	Customization	Customization	Customization
BXR-LE	Stator	0.06 ～ 3.20	—	—	Std.	Customization	Customization	Customization
BXR	Stator	5 ～ 55	—	—	Std.	Customization	Customization	Customization
BXL	Stator	2 ～ 22	Option	—	Customization	Option	Option	Std.
BXH	Stator	4 ～ 44	Option	—	Customization	Option	Customization	Customization
BXL-N	Stator	2 ～ 80	—	—	Customization	Option	Option	Std.

Product Lineup

BXW-L/H/S

For holding and braking
2-way mounting
Quiet
Long service life
No break-in needed

RoHS



Three types for various applications

The line-up includes three types: the S type for holding, the L type for braking, and the H type for both holding and braking.

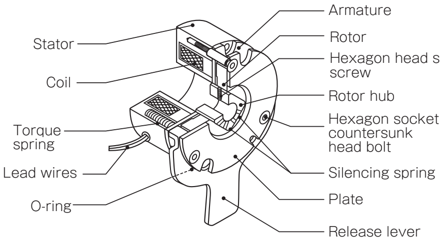
2-way mounting

The stator (a heat source) can be mounted facing either inwards or outwards.

Brake type		BXW-□-□L	BXW-□-□H	BXW-□-□S
Brake torque	[N·m]	0.12～2.00	0.24～4.00	0.36～5.20
Operating temperature	[℃]	−10～+40	−10～+40	−10～+40
Backlash		Extremely small size	Extremely small size	Extremely small size

Structure

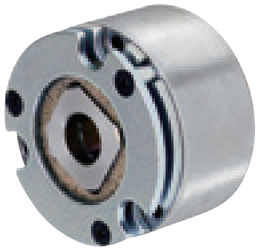
Has release lever



BXW-R

Dedicated for holding
High torque
Low inertia
No break-in needed

RoHS



Dedicated design for small servo motors

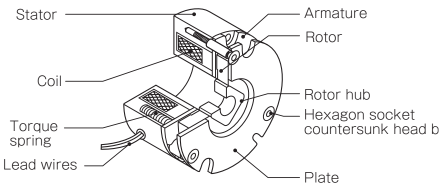
These have dedicated designs matched for specifications and dimensions for □40, □60, and □80 small servo motors.

Low-inertia rotor

We succeeded in dramatically reducing both mass and drag wear while ensuring adequate strength.

Brake torque	[N·m]	0.30～2.50
Operating temperature	[℃]	−10～+40
Backlash		Extremely small size

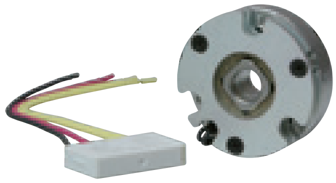
Structure



BXR-LE

Dedicated for holding
Ultra-slim
Low inertia

RoHS

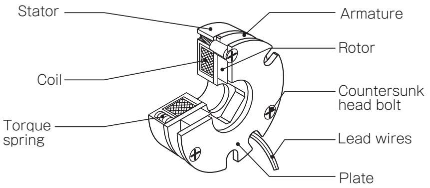


Ultra compact

Use with a built-in dedicated controller provides a range of benefits, including an ultra-thin profile, reduced energy consumption, lower heat emissions, higher torque and a longer service life.

Brake torque	[N·m]	0.06～3.20
Operating temperature	[℃]	−10～+40
Backlash		Extremely small size

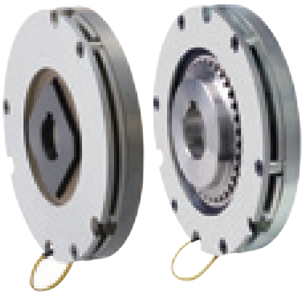
Structure



BXR

Dedicated for holding
Ultra-slim
Low inertia
Spline
No break-in needed

RoHS



Ultra-slim

This ultra-slim design is two-thirds the thickness of our previous design.

Low-inertia rotor

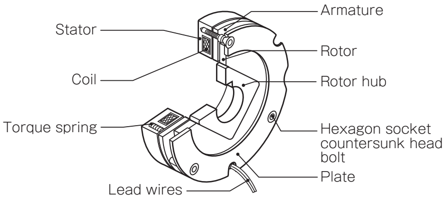
We succeeded in dramatically reducing both mass and drag wear while ensuring adequate strength.

Extremely small backlash

The backlash of the spline hub type is 0.2° to 0.5°.

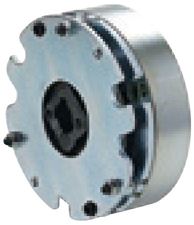
Brake torque	[N·m]	5~55
Operating temperature	[℃]	−10～+40
Backlash		Extremely small size

Structure



BXL

RoHS



Dedicated for braking | Quiet | Stable braking | Long service life

Low noise

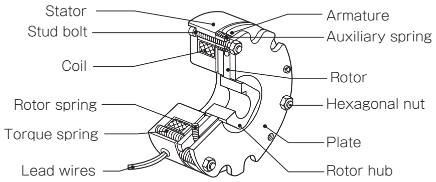
These reduce annoying high-frequency friction noise during braking. Products that reduce aperiodic noise or armature pull-in noise are also available.

Stable braking

With low torque fluctuation, these brake loads instantly even when malfunctions occur.

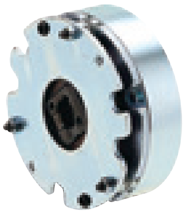
Brake torque	[N·m]	2～22
Operating temperature	[℃]	－10～＋40
Backlash		Extremely small size

Structure



BXH

RoHS



For holding and braking | High torque | Quiet | No break-in needed

For both holding and braking

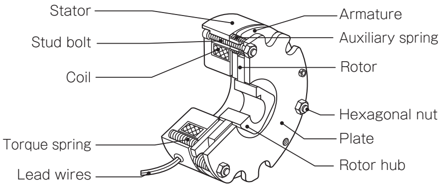
These brakes ensure sufficient torque for holding applications while also being usable as emergency brakes.

High torque

Provide twice the torque with the same dimensions as BXL models.

Brake torque	[N·m]	4~44
Operating temperature	[℃]	－10～＋40
Backlash		Extremely small size

Structure



BXL-N

Dedicated for braking | Quiet | Stable braking | Long service life

Low noise

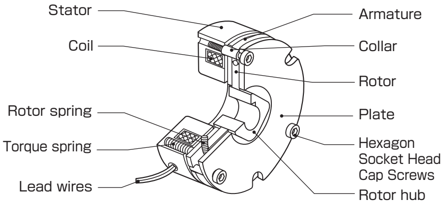
These reduce annoying high-frequency friction noise during braking. Products that reduce aperiodic noise or armature pull-in noise are also available.

Variety of torques

Two to three different kinds of braking torque for the same outer diameter are available to permit the most suitable design for the application at hand.

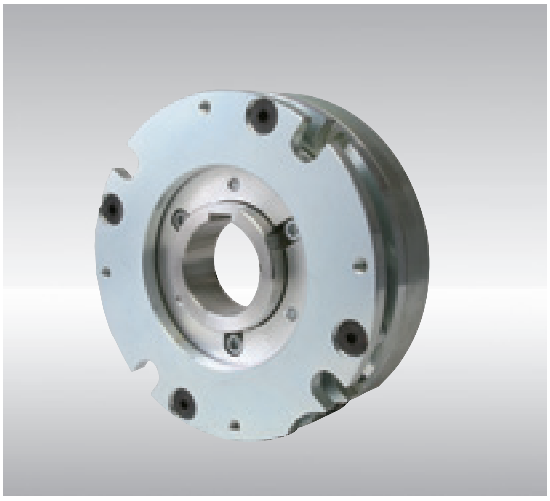
Brake torque	[N·m]	2～80
Operating temperature	[℃]	0～＋40
Backlash		Extremely small size

Structure



Customization Examples

BXW Large Type



This is a large version of the BXW with static friction torque of 300 N•m.
Backlash is kept extremely small by locking the rotor hub to the rotor via a disc spring.

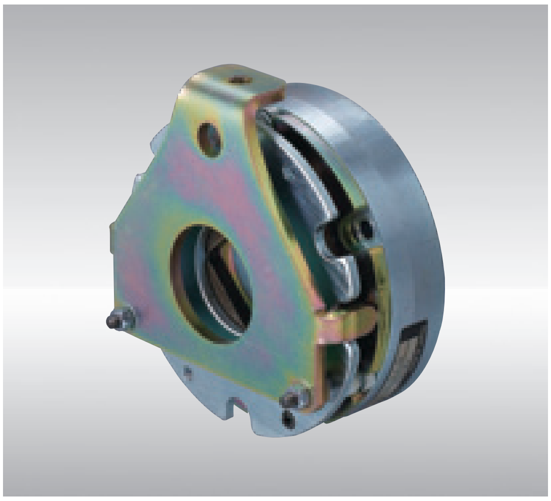
Integrated coupling-rotor hub type

Even more compact devices can be designed by fitting the slim and compact BXR model spline rotor hub into a metal plate-spring-type coupling exterior.

Types with Integrated Flanges

Mounting flanges and brake stators can be integrated. This helps reduce the number of components and saves space.

Special Release Levers



Release levers can also be designed for specific units to match the device construction.

Contact Miki Pulley from our website for details.

For inquiries on customization

www.mikipulley.co.jp Web code Z001

FAQ

Q1 I don't see anything with the torque and response I need in your standard products. Can you customize something for me?

A We can customize units in many ways: outfitting them for overexcitation power supplies or use of inrush current at motor startup, changing the frictional material, boosting torque, increasing response, extending the total energy (service life), suppressing heat generation, and more. Consult Miki Pulley for details.

Overexcitation power supply
BEW-2FH

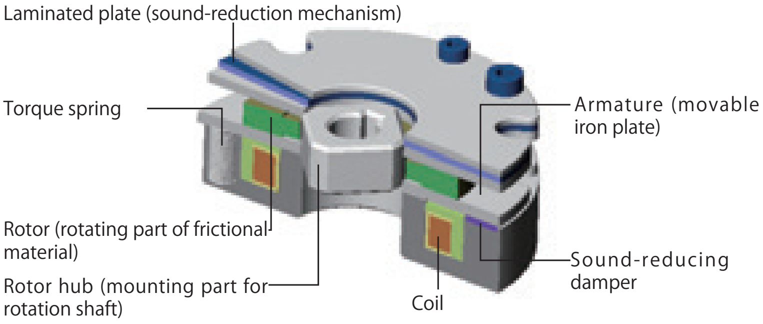
Q2 Can you handle cases in which standard products cannot be installed due to dimensional constraints?

A Yes, we can. For example, we have a long track record creating slimmer units that deliver the same torque. These units can provide the same torque while being only about half as thick as the standard product, although this will vary with your conditions. Consult Miki Pulley for details.

Q3 What do you have for dealing with noise issues?

A Spring-actuated brakes have a number of types of noises, such as (1) rattling generated by microvibrations during rotating, (2) armature pull-in and release noise, (3) friction noise (chirping) during braking, and (4) grinding noise under drive (when the brake is released). We have ways of reducing all of these. The figure below shows an example.

To reduce pull-in/release noise: Special plate specification



To reduce grinding noise: Single-side braking specification

BXW Models

Specifications

BXW-□-□L (Braking use)

Model	Size	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed $[\text{min}^{-1}]$	Rotating part moment of inertia $J\ [\text{kg·m}^2]$	Allowable braking energy rate $P_{ba\ell}$ [W]	Total braking energy E_T[J]	Armature pull-in time t_a [s]	Armature release time t_{ar} [s]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
BXW-01-10L	01	0.12	12	5.0	0.417	28.8	F	5000	0.6×10^{-6}	2.5	1.5×10^6	0.008	0.015	0.2
			24	5.0	0.208	115	F							
			45	5.0	0.111	405	F							
			90	5.0	0.056	1622	F							
			180	5.0	0.028	6486	F							
BXW-02-10L BXW-02-12L	02	0.25	12	6.6	0.550	21.8	F	5000	1.9×10^{-6}	5.0	3.0×10^6	0.008	0.015	0.3
			24	6.6	0.275	87.3	F							
			45	6.6	0.147	307	F							
			90	6.6	0.073	1228	F							
			180	6.6	0.037	4912	F							
BXW-03-10L BXW-03-12L	03	0.50	12	9.0	0.750	16.0	F	5000	3.8×10^{-6}	10.0	4.5×10^6	0.025	0.025	0.4
			24	9.0	0.375	64.0	F							
			45	8.2	0.182	247	F							
			90	8.2	0.091	988	F							
			180	8.2	0.046	3954	F							
BXW-04-10L BXW-04-12L	04	1.00	12	11.5	0.958	12.5	F	5000	12.0×10^{-6}	20.0	7.0×10^6	0.030	0.030	0.6
			24	11.5	0.479	50.1	F							
			45	10.0	0.222	203	F							
			90	10.0	0.111	810	F							
			180	10.0	0.056	3241	F							
BXW-05-10L BXW-05-12L	05	2.00	12	13.0	1.083	11.1	F	5000	23.0×10^{-6}	30.0	12.0×10^6	0.035	0.035	0.8
			24	13.0	0.542	44.3	F							
			45	13.0	0.289	156	F							
			90	13.0	0.144	623	F							
			180	13.0	0.072	2492	F							

BXW-□-□H (Holding and braking use)

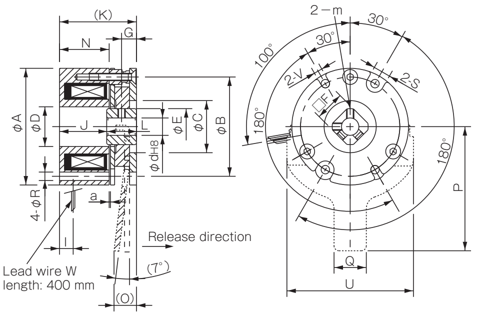
Model	Size	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed $[\text{min}^{-1}]$	Rotating part moment of inertia $J\ [\text{kg·m}^2]$	Allowable braking energy rate $P_{ba\ell}$ [W]	Total braking energy E_T[J]	Armature pull-in time t_a [s]	Armature release time t_{ar} [s]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
BXW-01-10H	01	0.24	12	5.0	0.417	28.8	F	5000	0.6×10^{-6}	0.5	0.2×10^6	0.010	0.010	0.2
			24	5.0	0.208	115	F							
			45	5.0	0.111	405	F							
			90	5.0	0.056	1622	F							
			180	5.0	0.028	6486	F							
BXW-02-10H BXW-02-12H	02	0.50	12	6.6	0.550	21.8	F	5000	1.9×10^{-6}	1.0	0.3×10^6	0.010	0.010	0.3
			24	6.6	0.275	87.3	F							
			45	6.6	0.147	307	F							
			90	6.6	0.073	1228	F							
			180	6.6	0.037	4912	F							
BXW-03-10H BXW-03-12H	03	1.00	12	9.0	0.750	16.0	F	5000	3.8×10^{-6}	2.0	0.5×10^6	0.035	0.020	0.4
			24	9.0	0.375	64.0	F							
			45	8.2	0.182	247	F							
			90	8.2	0.091	988	F							
			180	8.2	0.046	3954	F							
BXW-04-10H BXW-04-12H	04	2.00	12	11.5	0.958	12.5	F	5000	12.0×10^{-6}	4.0	1.0×10^6	0.040	0.025	0.6
			24	11.5	0.479	50.1	F							
			45	10.0	0.222	203	F							
			90	10.0	0.111	810	F							
			180	10.0	0.056	3241	F							
BXW-05-10H BXW-05-12H	05	4.00	12	13.0	1.083	11.1	F	5000	23.0×10^{-6}	6.0	2.0×10^6	0.045	0.030	0.8
			24	13.0	0.542	44.3	F							
			45	13.0	0.289	156	F							
			90	13.0	0.144	623	F							
			180	13.0	0.072	2492	F							

BXW-□-□S (Holding use)

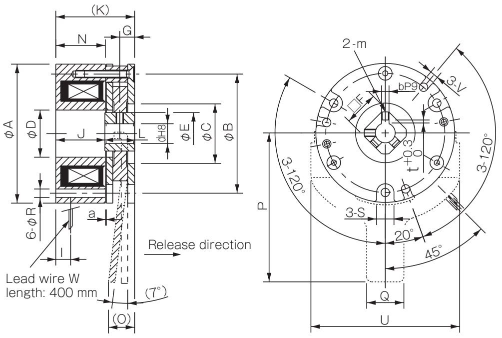
Model	Size	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed $[\text{min}^{-1}]$	Rotating part moment of inertia $J\ [\text{kg·m}^2]$	Allowable braking energy rate $P_{ba\ell}$ [W]	Total braking energy E_T[J]	Armature pull-in time t_a [s]	Armature release time t_{ar} [s]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
BXW-01-10S	01	0.36	24	5.0	0.208	115	F	5000	0.6×10^{-6}	—	—	0.025	0.010	0.2
BXW-02-10S BXW-02-12S	02	0.75	24	6.6	0.275	87.3	F	5000	1.9×10^{-6}	—	—	0.030	0.010	0.3
BXW-03-10S BXW-03-12S	03	1.50	24	9.0	0.375	64.0	F	5000	3.8×10^{-6}	—	—	0.035	0.020	0.4
BXW-04-10S BXW-04-12S	04	2.60	24	11.5	0.479	50.1	F	5000	12.0×10^{-6}	—	—	0.040	0.025	0.6
BXW-05-10S BXW-05-12S	05	5.20	24	13.0	0.542	44.3	F	5000	23.0×10^{-6}	—	—	0.045	0.030	0.8

* The armature pull-in time and armature release time are taken during DC switching.

Dimensions



Size #01, #02



Size #03, #04, #05

Unit [mm]

Size	Radial direction dimensions															Axial direction dimentions							Bore dimensions		
	A	B	C	D	E	S	V	R	F	W	m	O	P	Q	U	G	I	J	K	L	N	a	d	b	t
01	37	32	18	13.5	12.0	6	3	3	10	AWG26	M3	—	—	—	—	4.5	5.0	22.5	32	9	22.5	0.10	5 6	—	—
02	47	40	21	16.0	14.5	7	3.4	3.4	12	AWG26	M3	9	50	13	51	6.0	5.5	19.2	32	12	20.0	0.10	6 7	—	—
03	56	48	24	19.0	17.0	7	3.4	3.4	14	AWG26	M3	11	60	15	60	6.0	6.0	19.9	32	12	20.0	0.15	8	—	—
04	65	58	35	24.0	22.0	7	3.4	3.4	18	AWG22	M4	12	70	15	70	7.0	7.0	19.9	34	14	21.0	0.15	10	3	1.2
05	75	66	36	28.0	26.5	9	4.5	4.5	22	AWG22	M4	14	80	20	80	7.0	7.0	22.1	36	14	21.5	0.15	12	4	1.5

* There is no release lever option for size #01.

How to Place an Order

BXW-01-10L-24V-5

Size
Release lever
10: Not included
12: Included
Bore diameter (dimensional symbol d)
Voltage (Specifications table)
Application L: Braking-use H: Holding- and braking-use
S: Holding use

* Models equipped with the release lever and models with 12-V and 180-V voltage specifications are made to order.
* Contact Miki Pulley for assistance with bore diameters, d, not listed in the Dimensions tales and voltages not listed in the Specifications table.

Options: Dust Cover

Dust covers are available as options. These enable use in challenging environments by keeping out foreign matter.
Dust covers come in two types: full covers that have no hole for the shaft, and shaft-hole covers, which can be used on brakes mounted with the shaft passing through. You can also choose the locations of the lead exit holes for brakes mounted on plates or mounted on stators.

How to Place an Order

BXW-01-C02

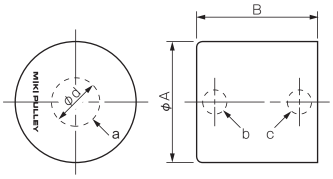
Brake size
01, 02, 03, 04, 05
Shape no.
01, 02, 03, 04, 05, 06

Specifications

Material	Ethylene propylene diene monomer (EPDM) rubber
Temperature range	-40℃ to 140℃
Exterior color	Black
Applicable brake models	L type, H type, S type BXW models
Applicable brake sizes	#01, #02, #03, #04, #05
Applicable specification voltages	12 V DC, 24 V DC, 45 V DC, 90 V DC, 180 V DC

* This temperature range is for dust cover materials. The operating temperature for BXW models is -10°C to 40°C.
* Cannot be mounted on BXW models with release levers or R-type BXW models.

Dimensions



Shape No.	a	b	c
01	×	×	×
02	×	×	○
03	×	○	×
04	○	×	×
05	○	×	○
06	○	○	×

Unit [mm]

Model	φA	B	φd
BXW-01-C□	41	33	16
BXW-02-C□	51	33	21
BXW-03-C□	60	33.5	24
BXW-04-C□	69	35.5	30
BXW-05-C□	79	37.5	30

* Symbol a indicates a hole made for brakes with shafts passing through; symbol b indicates a hole made for lead exit when mounted on a plate; symbol c indicates a hole made for lead exit when mounted on a stator.
* Shapes #01 and #04 require that a hole be made separately for leads to exit.

BXW Models

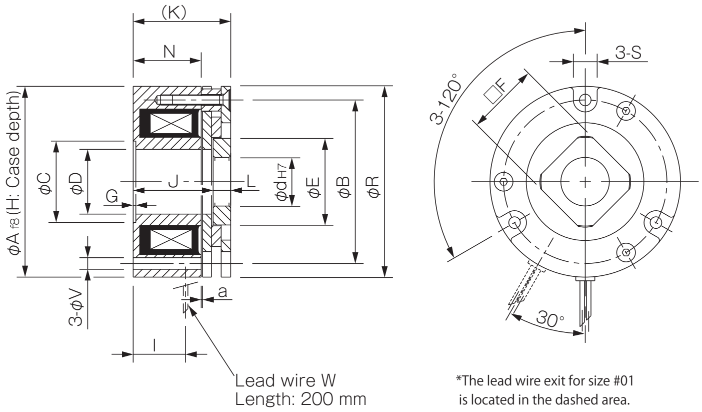
Specifications (BXW-□-□R)

(For servo motors)

Model	Size	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min^{-1}]	Rotating part moment of inertia J [kg·m²]	Allowable braking energy rate $E_{ba\ell}$ [J]	Total braking energy E_T [J]	Armature pull-in time t_a [s]	Armature release time t_{ar} [s]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
BXW-01-10R	01	0.3	24	6.1	0.254	94.4	F	6000	1.36×10^{-7}	15	3000	0.035	0.020	0.1
BXW-03-10R	03	1.3	24	7.2	0.300	80.0	F	6000	1.17×10^{-6}	87	17000	0.050	0.020	0.3
BXW-05-10R	05	2.5	24	8.0	0.333	72.0	F	6000	3.68×10^{-6}	200	40000	0.060	0.020	0.5

* The armature pull-in time and armature release time are taken during DC switching.

Dimensions



*The lead wire exit for size #01 is located in the dashed area.

Unit [mm]

Size	Radial direction dimensions										Axial direction dimentions								Bore dimensions	
	A	B	C	D	E	S	V	R	F	W	G	H	I	J	K	L	N	a	d	d max
01	33	26.5	16	9	14	7	3.4	32.5	12	AWG26	0.2	4	19	26	30	4	22.8	0.1	8.5	8.5
03	48	42	26	14	23	8	3.4	47.5	19	AWG22	0.2	4	18	26	30	4	22.6	0.1	11	15
05	64	56	28	22	31	8	4.5	63.5	25	AWG22	0.2	4	16	25.5	30	4.5	21.3	0.1	16	20

* Bore diameters other than the standard bore diameters given above are also possible. d max indicates the maximum bore diameter with a round shaft.
* In addition to round bores, key processing can also be handled. Consult Miki Pulley for details.
* Dimensions, mounting and the like are not interchangeable with other BXW models.

How to Place an Order

BXW-01-10R-24V-8.5

Size
Release lever
10: Not included
Bore diameter (dimensional symbol d)
Voltage (Specifications table)
Application R: Servo motor-use

*Contact Miki Pulley for assistance with bore diameters, d, not listed in the Dimensions tales and voltages not listed in the Specifications table.

Items Checked for Design Purposes

Precautions for Handling

Brakes

Most electromagnetic braking systems are made using flexible materials. Be careful when handling such parts and materials as striking or dropping them or applying excessive force could cause them to become damaged or deformed.

Lead Wires

Be careful not to pull excessively on the brake lead wires, bend them at sharp angles, or allow them to hang too low.

Frictional Surface

Since these are dry brakes, they must be used with the frictional surface dry. Keep water and oil off of the frictional surfaces when handling the brakes.

Precautions for Use

Environment

These brake units are dry braking systems, meaning that the torque will drop if oil residue, moisture, or other liquids get onto friction surfaces. Attach the protective cover when working in areas with oil, moisture, dust, and other particles that could affect the braking system.

Operating Temperature

The operating temperature range is -10° C to 40° C. If you will use the product at other temperatures, consult Miki Pulley.

Power Supplies

BXW models use commercial AC 100 V or 200 V single phase, full-wave rectified or half-wave rectified. Select as appropriate for your application. See the table below, "Recommended power supplies and circuit protectors," for the power supply devices we recommend.

Power Supply Voltage Fluctuations

Full braking performance may not be guaranteed with extreme changes in power supply voltage. Make sure to keep power supply voltage to within ± 10% of the rated voltage value.

Air Gap Adjustment

BXW models do not require air gap adjustment. The brake air gap is adjusted when the braking system is shipped from the factory.

Circuit Protectors

If using a power supply that is not equipped with a circuit protector for DC switching, make sure to connect the recommended circuit protector device in parallel with the brake.

Recommended Power Supplies and Circuit Protectors

Recommended power supplies

Input AC power	Brake voltage	Rectification method	Recommended power supply model
AC100V 50/60Hz	DC24V	Single-phase, full-wave	BES-20-71-1
AC100V 50/60Hz	DC45V	Single-phase, half-wave	BEW-1R
AC100V 50/60Hz	DC90V	Single-phase, full-wave	BEW-1R
AC200V 50/60Hz	DC24V	Single-phase, full-wave	BES-20-71
AC200V 50/60Hz	DC90V	Single-phase, half-wave	BEW-2R
AC200V 50/60Hz	DC180V	Single-phase, full-wave	BEW-2R
AC400V 50/60Hz	DC180V	Single-phase, half-wave	BEW-4R

* A DC power supply such as a battery can also be used to supply the 24 V DC required for the brake voltage.

Recommended circuit protectors

Input voltage	Brake voltage	Rectification method	Recommended circuit protector (varistor)
DC24V	DC24V	–	NVD07SCD082 or an equivalent
AC100V 50/60Hz	DC45V	Single-phase, half-wave	NVD07SCD220 or an equivalent
AC100V 50/60Hz	DC90V	Single-phase, full-wave	NVD07SCD220 or an equivalent
AC200V 50/60Hz	DC90V	Single-phase, half-wave	NVD07SCD470 or an equivalent
AC200V 50/60Hz	DC180V	Single-phase, full-wave	NVD07SCD470 or an equivalent
AC400V 50/60Hz	DC180V	Single-phase, half-wave	NVD14SCD820 or an equivalent

* NVD□SCD□ parts are manufactured by KOA Corporation.
* DC24V indicates a product recommended with a stepdown transformer or the like.
* BXW models do not come with circuit protectors.

Precautions for Mounting

Mounting Orientation

BXW models can be mounted with the stator facing inwards (stator mounted) or outwards (plate mounted). Select your mounting orientation as the application dictates. Be aware, however, that the BXW-R type is only compatible with stator centering-mark mounting. Your understanding is appreciated.

Affixing the Rotor Hub

Affix the rotor hub to the shaft with hex-socket-head set screws such that the rotor hub does not touch the armature or stator. If you are applying adhesive to the hex-socket-head set screws, be careful that the adhesive does not come out onto the rotor hub surface. Note also that since the BXW-R type is constructed so that the rotor hub does not go through the stator, affix it by press-fitting it onto the shaft at a position that does not touch the armature (see dimension J) when they are assembled.

Bolts and Screws

Implement screw-locking measures such as use of an adhesive thread-locking compound to bolts and screws used to install brakes.

Shafts

The shaft tolerance should be h7 class (JIS B 0401). Note that the harder the material used in the shaft, the less effective the hexagon-socket set screw will be. Note also that for the BXW-R type, the shaft is press fitted into the rotor hub. The shaft tolerance should be determined based on the press-fit tolerance.

Accuracy of Brake Attachment Surfaces

Make sure that concentricity (X) and perpendicularity (Y) do not exceed the allowable values of the table below.

Allowable concentricity and perpendicularity values for the BXW

Size	Concentricity (X)	Perpendicularity (Y)
	T.I.R. [mm]	T.I.R. [mm]
01	0.05	0.02
02	0.05	0.02
03	0.10	0.02
04	0.10	0.02
05	0.10	0.02

Stator mounted

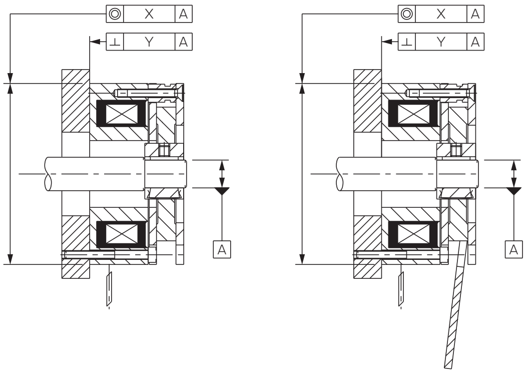
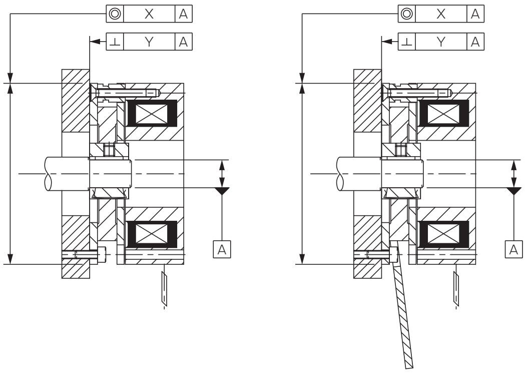


Plate mounted

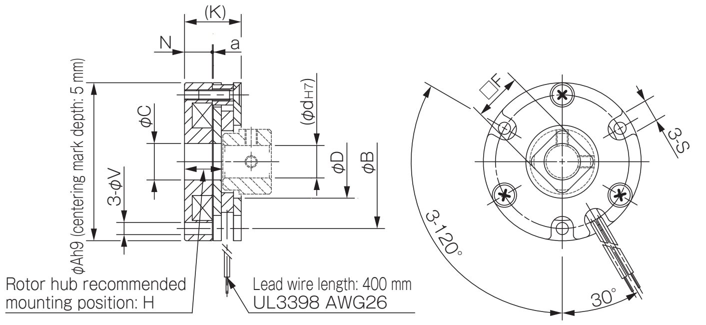


BXR-LE Models For holding

Specifications (Brake unit)

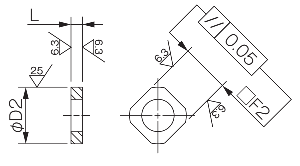
Model	Size	Static friction torque T_s [N·m]	Coil (at 20℃)								Heat resistance class	Max. rotation speed [min^{-1}]	Rotating part moment of inertia J [kg·m^2]	Allowable braking energy rate $E_{ba\ell}$ [J]	Total braking energy E_T [J]	Armature pull-in time (24 V DC) ta [s]	Armature release time (7 V DC) tar [s]	Mass [kg]
			Overexcitation output				Normal excitation output											
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]	Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
BXR-015-10LE	015	0.06	24	16.5	0.688	35	7	1.4	0.200	35	F	6000	3.34 × 10^{-8}	5	1000	0.020	0.020	0.03
BXR-020-10LE	020	0.14	24	16.5	0.688	35	7	1.4	0.200	35	F	6000	5.56 × 10^{-8}	15	3000	0.035	0.020	0.06
BXR-025-10LE	025	0.32	24	16.5	0.688	35	7	1.4	0.200	35	F	6000	1.56 × 10^{-7}	15	3000	0.035	0.020	0.08
BXR-035-10LE	035	0.62	24	16.5	0.688	35	7	1.4	0.200	35	F	6000	4.83 × 10^{-7}	87	17000	0.050	0.020	0.12
BXR-040-10LE	040	1.32	24	16.5	0.688	35	7	1.4	0.200	35	F	6000	6.32 × 10^{-7}	87	17000	0.060	0.020	0.16
BXR-050-10LE	050	3.20	24	16.5	0.688	35	7	1.4	0.200	35	F	6000	1.51 × 10^{-6}	200	40000	0.060	0.020	0.40

Dimensions (Brake unit)



Rotor hub recommended mounting position: H

Lead wire length: 400 mm
UL3398 AWG26



Rotor hub machining dimensions

* The rotor hub used to couple the shaft and rotor can either be provided by the customer based on the above diagram or selected from the optional products on the right-hand page.
Rotor hubs can also be recommended or fabricated to the desired shape.
Consult Miki Pulley for details.

Unit [mm]

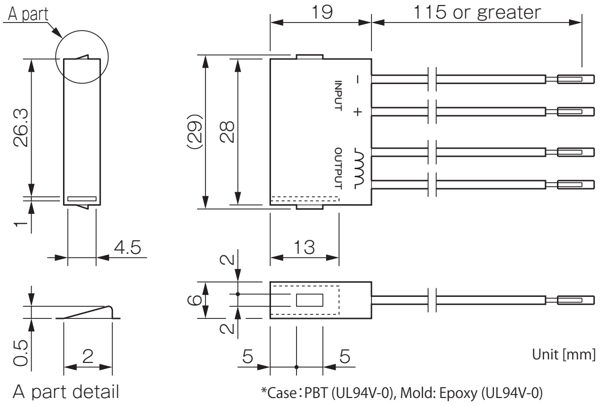
Model	Size	Radial direction dimensions [mm]									Axial direction dimentions [mm]			Rotor hub machining dimensions [mm]		
		φ A	φ B	φ C	φ D	φ d max.	□F	S	φ V	H	K	N	a	L	φ D2	□F2
BXR-015-10LE	**015**	26	22	7	12	5	8	4.3	2.3	9.5 ~ 10.0	14.0	7.0	0.1	4 or more	$10_{-0.1}^{0}$	$8_{-0.07}^{0}$
BXR-020-10LE	**020**	32	28	9	16	8	12	5.0	2.3	9.5 ~ 10.0	14.0	7.0	0.1	4 or more	$14_{-0.1}^{0}$	$12_{-0.07}^{0}$
BXR-025-10LE	**025**	39	33	9	18	8	12	5.5	3.0	9.5 ~ 10.0	14.0	7.0	0.1	4 or more	$14_{-0.1}^{0}$	$12_{-0.07}^{0}$
BXR-035-10LE	**035**	48	42	15	28	14	19	5.5	3.0	9.5 ~ 10.0	14.0	7.0	0.1	4 or more	$23_{-0.1}^{0}$	$19_{-0.07}^{0}$
BXR-040-10LE	**040**	56	50	15	27	14	19	6.5	3.4	9.9 ~ 10.4	14.5	7.4	0.1	4 or more	$23_{-0.1}^{0}$	$19_{-0.07}^{0}$
BXR-050-10LE	**050**	71	65	22	37	20	25	8.0	4.4	14.0 ~ 14.4	19.0	10.5	0.1	4.5 or more	$31_{-0.1}^{0}$	$25_{-0.07}^{0}$

Specifications (Controller)

Model	BEM-24ESN7-120N
Input voltage	24V DC ± 10% smoothing power supply
Output voltage	Initial: 24 V DC (0.2 sec.) Constant: 7 V DC (± 10%), PWM control * When the input voltage is 21 V DC, the output voltage is cut off.
Max. output current	1.0 A DC (ambient temp.: 20° C), 0.8 A DC (ambient temp.: 60° C)
Time rating	Continuous
Insulating resistance	500 V DC, 100 M Ω with Megger (input/output - between terminal and case)
Dielectric strength voltage	1000 V AC, 50/60 Hz, 1 min. (input/output - between terminal and case)
Ambient environment	-20 to 60° C, 5 to 95% RH, no condensation/freezing
Mass	0.02kg

Lead wire	Function	Description	Specification
Red	Input (+)	Connects the 24 V DC smoothing power supply (+)	UL3398 AWG26
Black	Input (−)	Connects the 24 V DC smoothing power supply (-)	UL3398 AWG26
Yellow	Output	Connects the spring-actuated brake (either pole)	UL3398 AWG26
Yellow	Output	Connects the spring-actuated brake (either pole)	UL3398 AWG26

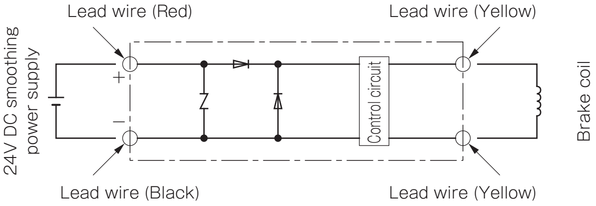
Dimensions (Controller)



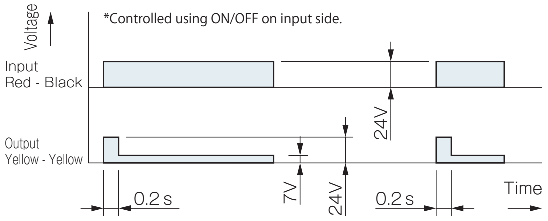
Unit [mm]

*Case：PBT (UL94V-0), Mold: Epoxy (UL94V-0)

Structure (Controller)

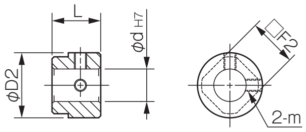


Timing Chart (Controller)



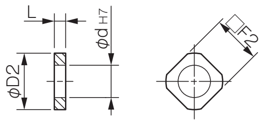
Option (Rotor Hub)

■ Set screw type (C)



Model	Size	L [mm]	D2 [mm]	□F2 [mm]	m Nominal dia.	d[mm]		
						Standard	Min.	Max.
BXR-015-10LE	015	10	10	$8^{0}_{-0.07}$	M2.5	5	4	5
BXR-020-10LE	020	10	14	$12^{0}_{-0.07}$	M3	8	5	8
BXR-025-10LE	025	10	16	$12^{0}_{-0.07}$	M3	8	5	8
BXR-035-10LE	035	12	26	$19^{0}_{-0.07}$	M4	14	8	14
BXR-040-10LE	040	12	26	$19^{0}_{-0.07}$	M4	14	11	14
BXR-050-10LE	050	15	35	$25^{0}_{-0.07}$	M5	20	15	20

■ Press fit type (P)



Model	Size	L [mm]	D2 [mm]	□F2 [mm]	d[mm]		
					Standard	Min.	Max.
BXR-015-10LE	015	4	9.5	$8^{0}_{-0.07}$	5	4	5
BXR-020-10LE	020	4	14	$12^{0}_{-0.07}$	8	5	8
BXR-025-10LE	025	4	14	$12^{0}_{-0.07}$	8	5	8
BXR-035-10LE	035	4	23	$19^{0}_{-0.07}$	14	8	14
BXR-040-10LE	040	4	23	$19^{0}_{-0.07}$	14	11	14
BXR-050-10LE	050	4.5	31	$25^{0}_{-0.07}$	20	15	20

How to Place an Order

BXR-015-10LE-006-C5

Size

Controller set type

Nominal static friction torque
(3-digit number listed in the specifications tables)

Bore diameter (dimension symbol: d)

Option (Rotor Hub)
Blank: No rotor hub
C: Set screw type
P: Press fit type

Items Checked for Design Purposes

Precautions for Handling

■ Brakes

Electromagnetic brakes use many soft materials. Care should be taken during handling as accidentally striking, dropping or applying excessive force to the brake could cause denting or deformation.

■ Lead wires

Be careful not to pull excessively on the brake lead wires, bend them at sharp angles or allow them to hang too low.

■ Friction Surfaces

Since these are dry brakes, they must be used with the friction surfaces dry. Keep water and oil away from the friction surfaces when handling the brakes.

Precautions for Use

■ Environment

These brake units are dry braking systems, meaning that the torque will drop if oil residue, moisture, or other liquids get onto friction surfaces. Attach the protective cover when working in areas with oil, moisture, dust or other particles that could affect the braking system.

■ Operating Temperature

The operating temperature range is -10° C to 40° C for brakes and -20° C to 60° C for dedicated controllers. If you will use the product at other temperatures, consult Miki Pulley.

■ Power Supply Voltage Fluctuations

Full braking performance may not be guaranteed with extreme fluctuations in power supply voltage. Keep the power supply voltage to within ± 10% of the rated voltage.

■ Air Gap Adjustment

BXR LE models do not require air gap adjustment. The brake air gap is adjusted at shipment from the factory.

■ Circuit Protectors

Circuit protectors should not be connected as they are built into the dedicated controllers.

■ Controller Operation

The control function is operated by the ON/OFF switch on the input side, so switching should be carried out by the input side of the dedicated controller.

Precautions for Mounting

■ Affixing the Rotor Hub

In the design, the rotor hub section should be installed such that it does not touch the armature or stator. Also, with the normal installation method of using hexagon-socket set screws coated with adhesive, take care not to trap adhesive between the screws and the rotor hub surface.

■ Bolts and Screws

Implement screw-locking measures such as use of an adhesive thread locking compound to bolts and screws used to install brakes.

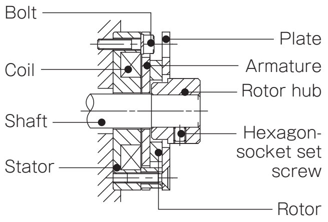
■ Shafts

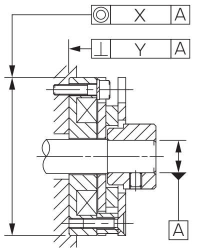
The shaft tolerance should be h7 class (JIS B 0401). If using an optional press-fit type rotor hub, the shaft tolerance should be determined based on the press-fit tolerance.

■ Accuracy of Brake Attachment Surfaces

Make sure that the centering mark and shaft concentricity (X) and the shaft perpendicularity (Y) relative to the brake mounting surface do not exceed the allowable values in the table below.

Model	Size	Concentricity (X)	Perpendicularity (Y)
		T.I.R. [mm]	T.I.R. [mm]
BXR-015-10LE	015	0.05	0.02
BXR-020-10LE	020	0.05	0.02
BXR-025-10LE	025	0.05	0.02
BXR-035-10LE	035	0.05	0.02
BXR-040-10LE	040	0.10	0.02
BXR-050-10LE	050	0.10	0.02





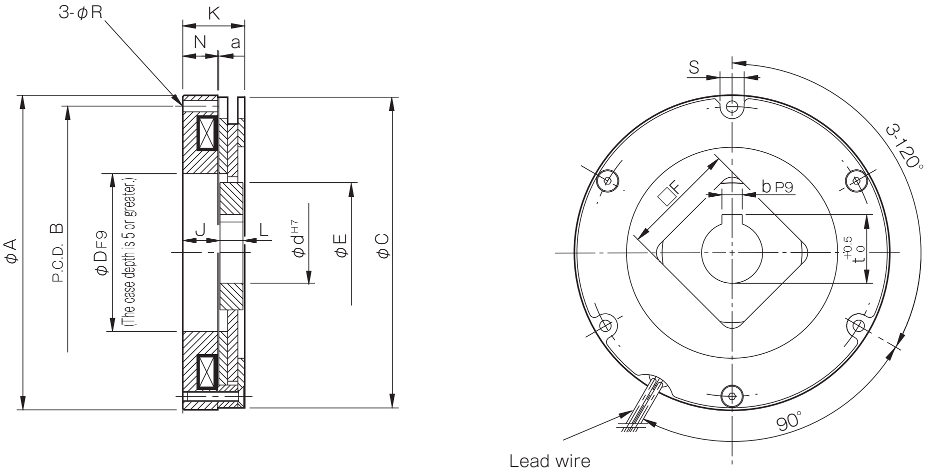
BXR Models Square Hub Type

Specifications (BXR-□-10)

Model	Size	Static friction torque Ts [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed $[min^{-1}]$	Rotating part moment of inertia J $[kg·m^2]$	Allowable braking energy rate Ebaℓ [J]	Total braking energy ET[J]	Armature pull-in time ta [s]	Armature release time tar [s]	Backlash [°]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]									
BXR-06-10-005	06	5	24	17.6	0.73	32.7	F	5000	2.35×10^{-5}	500	2.0×10^{5}	0.050	0.020	1.2	0.9
BXR-08-10-012	08	12	24	19.4	0.81	29.7	F	5000	3.45×10^{-5}	800	2.0×10^{5}	0.080	0.020	1.2	1.2
BXR-10-10-016	10	16	24	21.5	0.90	26.8	F	5000	1.12×10^{-4}	1500	2.2×10^{6}	0.110	0.050	0.9	1.3
BXR-12-10-030	12	30	24	23.7	0.99	24.3	F	5000	1.88×10^{-4}	1500	2.5×10^{6}	0.120	0.030	0.8	2.3
BXR-14-10-038	14	38	24	31.0	1.29	18.6	F	3600	4.22×10^{-4}	1800	3.0×10^{6}	0.120	0.030	0.5	3.0
BXR-16-10-055	16	55	24	19.0	0.79	30.3	F	3600	7.10×10^{-4}	2000	3.0×10^{6}	0.220	0.100	0.5	3.6

* The armature pull-in time and armature release time are taken during DC switching.
* Backlash is the value between the rotor and rotor hub.

Dimension (BXR-□-10)



Lead wire
length: 400
*The lead wire extraction position for size 14° is 60°.

Unit [mm]

Size	Radial direction dimensions								Axial direction dimentions					Bore diameter			
	A	B	C	D	E	F	R	S	J	L	N	K	a	d	b	t	d max
06	83.5	76	82	47	42	35	4.5	9	17.0	7	14.7	25.0	0.10	20	6	22.5	25
08	93.5	85	92	49	42	35	4.5	10	19.0	7	15.7	27.0	0.10	20	6	22.5	25
10	123.5	115	122	62	55	45	4.5	9.5	14.6	9	13.7	24.3	0.10	24	8	27	28
12	137.5	130	136	65	62	50	4.5	12	15.4	9	12.5	25.0	0.15	24	8	27	30
14	167.5	158	166	80	74	60	5.5	12	16.0	9	12.0	25.0	0.15	28	8	31	38
16	185	175	184	100	86	65	5.5	12.5	21.3	11.5	19.4	32.8	0.20	28	8	31	45

How to Place an Order

BXR-14-10-038-24V-28DIN

Size
Voltage
Bore diameter (dimensional symbol d)
Static friction torque [N·m]
(Refer to the Specifications table for details on the three-digit code.)
Shape fitting
10: Square

BXR Models Spline Hub Type

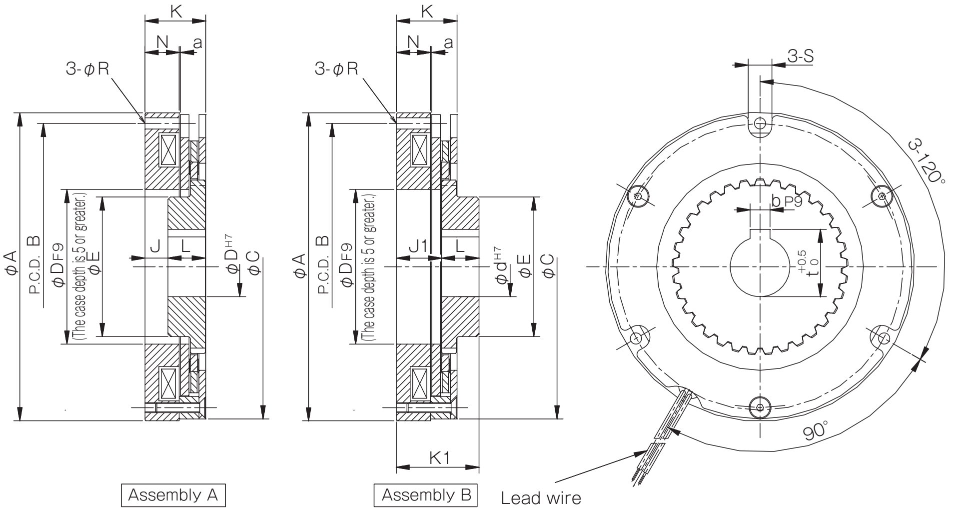
Specifications (BXR- □ -20)

Model	Size	Static friction torque Ts [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]	Allowable braking energy rate Ebaℓ [J]	Total braking energy ET[J]	Armature pull-in time ta [s]	Armature release time tar [s]	Backlash [°]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]									
BXR-06-20-005	06	5	24	17.6	0.73	32.7	F	5000	3.43×10^{-5}	500	2.0×10^{5}	0.050	0.020	0.5	1.0
BXR-08-20-012	08	12	24	19.4	0.81	29.7	F	5000	6.75×10^{-5}	800	2.0×10^{5}	0.080	0.020	0.4	1.3
BXR-10-20-016	10	16	24	21.5	0.90	26.8	F	5000	2.32×10^{-4}	1500	2.2×10^{6}	0.110	0.050	0.3	1.5
BXR-12-20-030	12	30	24	23.7	0.99	24.3	F	5000	3.02×10^{-4}	1500	2.5×10^{6}	0.120	0.030	0.3	2.5
BXR-14-20-038	14	38	24	31.0	1.29	18.6	F	3600	9.41×10^{-4}	1800	3.0×10^{6}	0.120	0.030	0.2	3.4
BXR-16-20-055	16	55	24	19.0	0.79	30.3	F	3600	15.2×10^{-4}	2000	3.0×10^{6}	0.220	0.100	0.2	4.0

* The armature pull-in time and armature release time are taken during DC switching.

* Backlash is the value between the rotor and rotor hub.

Dimension (BXR- □ -20)



Lead wire
length: 400

*The lead wire extraction position for size 14° is 60° .

Unit [mm]

Size	Radial direction dimensions								Axial direction dimentions							Bore diameter			
	A	B	C	D	E	F	R	S	J	J1	L	N	K	K1	a	d	b	t	d max
06	83.5	76	82	47	36	35	4.5	9	10.5	18	12.5	14.7	25.0	30.5	0.10	20	6	22.5	25
08	93.5	85	92	49	42	35	4.5	10	11.5	20	13.5	15.7	27.0	33.5	0.10	20	6	22.5	30
10	123.5	115	122	62	56	45	4.5	9.5	9	18.2	15	13.7	24.3	33.2	0.10	24	8	27	40
12	137.5	130	136	65	61	50	4.5	12	8.8	17.8	15	12.5	25.0	32.8	0.15	24	8	27	45
14	167.5	158	166	80	75	60	5.5	12	7.2	17.2	16	12.0	25.0	33.2	0.15	28	8	31	55
16	185	175	184	100	82	65	5.5	12.5	13.6	24.6	18	19.4	32.7	42.6	0.20	28	8	31	65

How to Place an Order

BXR-14-20-038-24V-28DIN

Size

Voltage

Bore diameter (dimensional symbol d)

Static friction torque [N·m]
(Refer to the Specifications table for details on the three-digit code.)

Shape fitting
20: Spline

BXR Models

Items Checked for Design Purposes

Precautions for Handling

Brakes

Most electromagnetic braking systems are made using flexible materials. Be careful when handling such parts and materials as striking or dropping them or applying excessive force could cause them to become damaged or deformed.

Lead Wires

Be careful not to pull excessively on the brake lead wires, bend them at sharp angles, or allow them to hang too low.

Frictional Surface

Since these are dry brakes, they must be used with the frictional surface dry. Keep water and oil off of the frictional surfaces when handling the brakes.

Precautions for Use

Environment

These brake units are dry braking systems, meaning that the torque will drop if oil residue, moisture, or other liquids get onto friction surfaces. Attach the protective cover when working in areas with oil, moisture, dust, and other particles that could affect the braking system.

Operating Temperature

The operating temperature range is -10° C to 40° C. If you will use the product at other temperatures, consult Miki Pulley.

Power Supplies

BXR models use commercial AC 100 V or 200 V single phase, full-wave rectified. Select as appropriate for your application. See the table, "Recommended power supplies and circuit protectors," for the power supply devices we recommend.

Power Supply Voltage Fluctuations

Full braking performance may not be guaranteed with extreme changes in power supply voltage. Make sure to keep power supply voltage to within ± 10% of the rated voltage value.

Air Gap Adjustment

BXR models do not require air gap adjustment. The brake air gap is adjusted when the braking system is shipped from the factory.

Circuit Protectors

If using a power supply that is not equipped with a circuit protector for DC switching, make sure to connect the recommended circuit protector device in parallel with the brake.

Precautions for Mounting

Affixing the Rotor Hub

Affix the rotor hub to the shaft with bolts, snap rings, or the like such that the rotor hub does not touch the armature or stator. Leave at least dimension J on spline hub types, since the rotor hub may contact the armature.

Bolts and Screws

Implement screw-locking measures such as use of an adhesive thread-locking compound to bolts and screws used to install brakes.

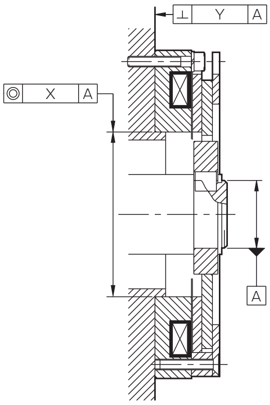
Shafts

The shaft tolerance should be h7 class (JIS B 0401).

Accuracy of Brake Attachment Surfaces

Ensure that the concentricity (X) of the centering mark and shaft and the perpendicularity (Y) of the brake mounting surface and shaft do not exceed allowable values.

Size	Concentricity (X)	Perpendicularity (Y)
	T.I.R. [mm]	T.I.R. [mm]
06	0.3	0.04
08	0.3	0.05
10	0.4	0.05
12	0.4	0.06
14	0.6	0.06
16	0.6	0.07



Recommended Power Supplies and Circuit Protectors

Recommended power supplies

Input AC power	Brake voltage	Rectification method	Brake size	Recommended power supply model
AC100V 50/60Hz	DC24V	Single-phase, full-wave	06,08,10	BES-20-71-1
AC100V 50/60Hz	DC24V	Single-phase, full-wave	12,14,16	BES-20-72-1
AC200V 50/60Hz	DC24V	Single-phase, full-wave	06,08,10	BES-20-71
AC200V 50/60Hz	DC24V	Single-phase, full-wave	12,14,16	BES-20-72

* A DC power supply such as a battery can also be used to supply the 24 V DC required for the brake voltage.

Circuit protector

Brake voltage	Included varistors
DC24V	NVD07SCD082 or an equivalent

* NVD□SCD□ parts are manufactured by KOA Corporation.

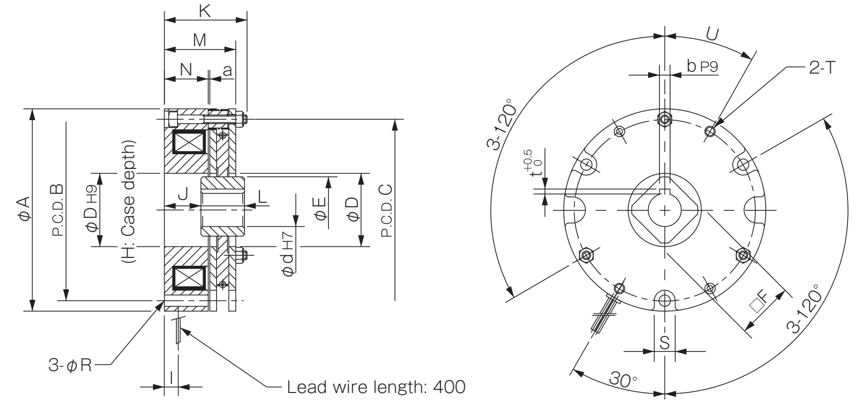
BXL Models

Specifications

Model	Size	Static friction torque Ts [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]	Allowable braking energy rate Pbaℓ [W]	Total braking energy ET [J]	Armature pull-in time ta [s]	Armature release time tar [s]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
BXL-06-10	06	2	DC24	15	0.63	38.4	F	5000	3.75 × 10⁻⁵	58.3	2.0 × 10⁷	0.035	0.020	0.9
			DC45	12	0.27	169	F							
			DC90	12	0.13	677	F							
BXL-08-10	08	4	DC24	23	0.94	25.6	F	5000	6.25 × 10⁻⁵	91.7	3.5 × 10⁷	0.040	0.020	1.3
			DC45	18	0.41	110	F							
			DC90	18	0.21	440	F							
BXL-10-10	10	8	DC24	27	1.14	21.1	F	4000	13.75 × 10⁻⁵	108.3	6.2 × 10⁷	0.050	0.025	2.3
			DC45	25	0.54	83.0	F							
			DC90	25	0.27	331	F							
BXL-12-10	12	16	DC24	35	1.46	16.2	F	3600	33.75 × 10⁻⁵	133.3	9.0 × 10⁷	0.070	0.030	3.4
			DC90	30	0.33	271	F							
BXL-16-10	16	22	DC24	39	1.64	14.6	F	3000	7.35 × 10⁻⁴	183.3	11.4 × 10⁷	0.100	0.035	5.4
			DC90	39	0.43	207	F							

* The armature pull-in time and armature release time are taken during DC switching.
* See the operating characteristics page for the armature pull-in time and release time during AC-side switching (half-wave rectified).

Dimensions



Unit [mm]

Size	A	B	C	D	E	F	H	I	J	K	L	M	N	R	S	T	U	a	d	b	t
06	83	73	73	28	26.5	22	3	10	20.5	39.5	14	33.6	20	4.5	9	2－M5	30°	0.15	11	4	1.5
08	96	86	86	35	32	25	3	12	20	41	17	35	20.8	5.5	10	2－M5	30°	0.15	14	5	2
10	116	104	104	42	38	30	3	9.5	21	47.5	25	41	25.3	6.5	12	2－M6	30°	0.2	19	6	2.5
12	138	124	124	50	45	35	4	12	19	49.8	30	43.5	23.3	6.5	12	2－M6	30°	0.2	24	8	3
16	158	142	143	59	55	45	4	14	22.5	57.5	35	51	27.7	9	15	2－M8	40°	0.25	28	8	3

How to Place an Order

BXL-06-10G 24V 11DIN

Size
Option number
10: Standard
Bore diameter (dimensional symbol d)
Voltage (Specifications table)

*Contact Miki Pulley for assistance with bore diameters, d, not listed in the Dimensions tales and voltages not listed in the Specifications table.

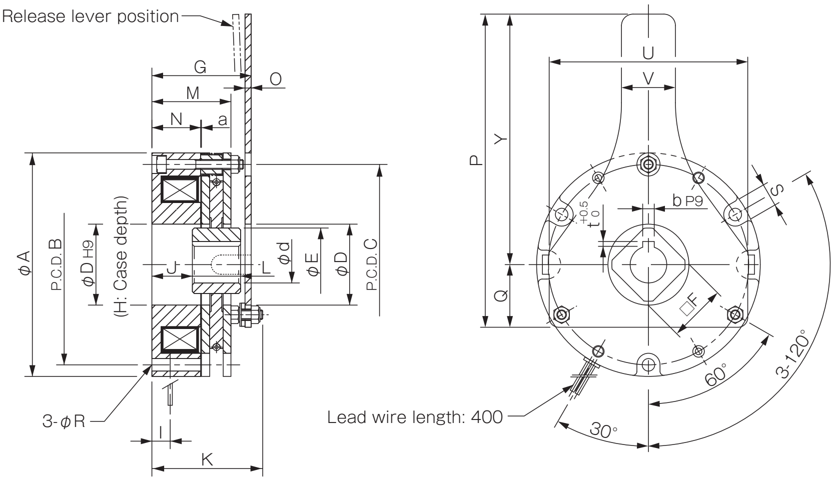
Option

Made to Order

Release Lever

Option No.: 12

In addition to the manual release tap of the standard product, we also offer an optional manual release lever. See the dimensions table below for the dimensions of brakes with release levers. Other specifications are the same as the standard specifications.



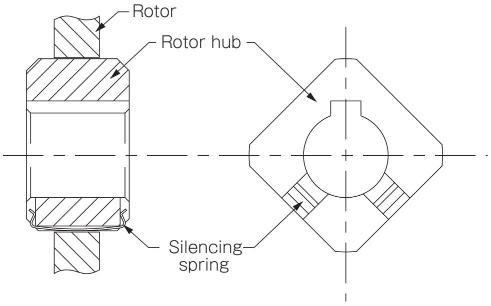
Unit [mm]

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Y	U	V	S	a	d	b	t
BXL-06-12	83	73	73	28	26.5	22	42.4	3	10	20.5	49.5	14	33.7	20	2.6	88	24	4.5	64	73	16	9	0.15	11	4	1.5
BXL-08-12	96	86	86	35	32	25	44	3	12	20	51	17	35	20.8	2.9	122	27	5.5	95	85	20	10	0.15	14	5	2
BXL-10-12	116	104	104	42	38	30	51.2	3	9.5	21	57.5	25	41	25.3	3.2	162.5	32.5	6.5	130	103	28	12	0.2	19	6	2.5
BXL-12-12	138	124	124	50	45	35	56.4	4	12	19	64.8	30	43.5	23.3	5	200	40	6.5	160	121	36	12	0.2	24	8	3
BXL-16-12	158	142	143	59	55	45	64.9	4	14	22.5	72.5	35	51	27.7	6	230	44	9	186	140	36	15	0.25	28	8	3

Quiet Mechanism (Silencing Spring)

Option No.: S1

There is a extremely small structural backlash (see figure on the right) between the rotor and the rotor hub. In applications that are prone to microvibrations of the drive shaft such as single-phase motors, this backlash may produce rattling (banging). The silencing spring for the rotor hub reduces this rattling.



Quiet Mechanism (Pull-in Noise Reduction Mechanism)

Option No.: S2

When the brake is energized, a magnetic circuit is formed, and the armature is pulled to the stator by that magnetic force. At that time, the armature touches the magnetic pole of the stator and a noise is produced. This sound (pull-in noise) is reduced by putting shock absorbing material in the stator's magnetic pole part.

In option S2, in addition to the pull-in noise reduction mechanism, the silencing spring (option S1) is also supplemented.

List of Option Numbers

Description of options	No quiet mechanism	Silencing spring	Silencing spring + Pull-in noise reduction mechanism
No release lever	10	10S1	10S2
Has release lever	12	12S1	12S2

* Option 10 uses standard specifications.

BXL-06-12S1G 24V 11DIN

Option no.

BXL Models

Items Checked for Design Purposes

Precautions for Handling

Brakes

Most electromagnetic braking systems are made using flexible materials. Be careful when handling such parts and materials as striking or dropping them or applying excessive force could cause them to become damaged or deformed.

Lead Wires

Be careful not to pull excessively on the brake lead wires, bend them at sharp angles, or allow them to hang too low.

Precautions for Mounting

Affixing the Rotor Hub

Affix the rotor hub to the shaft with bolts, snap rings, or the like such that the rotor hub does not touch the armature or stator.

Bolts and Screws

Implement screw-locking measures such as use of an adhesive thread-locking compound to bolts and screws used to install brakes.

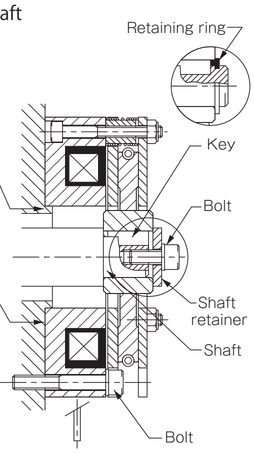
Shafts

The shaft tolerance should be h6 or js6 class (JIS B 0401).

Accuracy of Brake Attachment Surfaces

Ensure that the concentricity of the centering mark and shaft and the perpendicularity of the brake mounting surface and shaft do not exceed the following allowable values.

- Concentricity of centering mark and shaft
  - BXL-06: 0.4 T.I.R. or below
  - BXL-08: 0.4 T.I.R. or below
  - BXL-10: 0.4 T.I.R. or below
  - BXL-12: 0.6 T.I.R. or below
  - BXL-16: 0.6 T.I.R. or below
- Perpendicularity of stator mounting surface
  - BXL-06: 0.04 T.I.R. or below
  - BXL-08: 0.05 T.I.R. or below
  - BXL-10: 0.05 T.I.R. or below
  - BXL-12: 0.06 T.I.R. or below
  - BXL-16: 0.07 T.I.R. or below



Precautions for Use

■ Environment

These brake units are dry braking systems, meaning that the torque will drop if oil residue, moisture, or other liquids get onto friction surfaces. Attach the protective cover when working in areas with oil, moisture, dust, and other particles that could affect the braking system.

■ Power Supply Voltage Fluctuations

Full braking performance may not be guaranteed with extreme changes in power supply voltage. Make sure to keep power supply voltage to within ± 10% of the rated voltage value.

■ Operating Temperature

The operating temperature is -10° C to 40° C (no freezing or condensation). If you will use the product at other temperatures, consult Miki Pulley.

■ Manual Release

BXL models can be released manually.

Alternately tighten screws in two or three of the tap holes on the plate to press the armature.

The screw tips will push against the armature and release it with about a 90° rotation. Do not force the screws in more than that.

■ Air Gap Adjustment

BXL models do not require air gap adjustment. The brake air gap is adjusted when the braking system is shipped from the factory. When first used, no gap adjustment is needed, so do not rotate the nut.

■ Initial Torque

The torque may be lower than the indicated value at initial use. In such cases, run it to break in the frictional surface before use.

■ Circuit Protectors

If using a power supply that is not equipped with a circuit protector for DC switching, make sure to connect the recommended circuit protector device in parallel with the brake.

Recommended Power Supplies and Circuit Protectors

Recommended power supplies

Input AC power	Brake voltage	Rectification method	Brake size	Recommended power supply model
AC100V 50/60Hz	DC24V	Single-phase, full-wave	06,08,10	BES-20-71-1
AC100V 50/60Hz	DC24V	Single-phase, full-wave	12,16	BES-20-72-1
AC100V 50/60Hz	DC45V	Single-phase, half-wave	06,08,10	BEW-1R
AC100V 50/60Hz	DC90V	Single-phase, full-wave	06,08,10,12,16	BEW-1R
AC200V 50/60Hz	DC24V	Single-phase, full-wave	06,08,10	BES-20-71
AC200V 50/60Hz	DC24V	Single-phase, full-wave	12,16	BES-20-72
AC200V 50/60Hz	DC90V	Single-phase, half-wave	06,08,10,12,16	BEW-2R
AC200V 50/60Hz	DC90V	Single-phase, half-wave	06,08,10,12,16	BEW-2R

* A DC power supply such as a battery can also be used to supply the 24 V DC required for the brake voltage.

Recommended circuit protectors

Input voltage	Brake voltage	Rectification method	Recommended circuit protector (varistor)
DC24V	DC24V	—	NVD07SCD082 or an equivalent
AC100V 50/60Hz	DC45V	Single-phase, half-wave	NVD07SCD220 or an equivalent
AC100V 50/60Hz	DC90V	Single-phase, full-wave	NVD07SCD220 or an equivalent
AC200V 50/60Hz	DC90V	Single-phase, half-wave	NVD07SCD470 or an equivalent

* NVD□SCD□ parts are manufactured by KOA Corporation.
* DC24V indicates a product recommended with a stepdown transformer or the like.

Included varistors

Brake voltage	Included varistors
DC24V	NVD07SCD082 or an equivalent
DC45V	No varistor provided
DC90V	No varistor provided

BXH Models

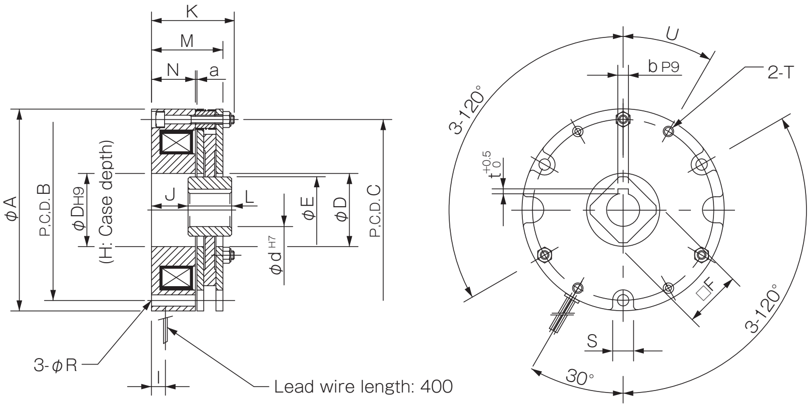
Specifications

Model	Size	Static friction torque T_s [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg·m²]	Allowable braking energy rate $E_{ba\ell}$ [J]	Total braking energy E_T [J]	Armature pull-in time t_a [s]	Armature release time t_{ar} [s]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
BXH-06-10	06	4	DC24	15	0.63	38.4	F	5000	3.25×10^{-5}	700	2.0×10^6	0.040	0.020	0.9
			DC45	12	0.27	169	F							
			DC90	12	0.13	677	F							
BXH-08-10	08	8	DC24	23	0.94	25.6	F	5000	5.75×10^{-5}	1100	3.5×10^6	0.045	0.020	1.3
			DC45	18	0.41	110	F							
			DC90	18	0.21	440	F							
BXH-10-10	10	16	DC24	27	1.14	21.1	F	4000	1.30×10^{-4}	1300	6.2×10^6	0.070	0.025	2.3
			DC45	25	0.54	83	F							
			DC90	25	0.27	331	F							
BXH-12-10	12	32	DC24	35	1.46	16.2	F	3600	3.20×10^{-4}	1600	9.0×10^6	0.090	0.025	3.4
			DC90	30	0.33	271	F							
BXH-16-10	16	44	DC24	39	1.64	14.6	F	3000	6.93×10^{-4}	2200	11.4×10^6	0.125	0.030	5.4
			DC90	39	0.43	207	F							

* The armature pull-in time and armature release time are taken during DC switching.

* See the operating characteristics page for the armature pull-in time and release time during AC-side switching (half-wave rectified).

Dimensions



Unit [mm]

Size	A	B	C	D	E	F	H	I	J	K	L	M	N	R	S	T	U	a	d	b	t
06	83	73	73	28	26.5	22	3	10	20.5	39.5	14	33.6	20	4.5	9	2 — M5	30°	0.15	11	4	1.5
08	96	86	86	35	32	25	3	12	20	41	17	35	20.8	5.5	10	2 — M5	30°	0.15	14	5	2
10	116	104	104	42	38	30	3	9.5	21	47.5	25	41	25.3	6.5	12	2 — M6	30°	0.2	19	6	2.5
12	138	124	124	50	45	35	4	12	19	49.8	30	43.5	23.3	6.5	12	2 — M6	30°	0.2	24	8	3
16	158	142	143	59	55	45	4	14	22.5	57.5	35	51	27.7	9	15	2 — M8	40°	0.25	28	8	3

How to Place an Order

BXH-06-10G 24V 11DIN

Size
Option number
10: Standard
Bore diameter (dimensional symbol d)
Voltage (Specifications table)

*Contact Miki Pulley for assistance with bore diameters, d, not listed in the Dimensions tales and voltages not listed in the Specifications table.

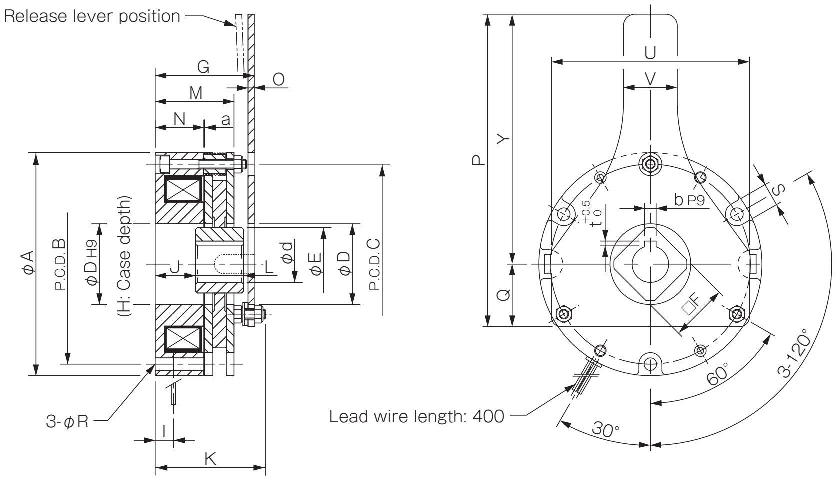
Option

Made to Order

Release Lever

Option No.: 12

In addition to the manual release tap of the standard product, we also offer an optional manual release lever. See the dimensions table below for the dimensions of brakes with release levers. Other specifications are the same as the standard specifications.



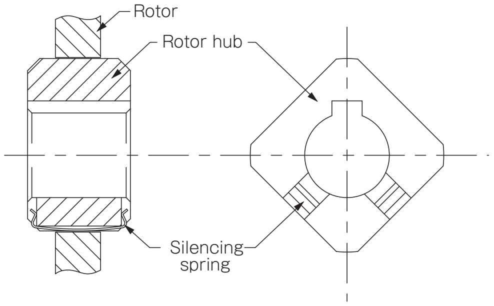
Unit [mm]

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Y	U	V	S	a	d	b	t
BXH-06-12	83	73	73	28	26.5	22	42.8	3	10	20.5	49.5	14	33.7	20	2.6	105	24	4.5	81	73	20	9	0.15	11	4	1.5
BXH-08-12	96	86	86	35	32	25	45.4	3	12	20	56	17	35.3	20.8	4	122	27	5.5	95	85	20	10	0.2	14	5	2
BXH-10-12	116	104	104	42	38	30	53.9	3	9.5	21	63	25	42.2	25.3	4.5	162.5	32.5	6.5	130	103	28	12	0.25	19	6	2.5
BXH-12-12	138	124	124	50	45	35	58.3	4	12	19	70	30	45.4	23.3	5	200	40	6.5	160	121	36	12	0.25	24	8	3
BXH-16-12	158	142	143	59	55	45	66.5	4	14	22.5	72.5	35	53.3	27.7	6	230	44	9	186	140	36	15	0.25	28	8	3

Quiet Mechanism (Silencing Spring)

Option No.: S1

There is a extremely small structural backlash (see figure on the right) between the rotor and the rotor hub. In applications that are prone to microvibrations of the drive shaft such as single-phase motors, this backlash may produce rattling (banging). The silencing spring for the rotor hub reduces this rattling.



List of Option Numbers

Description of options	No quiet mechanism	With silencing spring
No release lever	10	10S1
Has release lever	12	12S1

* Option 10 uses standard specifications.

BXH-06-12S1G 24V 11DIN

Option no.

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES
ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES
ELECTROMAGNETIC CLUTCH & BRAKE UNITS
SPRING-ACTUATED BRAKE
ELECTROMAGNETIC TOOTH CLUTCHES
BRAKE MOTORS
POWER SUPPLIES
MODELS
BXW
BXR
BXL
BXH
BXL-N

BXH Models

Items Checked for Design Purposes

Precautions for Handling

■ Brakes

Most electromagnetic braking systems are made using flexible materials. Be careful when handling such parts and materials as striking or dropping them or applying excessive force could cause them to become damaged or deformed.

■ Lead Wires

Be careful not to pull excessively on the brake lead wires, bend them at sharp angles, or allow them to hang too low.

Precautions for Mounting

■ Affixing the Rotor Hub

Affix the rotor hub to the shaft with bolts, snap rings, or the like such that the rotor hub does not touch the armature or stator.

■ Bolts and Screws

Implement screw-locking measures such as use of an adhesive thread-locking compound to bolts and screws used to install brakes.

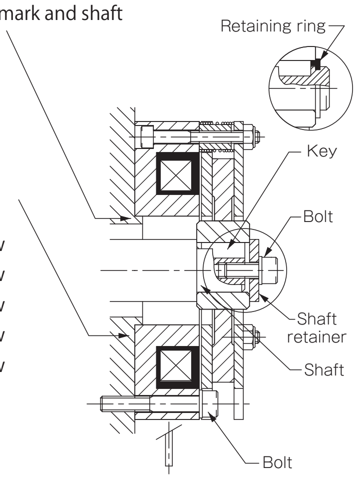
■ Shafts

The shaft tolerance should be h6 or js6 class (JIS B 0401).

■ Accuracy of Brake Attachment Surfaces

Ensure that the concentricity of the centering mark and shaft and the perpendicularity of the brake mounting surface and shaft do not exceed the following allowable values.

- Concentricity of centering mark and shaft
  BXH-06: 0.4 T.I.R. or below
  BXH-08: 0.4 T.I.R. or below
  BXH-10: 0.4 T.I.R. or below
  BXH-12: 0.6 T.I.R. or below
  BXH-16: 0.6 T.I.R. or below
- Perpendicularity of stator mounting surface
  BXH-06: 0.04 T.I.R. or below
  BXH-08: 0.05 T.I.R. or below
  BXH-10: 0.05 T.I.R. or below
  BXH-12: 0.06 T.I.R. or below
  BXH-16: 0.07 T.I.R. or below



Precautions for Use

Dedicated for Holding

These brakes are dedicated holding brakes. Do not use them for ordinary braking, except for emergency braking in the event of a power outage or the like.

Environment

These brake units are dry braking systems, meaning that the torque will drop if oil residue, moisture, or other liquids get onto friction surfaces. Attach the protective cover when working in areas with oil, moisture, dust, and other particles that could affect the braking system.

Power Supply Voltage Fluctuations

Full braking performance may not be guaranteed with extreme changes in power supply voltage. Make sure to keep power supply voltage to within ± 10% of the rated voltage value.

Operating Temperature

The operating temperature is -10°C to 40°C (no freezing or condensation). If you will use the product at other temperatures, consult Miki Pulley.

Manual Release

BXH models can be released manually.

Alternately tighten screws in two or three of the tap holes on the plate to press the armature.

The screw tips will push against the armature and release it with about a 90° rotation. Do not force the screws in more than that.

Air Gap Adjustment

BXH models do not require air gap adjustment. The brake air gap is adjusted when the braking system is shipped from the factory. When first used, no gap adjustment is needed, so do not rotate the nut.

Circuit Protectors

If using a power supply that is not equipped with a circuit protector for DC switching, make sure to connect the recommended circuit protector device in parallel with the brake.

Recommended Power Supplies and Circuit Protectors

Recommended power supplies

Input AC power	Brake voltage	Rectification method	Brake size	Recommended power supply model
AC100V 50/60Hz	DC24V	Single-phase, full-wave	06,08,10	BES-20-71-1
AC100V 50/60Hz	DC24V	Single-phase, full-wave	12,16	BES-20-72-1
AC100V 50/60Hz	DC45V	Single-phase, half-wave	06,08,10	BEW-1R
AC100V 50/60Hz	DC90V	Single-phase, full-wave	06,08,10,12,16	BEW-1R
AC200V 50/60Hz	DC24V	Single-phase, full-wave	06,08,10	BES-20-71
AC200V 50/60Hz	DC24V	Single-phase, full-wave	12,16	BES-20-72
AC200V 50/60Hz	DC90V	Single-phase, half-wave	06,08,10,12,16	BEW-2R
AC200V 50/60Hz	DC90V	Single-phase, half-wave	06,08,10,12,16	BEW-2R

* A DC power supply such as a battery can also be used to supply the 24 V DC required for the brake voltage.

Recommended circuit protectors

Input voltage	Brake voltage	Rectification method	Recommended circuit protector (varistor)
DC24V	DC24V	—	NVD07SCD082 or an equivalent
AC100V 50/60Hz	DC45V	Single-phase, half-wave	NVD07SCD220 or an equivalent
AC100V 50/60Hz	DC90V	Single-phase, full-wave	NVD07SCD220 or an equivalent
AC200V 50/60Hz	DC90V	Single-phase, half-wave	NVD07SCD470 or an equivalent

* NVD□SCD□ parts are manufactured by KOA Corporation.
* DC24V indicates a product recommended with a stepdown transformer or the like.

Included varistors

Brake voltage	Included varistors
DC24V	NVD07SCD082 or an equivalent
DC45V	No varistor provided
DC90V	No varistor provided

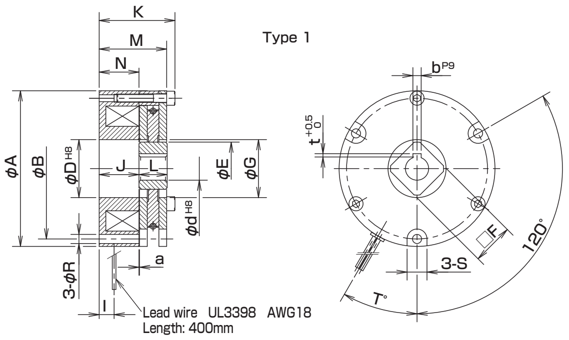
BXL-N Models

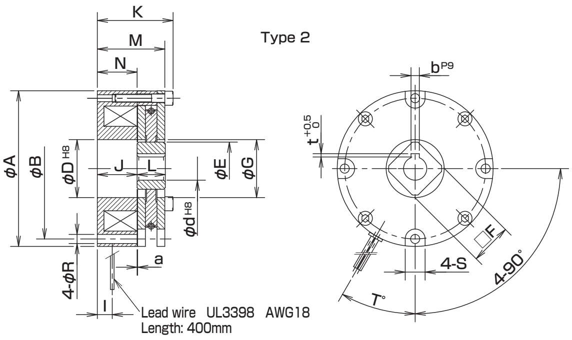
Specifications

Model	Size	Static friction torque Ts[N・m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min⁻¹]	Rotating part moment of inertia J [kg・m²]	Allowable braking energy rate Pbal [W]	Total braking energy ET [J]	Armature pull-in time ta [s]	Armature release time tar [s]	Applicable motor output (Reference) Four poles [kW]	Mass [kg]
			Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]									
BXL-08-10N-002	08	2	24	19.0	0.793	30.3	F	3600	6.3×10^{-5}	60.0	5.0×10^{7}	0.030	0.050	0.1/0.2	1.4
			99	19.0	0.192	515.8	F								
			171	19.0	0.111	1539	F								
BXL-08-10N-004	08	4	24	19.0	0.793	30.3	F	3600	6.3×10^{-5}	60.0	5.0×10^{7}	0.040	0.040	0.4	1.4
			99	19.0	0.192	515.8	F								
			171	19.0	0.111	1539	F								
BXL-10-10N-008	10	8	24	28.0	1.166	20.6	F	3600	13.8×10^{-5}	70.0	8.0×10^{7}	0.050	0.050	0.75	2.7
			99	28.0	0.283	350.0	F								
			171	28.0	0.164	1044	F								
BXL-10-10N-015	10	15	24	28.0	1.166	20.6	F	3600	13.8×10^{-5}	70.0	8.0×10^{7}	0.070	0.030	1.5	2.7
			99	28.0	0.283	350.0	F								
			171	28.0	0.164	1044	F								
BXL-12-10N-022	12	22	24	35.0	1.460	16.4	F	3600	33.8×10^{-5}	90.0	12.0×10^{7}	0.080	0.060	2.2	4.7
			99	35.0	0.353	280.1	F								
			171	35.0	0.205	835.5	F								
BXL-12-10N-030	12	30	24	35.0	1.460	16.4	F	3600	33.8×10^{-5}	90.0	12.0×10^{7}	0.100	0.030	3.0	4.7
			99	35.0	0.353	280.1	F								
			171	35.0	0.205	835.5	F								
BXL-16-10N-040	16	40	24	42.0	1.753	13.7	F	1800	73.5×10^{-5}	120.0	16.0×10^{7}	0.100	0.070	3.7	6.3
			99	42.0	0.424	233.3	F								
			171	42.0	0.246	696.1	F								
BXL-16-10N-060	16	60	24	55.0	2.294	10.5	F	1800	74.6×10^{-5}	150.0	16.0×10^{7}	0.100	0.050	5.5	6.7
			99	55.0	0.556	178.1	F								
			171	55.0	0.322	531.6	F								
BXL-16-10N-080	16	80	24	55.0	2.294	10.5	F	1800	74.6×10^{-5}	150.0	16.0×10^{7}	0.100	0.030	7.5	6.7
			99	55.0	0.556	178.1	F								
			171	55.0	0.322	531.6	F								

*The armature pull-in time and armature release time are taken during DC switching.

Dimensions





Unit [mm]

Model	Type	A	B	D	E	F	G	l	J	K	L	M	N	R	S	T	a	d	b	t
BXL-08-10N-002	1	94	85	35	32	25	35	9	24	45.7	17	40.7	24	5.5	12	30	0.3	11	4	1.5
BXL-08-10N-004	1	94	85	35	32	25	35	9	24	45.7	17	40.7	24	5.5	12	30	0.3	14	5	2
BXL-10-10N-008	1	124	110	40	38	30	42	10	22	48.7	25	42.7	26	6.5	12	30	0.3	18	6	2.5
BXL-10-10N-015	1	124	110	40	38	30	42	10	22	48.7	25	42.7	26	6.5	12	30	0.3	20	6	2.5
BXL-12-10N-022	1	150	130	49	45	35	50	18	25	57.1	30	51.1	29	6.5	14	30	0.3	24	8	3
BXL-12-10N-030	1	150	130	49	45	35	50	18	25	57.1	30	51.1	29	6.5	14	30	0.3	24	8	3
BXL-16-10N-040	1	165	150	62	55	45	62	18	24	63.1	35	55.1	28	9	15	30	0.3	28	8	3
BXL-16-10N-060	2	165	150	64	61	50	64	20	29	68.1	35	60.1	33	9	15	15	0.3	37	10	3.5
BXL-16-10N-080	2	165	150	64	61	50	64	20	29	68.1	35	60.1	33	9	15	15	0.3	37	10	3.5

How to Place an Order

BXL-08-10N-004-24V-11

Size

Static torque (refer to the specifications table)

Bore diameter (dimensional symbol d)

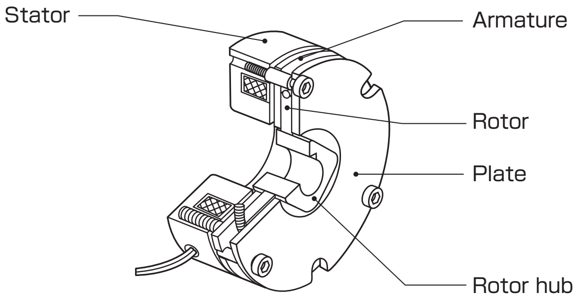
Voltage (refer to the specifications table)

* Contact Miki Pulley for assistance with bore diameters, d, not listed in the Dimensions tales and voltages not listed in the Specifications table.

Option

Plate Installation

Standard installation is performed using stator installation, but a plate installation specification is also available as an option. Please contact Miki Pulley for assistance if desiring to use plate installation.



Quiet Mechanism

There is a slight backlash between the rotor and the rotor hub. The armature may also strike the surface of the magnetic poles on the stator when electricity flows, generating a noise. There is a quiet mechanism available that works to suppress such clattering noises as well as operating noise. Please contact Miki Pulley for details.

Items Checked for Design Purposes

Precautions for Handling

Brakes

Most electromagnetic braking systems are made using flexible materials. Be careful when handling such parts and materials as striking or dropping them or applying excessive force could cause them to become damaged or deformed.

Lead Wires

Be careful not to pull excessively on the brake lead wires, bend them at sharp angles, or allow them to hang too low.

Frictional Surface

Since these are dry brakes, they must be used with the frictional surface dry. Keep water and oil off of the frictional surfaces when handling the brakes.

Precautions for Use

Environment

These brake units are dry braking systems, meaning that the torque will drop if oil residue, moisture, or other liquids get onto friction surfaces. Attach the protective cover when working in areas with oil, moisture, dust, and other particles that could affect the braking system.

Operating Temperature

The operating temperature is from 0℃ to 40℃ (no freezing or condensation). If you will use the product at other temperatures, consult Miki Pulley.

Power Supplies

BXL-N models use commercial AC 220 V or 380 V single phase, half-wave rectified. Select as appropriate for your application.

Power Supply Voltage Fluctuations

Full braking performance may not be guaranteed with extreme changes in power supply voltage. Make sure to keep power supply voltage to within ±10% of the rated voltage value.

Air Gap Adjustment

BXL-N models do not require air gap adjustment. The brake air gap is adjusted when the braking system is shipped from the factory.

Circuit Protectors

If using a power supply for separate DC switching, make sure to connect the recommended circuit protector device in parallel with the brake.

Precautions for Mounting

Precautions for Mounting

Use a bolt or snap ring to lock the rotor hub onto the shaft.

Shaft

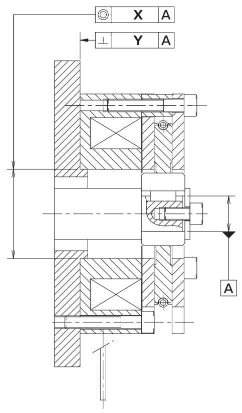
The shaft tolerance should be h7 class (JIS B 0401).

Bolts and Screws

Implement screw-locking measures such as use of an adhesive thread-locking compound to bolts and screws used to install brakes.

Accuracy of Brake Attachment Surfaces

Ensure that the concentricity (X) of the centering mark and shaft and the perpendicularity (Y) of the brake mounting surface and shaft do not exceed allowable values.



Allowable concentricity and perpendicularity values for the BXL-N Models

Size	Concentricity (X)	Perpendicularity (Y)
	T.I.R. [mm]	T.I.R. [mm]
08	0.4	0.05
10	0.4	0.05
12	0.6	0.05
16	0.6	0.05

Recommended Power Supplies and Circuit Protectors

Model	Rectification method	Frequency [Hz]	Input AC voltage [V]	DC output voltage *1 [V]	Recommended circuit protectors *2 (Varistor)
BEM-2T	Single-phase, half-wave	50/60	AC220	DC99	NVD07SCD220 or an equivalent
BEM-4T	Single-phase, half-wave	50/60	AC380	DC171	NVD14SCD820 or an equivalent

*1 The values given are for when there is electricity flowing to the brake coil.
*2 NVD□SCD□ parts are manufactured by KOA Corporation.

Selection Procedure for Brakes for Braking

1 Consideration of Required Torque to Brake Loads

To select the appropriate brake size, you must find the torque required for braking T, and then select a size of brake that delivers a greater torque than T.

- **Consideration of cases when load conditions are not clearly known**

  When load conditions are unclear, assuming that the motor has been selected correctly for the load, the approximate torque can be obtained from the motor output using the following equation.

$$T_M = \frac{9550 \times P}{n_r} \times \eta \ [\mathrm{N \cdot m}]$$

P: Motor output [kW]
n_r: Brake shaft rotation speed [min^{-1}]
η : Transmission efficiency from motor to brake

- **Consideration when load conditions can be clearly ascertained**

  When load conditions can be clearly ascertained, the torque T required for braking can be found using the following equation.

$$T = \left(\frac{J \times n}{9.55 \times t_{ab}} \pm T_\ell \right) \times K \ [\mathrm{N \cdot m}]$$

J: Total moment of inertia of load side [$\mathrm{kg \cdot m^2}$]
n: Rotation speed [min^{-1}]
t_{ab}: Actual braking time [s]
T_ℓ: Load torque [N•m]
K: Safety factor (see table below)

The sign of load torque T_ℓ is minus when the load works in the direction that assists braking and plus when it works in the direction that hinders braking. The actual braking time t_{ab} is the time required from the start of braking torque generation until braking is complete. When this is not clearly known at the selection stage, a guideline value is used that factors in service life and the like.

Load state	Factor
Low-inertia/low-frequency constant load	1.5
Ordinary use with normal inertia	2
High-inertia/high-frequency load fluctuation	3

2 Provisional Size Selection

Select a brake of a size for which the torque T found in the equation of step 1 satisfies the following equation.

A brake of a size for which torque T found from the equations above satisfies the following equation must be selected.

$$T_b > T \ (\text{or } T_M) \ [\mathrm{N \cdot m}]$$

T_b: Brake torque [N•m]

* For brake torque, treat T_s as equaling T_b. (T_s: Static friction torque from specifications table)

3 Consideration of Energy

When the load required for braking is sufficiently small, the size can be selected considering only torque T as described above. Given the effects of heat generated by braking, however, the following equation must be used to confirm that the operation frequency per unit time and the total number of operations (service life) meet the required specifications.

Use the following equation to find the energy E_b required for a single braking operation.

$$E_b = \frac{J \times n^2}{182} \times \frac{T_b}{T_b \pm T_\ell} \ [\mathrm{J}]$$

The sign of load torque T_ℓ is plus when the load works in the direction that assists braking and minus when it works in the direction that hinders braking.

- **Confirm the frequency S of operations that can be performed per minute**

  Find the frequency of operations that can be performed per minute using the equation at right to confirm that the desired operation frequency is sufficiently smaller than the value found.

$$S = \frac{60 \times P_{ba\ell}}{E_b} \ [\text{times/min}]$$

$P_{ba\ell}$: Allowable braking energy rate [W]
E_b : Energy required for one braking operation [J]

- **Confirm the total number of operations (service life)**

  Find the total number of operations (service life) using the equation at right, and then check that it meets the desired service life.

$$L = \frac{E_T}{E_b} \ [\text{times}]$$

E_T: Total braking energy [J]

4 Consideration of Braking Time

When there are limits on the time required to decelerate or stop the load, use the equation at right to confirm that the total braking time t_{tb} satisfies requirements.

$$t_{tb} = t_{id} + t_{ar} + t_{ab}$$

t_{ar}: Armature release time [s]
t_{id}: Initial delay time [s]

Here, actual braking time t_{ab} is the time from the start of braking torque generation to the completion of braking. Find it with the following equation.

$$t_{ab} = \frac{J \times n}{9.55 \times (T_b \pm T_\ell)} \ [\mathrm{s}]$$

The sign of load torque T_ℓ is plus when the load works in the direction that assists braking and minus when it works in the direction that hinders braking.

5 Consideration of Stopping Precision

To confirm stopping precision, find the stopping angle (rotation) using the following equation.

$$\theta = 6 \times n \times \left(t_{id} + t_{ar} + \frac{1}{2} t_{ab} \right) \ [^\circ]$$

t_{ar}: Armature release time [s]
t_{id}: Initial delay time [s]

The variation in stopping precision--i.e., stopping precision $\varDelta\theta$ --can be found empirically with the following equation and used as a guide.

$$\varDelta\theta = \pm 0.15 \times \theta \ [^\circ]$$

Selection Procedure for Brakes for Holding

1

Consideration of Required Torque to Hold Loads

Use the following equation to find the torque T required to hold a load while stationary.

$$T=T_{\ell\ \max}\times K\ [\mathrm{N{\bullet}m}]$$

$T_{\ell\ \max}$: Max. load torque [N•m]
K: Safety factor (see table at right)

Load state	Factor
Low inertia/small load fluctuations	1.5
Ordinary use with normal inertia	2
High inertia/large load fluctuations	3

2

Provisional Selection of Size

A brake of a size for which torque T found from the equations above satisfies the following equation must be selected.

$$T_s>T\ [\mathrm{N{\bullet}m}]$$

T_s: Static friction torque of brake [N•m]

3

Consideration of Energy

When considering a brake with the objective of holding loads, braking is limited to emergency braking.
Use the following equation to find the braking energy E_b for a single operation required for emergency braking. You must confirm that this result is sufficiently smaller than the allowable braking energy $E_{ba\ell}$ of the selected brake.

$$E_b=\frac{J\times n^2}{182}\times\frac{T_b}{T_b\pm T_\ell}\ [\mathrm{J}]$$

J: Total moment of inertia on load side [kg·m²]
n: Rotation speed [min⁻¹]
T_b: Brake torque [N·m]
$T_{\ell\ \max}$: Max. load torque [N•m]

The sign of maximum load torque $T_{\ell\ \max}$ is plus when the load works in the direction that assists braking and minus when it works in the direction that hinders braking.

$$E_b\ll E_{ba\ell}\ [\mathrm{J}]$$

When using brakes for both holding and braking and the specification is indicated by allowable braking energy rate $P_{ba\ell}$, check under the following conditions.

$$E_b\ll 60\times P_{ba\ell}\ [\mathrm{J}]$$

4

Consideration of Number of Operations

The total number of braking operations (service life) when performing emergency braking L must be found using the following equation to confirm that required specifications are satisfied.

$$L=\frac{E_T}{E_b}\ [\mathrm{times}]$$

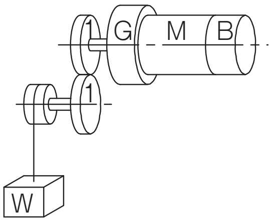
E_T: Total braking energy [J]

Note that the frequency of emergency braking will also vary with operating environment; however, it should be about once per minute or better. When the braking energy of a single operation E_b is 70% or more of the allowable braking energy $E_{ba\ell}$, however, allow the brake to cool sufficiently after emergency braking before resuming use.

BXW/BXR/BXL/BXH Models

Selection Example 1

Braking Brakes Used in Raising Loads



Selection of a brake to brake the load is as follows, as the above figure illustrates.

Motor (brake shaft) rotation speed	n	1800 [min^{-1}]
Load shaft rotation speed	n_1	60 [min^{-1}]
Moment of inertia of motor-side gear	J_1	1.5×10^{-2} [kg•m^2]
Moment of inertia of load-side gear	J_2	1.5×10^{-2} [kg•m^2]
Moment of inertia of load-side drum	J_3	4.30 [kg·m^2]
Moment of inertia of motor with speed reducer	J_M	6×10^{-3} [kg•m^2]
Moment of inertia of load	J_A	15.67 [kg·m^2]
Load-side torque	T	62.5 [N•m]
Number of braking operations of brake	L	53,000 cycles or more
Brake operating frequency	S	0.1 [cycles/min]

* The number of braking operations and operation frequency treat one ascending operation and one descending operation together as one cycle.

* The number of braking operations of the brake is treated as 6 (operations/h) × 8 (h/day) × 365 (days/year) × 3 (years).

Consideration of Torque

The torque required for braking is calculated from the above specifications, compared to the dynamic friction torque in the catalog, and the appropriate brake size is selected.

- Calculating the inertial moment converted to brake shaft inertial moment J_B
  We use the following equation to calculate the moment of inertia converted to the brake shaft (motor shaft) moment of inertia J_B[kg•m^2]. Here, R represents the ratio of the motor rotation speed to the load shaft rotation speed.

$$J_B = J_M + (J_1 + J_2 + J_3 + J_A) \times R^2 \ [\mathrm{kg \cdot m^2}]$$

$$J_B = 6\times10^{-3} + (1.5\times10^{-2} + 1.5\times10^{-2} + 4.30 + 15.67) \times (60/1800)^2 \fallingdotseq 2.8\times10^{-2} [\mathrm{kg \cdot m^2}]$$

- Calculating the load torque converted to brake shaft load torque T_ℓ
  We use the following equation to calculate the load torque converted to the brake shaft (motor shaft) load torque T_ℓ [N•m]. However, η indicates the transmission efficiency, which is 0.85 in this selection.

$$T_\ell = R \times T/\eta \ [\mathrm{N \cdot m}]$$

$$T_\ell = 60/1800 \times 62.5/0.85 \fallingdotseq 2.45 \ [\mathrm{N \cdot m}]$$

- Calculating the torque required for braking T
  Use the following equation to calculate the torque required for braking T [N•m].
  Here, the conditions are set as follows.

* The guideline for actual braking time t_{ab} is 2.0 [s].

* The sign of load torque T_R is minus when ascending because the load works in the direction that assists braking and plus when descending because the load works in the direction that hinders braking.

* Select a safety factor K of 3.0, based on operating conditions.

Ascending

$$T_{up} = \left(\frac{J_B \times n}{9.55 \times t_{ab}} - T_\ell \right) \times K$$

$$T_{up} = \left(\frac{2.8\times10^{-2}\times1800}{9.55\times2.0} - 2.45 \right) \times 3.0 \fallingdotseq 0.57 \, [\mathrm{N \cdot m}]$$

Descending

$$T_{DOWN} = \left(\frac{J_B \times n}{9.55 \times t_{ab}} + T_\ell \right) \times K$$

$$T_{DOWN} = \left(\frac{2.8\times10^{-2}\times1800}{9.55\times2.0} + 2.45 \right) \times 3.0 \fallingdotseq 15.3 \, [\mathrm{N \cdot m}]$$

Since the result of the above shows that required torque is 15.3 [N•m], check the specifications in the catalog and select size 12 (dynamic friction torque of 16.0 [N•m]) of the BXL models of brakes for braking.

■ Consideration of Energy

Confirm that the brake selected based on required torque satisfies the required specifications for number of braking operations and braking frequency.

- Calculating the total moment of inertia J
  Adding the inertial moment converted to brake shaft inertial moment J_B that was just calculated to the inertial moment of the rotating parts of the provisionally selected BXL-12 (catalog value of 33.75 × 10^{-5}), we arrive at the total moment of inertia.

$$J=2.8\times10^{-2}+33.75\times10^{-5}$$
$$\fallingdotseq2.83\times10^{-2}[\mathrm{kg\cdot m^2}]$$

- Calculating the amount of energy required for one braking operation E_b
  The calculated total moment of inertia is used to calculate the energy required by a single braking operation. Here, the sign of load torque T_ℓ is plus when ascending because the load works in the direction that assists braking and minus when descending because the load works in the direction that hinders braking.

Ascending

$$E_{bup}=\frac{J\times n^2}{182}\times\frac{T_b}{T_b+T_\ell}$$

$$E_{bup}=\frac{2.83\times10^{-2}\times1800^2}{182}\times\frac{16.0}{16.0+2.45}$$

$$\fallingdotseq437\,[\mathrm{J}]$$

Descending

$$E_{bDOWN}=\frac{J\times n^2}{182}\times\frac{T_b}{T_b-T_\ell}$$

$$E_{bDOWN}=\frac{2.83\times10^{-2}\times1800^2}{182}\times\frac{16.0}{16.0-2.45}$$

$$\fallingdotseq595\,[\mathrm{J}]$$

- Confirm the frequency S of operations that can be performed per minute
  Substitute the energy required for a single braking E_b calculated above and the allowable braking energy rate $P_{ba\ell}$ for the BXL-12 (catalog value 133.3 W) into the following equation and calculate the frequency S of operations that can be performed per minute.

Ascending

$$S_{up}=\frac{60\times P_{ba\ell}}{E_{bup}}$$

$$S_{up}=\frac{60\times133.3}{437}$$

$$\fallingdotseq18.3\,[\mathrm{times/min.}]$$

Descending

$$S_{DOWN}=\frac{60\times P_{ba\ell}}{E_{bDOWN}}$$

$$S_{DOWN}=\frac{60\times133.3}{595}$$

$$\fallingdotseq13.4\,[\mathrm{times/min.}]$$

The desired operation frequency is sufficiently smaller than the calculated operation frequency, so the specification is satisfied. Note that the braking energy rate (catalog value) used in the calculation is the value under ideal conditions, so the desired operation frequency needs to be sufficiently small.

$$13.4\,[\mathrm{times/min.}]\gg0.1\,[\mathrm{times/min.}]$$

- Calculating the total number of operations (service life)
  Substituting in the just-calculated energy required for a single braking E_b and the BXL-12 total frictional energy E_T (catalog value of 9.0 × 10^7 [J]), we arrive at the total number of operations L.

If the energy of a single cycle of ascending and descending E_b is:

$$E_b=E_{bup}+E_{bDOWN}$$
$$E_b=1032\,[\mathrm{J}]$$

The total number of operations L is:

$$L=\frac{E_T}{E_b}$$

$$L=\frac{9.0\times10^7}{1032}$$

$$\fallingdotseq87209\,[\mathrm{cycles}]$$

The desired total number of operations is fewer than the calculated total number of operations (service life), so the specification is satisfied.

$$87{,}209\,[\mathrm{cycles}]>53{,}000\,[\mathrm{cycles}]$$

■ Consideration of Braking Time

Total braking time t_{tb} is calculated as the sum of actual braking time t_{ab}, armature release time t_{ar}, and the initial delay time from start of command input to start of operating input t_{id}.

Here, the actual braking time is expected to be greater in the descending direction, so only the case of descending is considered. The sign of the load torque T_ℓ is minus, since it is in the direction that impedes braking.

$$t_{ab}=\frac{J\times n}{9.55\times(T_b-T_\ell)}$$

$$t_{ab}=\frac{2.83\times10^{-2}\times1800}{9.55\times(16.0-2.45)}$$

$$\fallingdotseq0.39[\mathrm{s}]$$

Here, the armature release time t_{ar} of the BXL-12 from the catalog is 0.03 [s]. The initial delay time t_{id} is the delay of the operation of relays and the like, so we use 0.025 [s], the typical relay operation time. Thus, the total braking time t_{tb} is:

$$t_{tb}=0.025+0.030+0.39$$
$$\fallingdotseq0.445\,[\mathrm{s}]$$

■ Consideration of Stopping Precision

When stopping precision (stopping distance) is restricted, calculate stopping precision using the following equations.

$$\theta=6\times n\times(t_{id}+t_{ar}+1/2\times t_{ab})$$
$$=2700[^\circ\ ]$$

The variation in stopping precision--i.e., stopping precision ⊿θ --can be found empirically with the following equation and used as a guide.

$$\varDelta\theta=\pm0.15\times\theta$$
$$=\pm405[^\circ\ ]$$

This angle is the angle at the brake shaft, so when the stopping precision θ max is 2700 + 405 = 3105 [°] and the drum diameter D_d is 0.5 [m], the braking distance B_d of load W is:

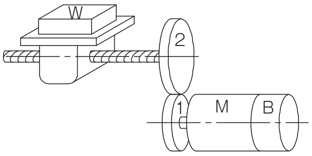
$$B_d=\theta\max/360\times R\times\pi\times D_d$$
$$=(3105/360)\times(60/1800)\times\pi\times0.5$$
$$=0.45[\mathrm{m}]$$

If there is no problem with the braking time and stopping precision, BXL-12 can be selected.

BXW/BXR/BXL/BXH Models

Selection Example 2

Holding Brakes Used in Ball Screw Drive of Loads



Selection of a brake to brake the load is as follows, as the above figure illustrates.

Motor (brake shaft) rotation speed	n	1800 [min^{-1}]
Load shaft rotation speed	n_l	900 [min^{-1}]
Moment of inertia of motor	J_M	0.001 [kg·m^2]
Mass of load	M	500 [kg]
Lead of feed screw	P	0.01 [m]
Shaft diameter of feed screw	D	0.05 [m]
Length of feed screw	l	1 [m]
Friction coefficient of feed screw	μ	0.2

■ Consideration of Torque

The torque required for holding is calculated from the specifications at left, compared to the static friction torque in the catalog, and the appropriate brake size is selected.

- Calculating load torque converted to brake shaft load torque T_ℓ
  Use the following equation to calculate the load torque T_ℓ [N•m]. Here, there is no external force F [N•m], gravitational acceleration g [m/s^2] is 9.8 [m/s^2], R is the ratio of motor rotation speed to load shaft rotation speed, and η is transmission efficiency, which in this selection is 0.85.

$$T_\ell = R \times 1/2\pi \times P \times (F + \mu M_g) / \eta \ [\text{N}\cdot\text{m}]$$

$$T_\ell = (900/1800) \times 1/2\pi \times 0.01 \times (0 + 0.2 \times 500 \times 9.8) / 0.85$$

$$\fallingdotseq 0.92 [\text{N}\cdot\text{m}]$$

- Calculating the required holding torque T
  Use the following equation to calculate the required holding torque T. Here, safety factor K is 2.

$$T = T_\ell \times K [\text{N}\cdot\text{m}]$$
$$T = 0.92 \times 2$$

$$\fallingdotseq 1.84 [\text{N}\cdot\text{m}]$$

Since the result of the above shows that required torque is 1.84 [N•m], check the specifications in the catalog and select size 06 (static friction torque of 4.0 [N•m]) of the BXH models of brakes for holding.

■ Consideration of Energy During Emergency Braking

Brakes selected based on required holding torque are designed primarily for holding, so their braking operations are limited to emergency braking and the like. It is therefore necessary to check that the braking energy per braking operation E_b during emergency braking does not exceed the allowable braking energy $E_{ba\ell}$.

- Calculating the moment of inertia of feed screws

Given a feed screw whose shaft has a length of 1 [m], diameter of 0.05 [m], and specific gravity of 7.8, the feed screw moment of inertia J_A [kg•m^2] is:

$$J_A = \frac{1}{8} \times M \times D^2$$

$$= \frac{1}{8} \times (0.025^2 \times \pi \times 1 \times 7.8 \times 1000) \times 0.05^2$$

$$≒ 0.0048 [\text{kg}・\text{m}^2]$$

- Calculating the moment of inertia of a linearly moving object

Use the following equation to calculate the moment of inertia Jx [kg•m^2] of a linearly moving object.

$$J_X = J_A + \frac{M \cdot P^2}{4\pi^2}$$

$$= 0.0048 + \frac{500 \times 0.01^2}{4 \times \pi^2}$$

$$≒ 6.1 \times 10^{-3} [\text{kg}・\text{m}^2]$$

- Calculating the total inertial moment converted to brake shaft inertial moment

The moment of inertia Jx [kg•m^2] of a linearly moving object found above is added to the moment of inertia of the rotating parts of the provisionally selected BXH-06 (catalog value of 3.25 × 10^{-5} kg•m^2) and the motor's moment of inertia J_M [kg•m^2] to calculate the total moment of inertia. Here, R represents the ratio of the motor rotation speed to the load shaft rotation speed.

$$J = J_x \times R^2 + J_M + J_B [\text{kg}・\text{m}^2]$$

$$= 6.1 \times 10^{-3} \times \left(\frac{1}{2}\right)^2 + 0.001 + 3.25 \times 10^{-5}$$

$$= 2.56 \times 10^{-3} [\text{kg}・\text{m}^2]$$

- Consideration of energy

We calculate the braking energy per braking Eb required for emergency braking using the following equation. Here, the brake torque T_b [N•m] is the catalog value of 4.0 [N•m] and the sign of the load torque T_ℓ is plus, since it works in the direction that assists braking.

$$E_b = \frac{J \cdot n^2}{182} \times \frac{T_b}{T_b + T_\ell}$$

$$E_b = \frac{2.56 \times 10^{-3} \times 1800^2}{182} + \frac{4.0}{4.0 + 0.92}$$

$$≒ 37.1 [\text{J}]$$

Since the calculated braking energy E_b does not exceed the BXH-06's allowable braking energy $E_{ba\ell}$ (catalog value of 700 [J]), the specification is satisfied.

$$37.1 [\text{J}] < 700 [\text{J}]$$

■ Consideration of Number of Operations

The total number of braking operations (service life) L when doing emergency braking can be found using the following equation. Here, the BXH-06's total braking energy E_T is the catalog value of 2.0 × 10^6 [J].

$$L = \frac{E_T}{E_b}$$

$$L = \frac{2.0 \times 10^6}{37.1}$$

$$≒ 53908 [\text{times}]$$

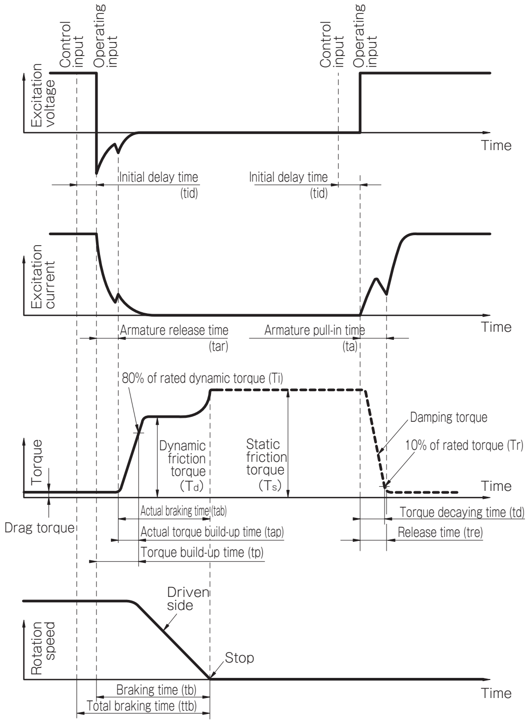
With these specifications, BXH-06 can be selected.

Note that the frequency of emergency braking has a major impact on service life, so it should be about once per minute or better.

BXW/BXR/BXL/BXH Models

Operating Characteristics

Operating Time



t_{ar}: Armature release time

The time from when current shuts off until the armature returns to its position prior to being pulled in and torque begins to be generated

t_{ap}: Actual torque build-up time

The time from when torque first begins to be generated until it reaches 80% of rated torque

t_p: Torque build-up time

The time from when current flow is shut off until torque reaches 80% of rated torque

t_a: Armature pull-in time

The time from when current flow first starts until the armature is pulled in and torque disappears

t_{id}: Initial delay time

The time from start of command input to actuation input or release input to the main brake body

BXW Models

Unit [s]

Type	Voltage	Size	Switching	t_{ar}	t_a
L type (Braking use)	12V	01	DC side	0.015	0.008
	24V	02		0.015	0.008
	45V	03		0.025	0.025
	90V	04		0.030	0.030
	180V	05		0.035	0.035
H type (Holding and braking use)	12V	01	DC side	0.010	0.010
	24V	02		0.010	0.010
	45V	03		0.020	0.035
	90V	04		0.025	0.040
	180V	05		0.030	0.045
S type (Holding use)	24V	01	DC side	0.010	0.025
		02		0.010	0.030
		03		0.020	0.035
		04		0.025	0.040
		05		0.030	0.045
R type (For servo motors)	24V	01	DC side	0.020	0.035
		03		0.020	0.050
		05		0.020	0.060

BXR LE Models（Holding use）

Unit [s]

Voltage	Size	Switching	t_{ar}	t_a
24V	015	DC side	0.020	0.020
	020		0.020	0.035
	025		0.020	0.035
	035		0.020	0.050
	040		0.020	0.060
	050		0.020	0.060

BXR Models (Holding use)

Unit [s]

Voltage	Size	Switching	t_{ar}	t_a
24V	06	DC side	0.02	0.05
	08		0.02	0.08
	10		0.05	0.11
	12		0.03	0.12
	14		0.03	0.12
	16		0.10	0.22

BXL Models (Braking use)

Unit [s]

Voltage	Size	Switching	t_{ar}	t_{ap}	t_p	t_a
24V 45V 90V	06	DC side	0.020	0.015	0.035	0.035
	08		0.020	0.015	0.035	0.040
	10		0.025	0.020	0.045	0.050
	12		0.030	0.025	0.055	0.070
	16		0.035	0.030	0.065	0.100
45V 90V	06	AC side	0.110	0.035	0.145	0.035
	08		0.110	0.040	0.150	0.040
	10		0.150	0.060	0.210	0.050
	12		0.180	0.095	0.275	0.070
	16		0.180	0.100	0.280	0.100

BXH Models (Holding use)

Unit [s]

Voltage	Size	Switching	t_{ar}	t_a
24V 45V 90V	06	DC side	0.020	0.040
	08		0.020	0.045
	10		0.025	0.070
	12		0.025	0.090
	16		0.030	0.125
45V 90V	06	AC side	0.070	0.040
	08		0.080	0.045
	10		0.090	0.070
	12		0.120	0.090
	16		0.140	0.125

BXL-N Models (Braking use)

Unit [s]

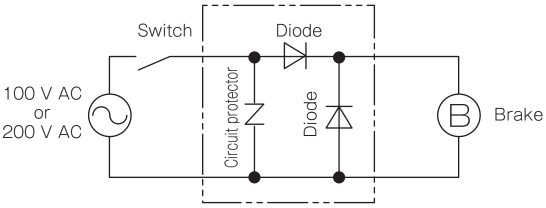
Voltage	Size	Switching	t_{ar}	t_a
24V 99V 171V	08-10N-002	DC side	0.050	0.030
	08-10N-004		0.040	0.040
	10-10N-008		0.050	0.050
	10-10N-015		0.030	0.070
	12-10N-022		0.060	0.080
	12-10N-030		0.030	0.100
	16-10N-040		0.070	0.100
	16-10N-060		0.050	0.100
	16-10N-080		0.030	0.100

Control Circuits

45 V, 90 V, and 96 V Specifications for BXW, BXR, BXL, and BXH Models (Single-phase Half-wave Rectified)

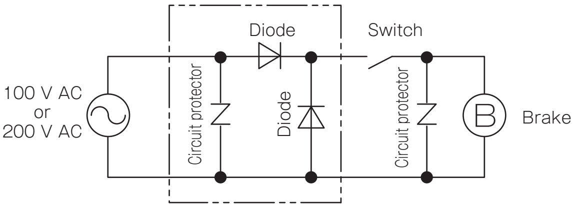
■ AC-side Switching

This is the usual switching method. Connection is simple.



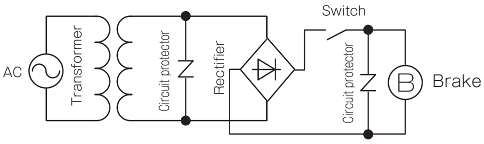
■ DC-side Switching

This method achieves even faster operational characteristics than AC-side switching.



12 V and 24 V Specifications for BXW, BXR, BXL, and BXH Models (Single-phase Full-wave Rectified)

■ DC-side Switching



■ Circuit Protectors

If using a power supply that is not equipped with a circuit protector for DC switching, make sure to connect the recommended circuit protector device in parallel with the brake. However, with some circuit protectors, operation times may lengthen. In such cases, we recommend use of varistors.

Select varistors from the following table based on brake size and AC voltage before rectification.

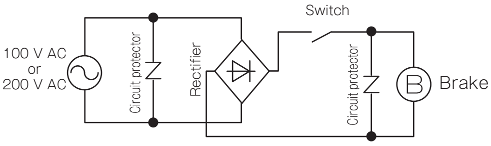
Note that the 24 V specifications of BXL and BXH as well as all BXR models are supplied with varistors. See Included varistors for each model.

Brake size	Pre-rectification voltage [V]	Recommended varistor model
01 ～ 18	AC 30 or below	NVD07SCD082 or an equivalent
	Over AC 30 to AC 110 or below	NVD07SCD220 or an equivalent
	Over AC 110 to AC 220 or below	NVD07SCD470 or an equivalent
	Over AC 220 to AC 460 or below	NVD14SCD820 or an equivalent
20 ～ 25	AC 30 or below	NVD14SCD082 or an equivalent
	Over AC 30 to AC 110 or below	NVD14SCD220 or an equivalent
	Over AC 110 to AC 220 or below	NVD14SCD470 or an equivalent
	Over AC 220 to AC 460 or below	NVD14SCD820 or an equivalent

* NVD□SCD□ parts are manufactured by KOA Corporation.

90 V, 96 V, 180 V, and 190 V Specifications for BXW Models (Single-phase Full-wave Rectified)

■ DC-side Switching

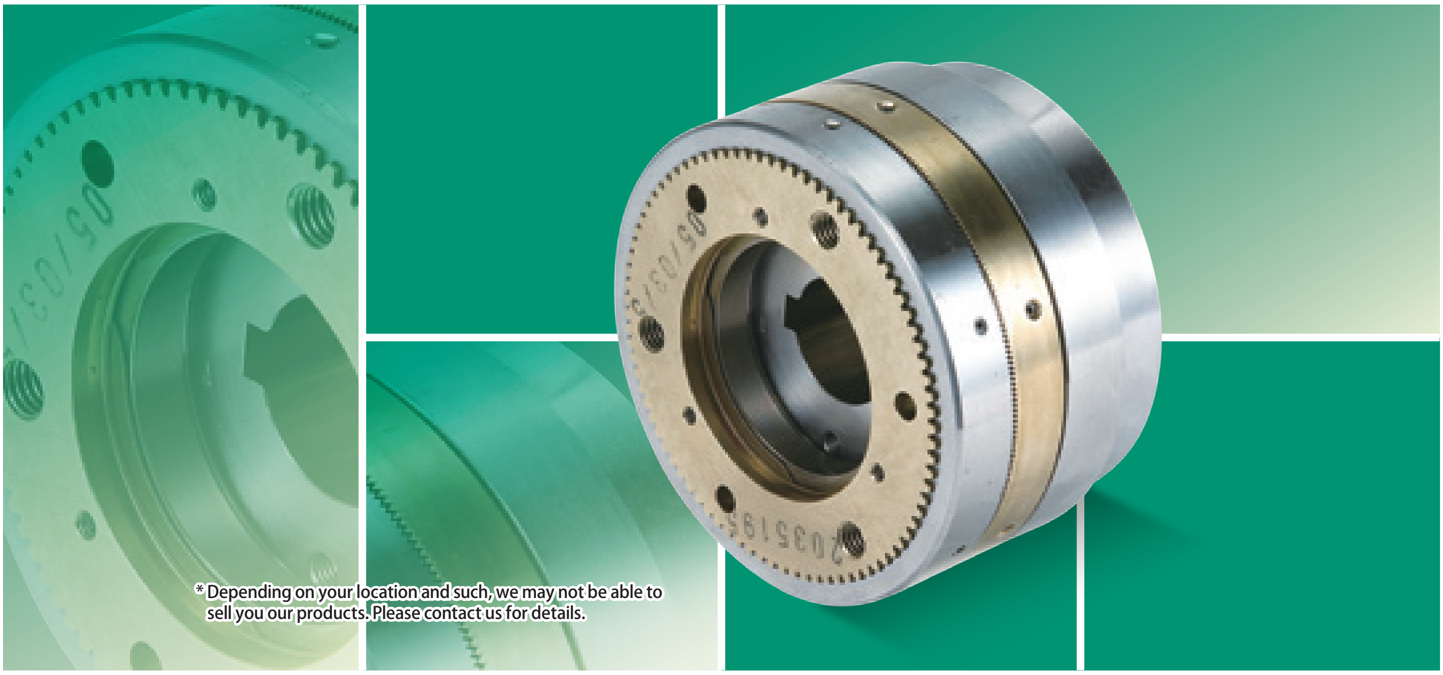


ELECTROMAGNETIC TOOTH CLUTCHES

Application Printing machinery, wrapping machinery, filling machinery, food machinery, medical machinery

Meshing-type Electromagnetic-actuated Clutch Has High Torque and Reliable Transmission

These electromagnetic tooth clutches are electromagnetic-actuated clutches of the type that transmit torque by engaging tooth. Since torque is transmitted by engaging tooth, these clutches can transmit very high torque with a compact size (five to ten times our dry-type single discs). They may be either full position, which engage everywhere around their circumference, or single position, which engage at a set position, engaging in only one location per revolution. The shape of the tooth tip may be either symmetrical or sawtooth. Symmetrical tips can be used in any rotation direction, while sawtooth tips are faster than symmetrical tips and can engage at higher speeds.



* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Compact, high torque

Since torque is transmitted by the meshing of the tooth, high torque transmission can be achieved with a compact form factor.

No drag torque

Since the tooth do not form a magnetic circuit, engagement and release can be faster, and there is no drag torque.

Easy mounting

Bearings are built in, so there is no centering of stator and rotor.

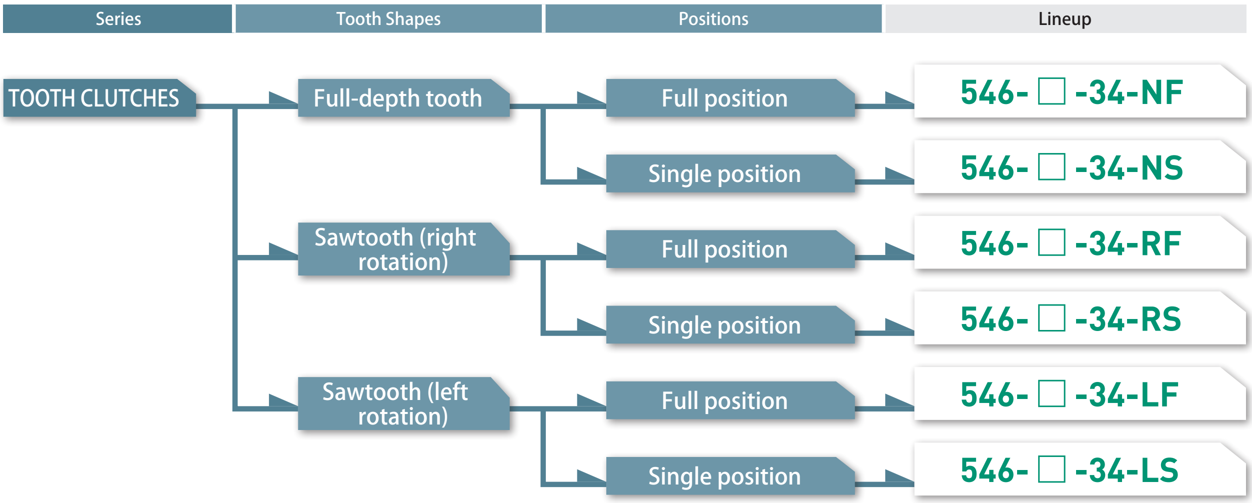
Can be used in oily environments

Can be used in oily environments under some usage conditions.

Special position engagement

Special tooth shapes can be made that mesh at multiple locations.

Available Models



Tooth Shape/Construction

Full-depth Tooth

By far the most common tooth shape, it can be used rotating in either direction.

Sawtooth

These have fewer tooth that the full-depth tooth type, and have a smaller angle of mesh insertion. They can thus engage at a relatively higher speed than full-depth tooth.

Full Position

A common tooth shape that can mesh anywhere around the full circumference.

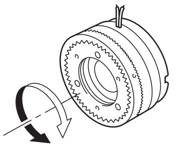
Single Position

This tooth shape is for fixed position engagement, where only one location meshes per revolution.

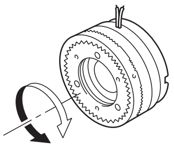
Name of tooth shape	NF	NS	RF	RS	LF	LS
Type of tooth shape	Full-depth tooth	Full-depth tooth	Sawtooth	Sawtooth	Sawtooth	Sawtooth
Position	Full	Single	Full	Single	Full	Single
Rotational direction	Both	Both	Right	Right	Left	Left

* The reference point for rotation direction (rotor) is the direction as seen from the adapter plate. With armature input, the rotation direction is as stated. Note that with shaft input, the direction is the opposite.
Example: To get right rotation at shaft input, use a left-rotating sawtooth (L).

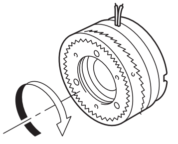
[NF]
Full-depth tooth,
full-position



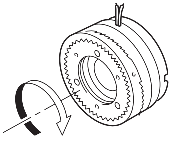
[NS]
Full-depth tooth,
single-position



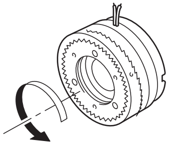
[RF]
Right-handed
rotating sawtooth,
full-position

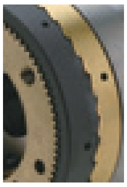


[RS]
Right-handed
rotating sawtooth,
single-position

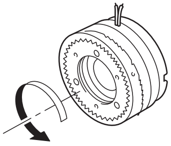


[LF]
Left-handed
rotating sawtooth,
full-position





[LS]
Left-handed
rotating sawtooth,
single-position



546 Models

Specifications

Model	Size	Torque [N·m]	Coil (at 20℃)				Heat resistance class	Allowable rotation speed of engagement [min⁻¹]			Max. rotation speed [min⁻¹]	Moment of inertia J [kg·m²]		Number of teeth		Armature pull-in time ta [s]	Armature release time tar [s]	Mass [kg]
			Exciting voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]		NF	NS	Sawtooth		Rotor	Armature	Full-depth tooth, Full	Sawtooth, Full			
546-12-34	12	17.5	DC24	13.3	0.55	44.0	F	50	30	100	1500	6.6×10^{-5}	6.0×10^{-5}	200	25	0.035	0.040	0.5
546-13-34	13	25	DC24	18.7	0.78	31.0	F	50	30	100	1500	1.5×10^{-4}	1.2×10^{-4}	220	30	0.040	0.050	0.9
546-15-34	15	50	DC24	21.3	0.89	27.1	F	50	30	100	1500	3.7×10^{-4}	3.7×10^{-4}	260	36	0.060	0.060	1.5
546-21-34	21	100	DC24	27.0	1.13	21.0	F	50	30	100	1500	8.7×10^{-4}	5.2×10^{-4}	290	36	0.080	0.070	2.4
546-23-34	23	250	DC24	36.2	1.51	15.9	F	50	30	100	1500	2.06×10^{-3}	1.85×10^{-3}	280	38	0.090	0.080	3.9
546-25-34	25	500	DC24	56.6	2.36	10.2	F	50	30	100	1500	4.88×10^{-3}	4.51×10^{-3}	250	40	0.100	0.090	6.8
546-31-34	31	1000	DC24	79.7	3.32	7.2	F	50	30	100	1500	1.12×10^{-2}	1.28×10^{-2}	195	40	0.110	0.110	11.1
546-32-34	32	2200	DC24	114.0	4.75	5.1	F	50	30	100	1500	2.87×10^{-2}	2.92×10^{-2}	186	40	0.120	0.130	15.3

* The armature pull-in and release times are reference values under no load in a stationary state. They are generally longer depending on the size of the load and the operating state when engaged.
* The allowable rotation speeds of engagement NF and NS indicate, respectively, full-depth tooth/full position and full-depth tooth/single position.

Dimensions

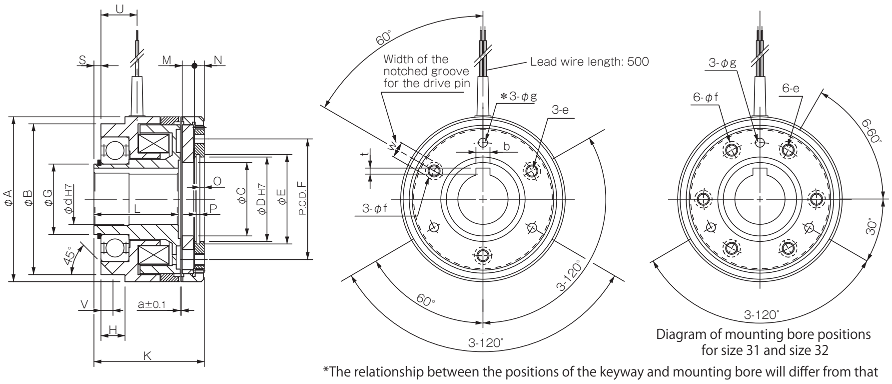


Diagram of mounting bore positions for size 31 and size 32

*The relationship between the positions of the keyway and mounting bore will differ from that shown in the diagram while the parts are fitted together.
*The dimension φg marked with [*] does not apply for size 12.

Unit [mm]

Size	Shaft bore dimensions				
	d H7	Models compliant with the new JIS standards		Models compliant with the old JIS standards	
		b P9	t $^{+0.5}_{0}$	b E9	t $^{+0.5}_{0}$
12	10	$3^{-0.006}_{-0.031}$	1.2	$4^{+0.05}_{+0.02}$	1.5
13	15	$5^{-0.012}_{-0.042}$	2	$5^{+0.05}_{+0.02}$	2
15	20	$6^{-0.012}_{-0.042}$	2.5	$5^{+0.05}_{+0.02}$	2
	25	$8^{-0.015}_{-0.051}$	3	$7^{+0.061}_{+0.025}$	3
21	25	$8^{-0.015}_{-0.051}$	3	$7^{+0.061}_{+0.025}$	3
	30	$8^{-0.015}_{-0.051}$	3	$7^{+0.061}_{+0.025}$	3
23	30	$8^{-0.015}_{-0.051}$	3	$7^{+0.061}_{+0.025}$	3
	40	$12^{-0.018}_{-0.061}$	3	$10^{+0.061}_{+0.025}$	3.5
25	40	$12^{-0.018}_{-0.061}$	3	$10^{+0.061}_{+0.025}$	3.5
	50	$14^{-0.018}_{-0.061}$	3.5	$12^{+0.075}_{+0.032}$	3.5
31	50	$14^{-0.018}_{-0.061}$	3.5	$12^{+0.075}_{+0.032}$	3.5
	60	$18^{-0.018}_{-0.061}$	4	$15^{+0.075}_{+0.032}$	5
32	60	$18^{-0.018}_{-0.061}$	4	$15^{+0.075}_{+0.032}$	5
	70	$20^{-0.022}_{-0.074}$	4.5	$18^{+0.075}_{+0.032}$	6

Unit [mm]

Model	Radial direction dimensions										Axial direction dimensions											
	A	B	C	D	E	F	G	e	f	g	H	K	L	M	N	O	P	S	U	V	W	a
546-12-34	57	52	22.5	26	27.2	36	20	M4	8.5	—	10	43	34	4.3	3.1	1.3	1.3	2.0	15	4.5	5	0.2
546-13-34	67	58	31	32	33.7	46	25	M5	8.5	4.5	11	49	39	4.9	3.5	1.4	1.3	2.5	16.5	5	6	0.3
546-15-34	82	75	36.5	42	44.5	60	35	M6	10	4.5	12	55	42	6.1	4.8	2.2	1.9	3.5	18	6	8	0.3
546-21-34	95	88	46	52	55	70	45	M8	12	5.5	14	63	45	8.7	6.0	2.8	2.2	3.0	20	6	10	0.4
546-23-34	114	105	55	62	65	80	55	M8	12	7.8	18	69	50	9.0	6.5	3.3	2.2	3.0	24	6	10	0.4
546-25-34	134	127	68	72	75	95	70	M12	15	9.5	20	83	61	11.0	8.4	4.3	2.7	3.0	26	8	10	0.4
546-31-34	166	152	80	90	93.5	120	85	M12	15	9.5	22	93.5	66	13.1	11.4	5.3	3.2	3.5	31	10	12	0.5
546-32-34	195	175	95	100	103.5	150	100	M12	19	11.5	24	110	80	14.0	11.7	6.3	3.2	4.0	38.5	10	12	0.5

How to Place an Order

546-12-34-NF 24V 10DIN

Size

Keyway standards
DIN: Compliant with the new JIS standards
JIS: Compliant with the old JIS standards

Rotor bore diameter (dimensional symbol d)

Tooth shape

NF: Full-depth tooth, full-position	NS: Full-depth tooth, single-position
RF: Right-handed rotating sawtooth, full-position	RS: Right-handed rotating sawtooth, single-position
LF: Left-handed rotating sawtooth, full-position	LS: Left-handed rotating sawtooth, single-position

*Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Selection

When Found from Motor Output

The clutch-shaft conversion of motor torque (TM) is:

$$T_M = \frac{9550 \cdot P}{n_r} \cdot \eta \ [N \cdot m] \ \cdots\cdots (1)$$

P: Motor output [kW]

n: Clutch-shaft conversion of rotation speed [min^{-1}]

η : Transmission efficiency from motor to clutch

The required torque (T) when the motor is correctly selected for the load is:

$$T = T_M \cdot K \ [N \cdot m] \ \cdots\cdots (2)$$

K: Safety factor

When Load Rotation Starts After Engagement

The acceleration torque (TA) for starting up within n rotations is:

$$T_A = \frac{J \cdot n}{9.55 \cdot t_A} \ [N \cdot m] \ \cdots\cdots (3)$$

J: Total moment of inertia on load side [kg·m^2]

t_A: Acceleration time [s]

Therefore, the required torque (T) is:

$$T = (T_L + T_A) \ K \ [N \cdot m] \ \cdots\cdots (4)$$

T_L: Load torque [N•m]

Select the clutch size by searching the specification table for the clutch whose value adequately satisfies the required torque (T).

Safety factor: K

Load state	Factor
Low rotation speed/small torque fluctuation	1.5
Ordinary load/small torque fluctuation	2
High rotation speed/large torque fluctuation	3

Recommended Power Supplies and Accessory Parts

Model	Recommended power supplies	Accessory parts	
		Circuit protector (Varistor), qty. 1	Shims (Inner diameter × Outer diameter × Thickness), qty. 5 [mm]
546-12-34-□ 24V 10□	BES-20-51・BEH-10G	NVD07SCD082 or an equivalent	10.3 × 13.7 × 0.1t
546-13-34-□ 24V 15□	BES-20-51・BEH-10G	NVD07SCD082 or an equivalent	15.3 × 20.7 × 0.1t
546-15-34-□ 24V 20□	BES-20-51・BEH-10G	NVD07SCD082 or an equivalent	20.3 × 27.7 × 0.1t
546-15-34-□ 24V 25□	BES-20-51・BEH-10G	NVD07SCD082 or an equivalent	25.3 × 34.7 × 0.1t
546-21-34-□ 24V 25□	BES-20-52・BEH-10G	NVD07SCD082 or an equivalent	25.3 × 34.7 × 0.1t
546-21-34-□ 24V 30□	BES-20-52・BEH-10G	NVD07SCD082 or an equivalent	30.3 × 41.7 × 0.1t
546-23-34-□ 24V 30□	BES-20-52・BEH-10G	NVD07SCD082 or an equivalent	30.3 × 41.7 × 0.1t
546-23-34-□ 24V 40□	BES-20-52・BEH-10G	NVD07SCD082 or an equivalent	40.3 × 51.7 × 0.1t
546-25-34-□ 24V 40□	BES-20-52・BEH-20G	NVD07SCD082 or an equivalent	40.3 × 51.7 × 0.1t
546-25-34-□ 24V 50□	BES-20-52・BEH-20G	NVD07SCD082 or an equivalent	50.3 × 61.7 × 0.1t
546-31-34-□ 24V 50□	BES-40-53・BEH-20G	NVD14SCD082 or an equivalent	50.3 × 61.7 × 0.1t
546-31-34-□ 24V 60□	BES-40-53・BEH-20G	NVD14SCD082 or an equivalent	60.3 × 71.1 × 0.1t
546-32-34-□ 24V 60□	BES-40-53・BEH-20G	NVD14SCD082 or an equivalent	60.3 × 71.1 × 0.1t
546-32-34-□ 24V 70□	BES-40-53・BEH-20G	NVD14SCD082 or an equivalent	70.3 × 79.7 × 0.1t

* NVD□SCD□ parts are manufactured by KOA Corporation.

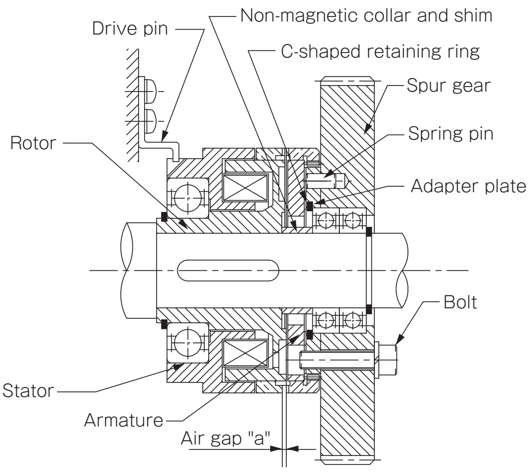
* Varistors need not be used when a BES/BEH model recommended power supply is used. For details, refer to the section on power supplies.

546 Models

Items Checked for Design Purposes

Precautions for Mounting

This clutch is mounted for a through-shaft. The mounting example shown below is for mounting on an ordinary through-shaft.



❶ Set the air gap between the teeth tips on the rotor and armature sides so that it is the value "a" in the dimensions table. Shims may be used to facilitate setting of the air gap.

❷ Use a collar made of a non-magnetic material (such as stainless steel or brass) to set the air gap. Use the reference values of the table below for the length of the collar when centering bearings relative to the adapter plate.

Collar lengths when using bearings to center

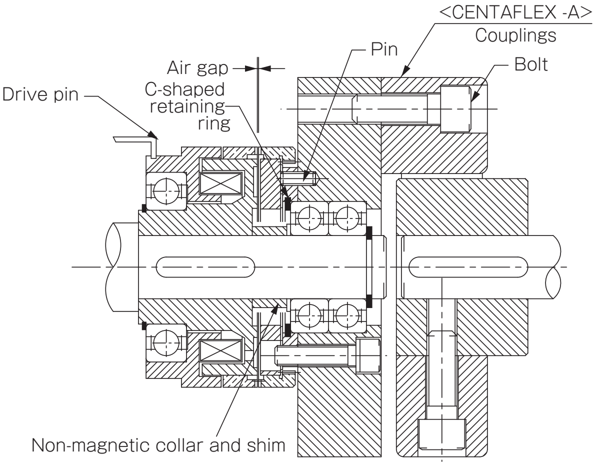
Size	Dimensions [mm]	Size	Dimensions [mm]
12	7.3	23	15.5
13	8.3	25	17.5
15	10.5	31	22.0
21	15.0	32	23.5

* Process the collar length to the negative tolerance and then make fine adjustments with shims.
* Five shims (0.1 mm in thickness) are provided for each shaft bore diameter.
* If not using the bearing to center, use a different collar design.

❸ When mounting, lock it securely in the axial direction so that there is no play (rattle) in the axial direction.

❹ We recommend a tolerance of h6 or j6 for the shaft when mounting.

❺ This clutch is for through-shafts; when using it on butt shafts, align one of the shafts with a bearing. Using a MIKI PULLEY CENTAFLEX coupling makes it relatively easy to find the centers. See the mounting examples below.



❻ The inner diameter of the adapter plate is the same as the outer diameter of the ball bearing, so the center is easy to find when designed to directly press in the ball bearings.

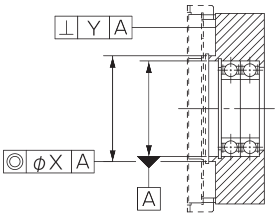
Recommended bearings when inner diameter of adapter plate is used as centering mark

Size	Bore diameter ød [mm]	Centering dimension øD [mm]	Bearing
12	10	26	6000
13	15	32	6002
15	20	42	6004
15	25	42	6905
21	25	52	6205
23	30	62	6206
23	40	62	6908
25	50	72	6910
31	50	90	6210
32	70	100	6914

Ball bearings cannot be used as centering points for combinations of the sizes and shaft diameters at right; in such cases, install centering positions on the flange (gear, sprocket, or the like) on which the adapter plate is mounted and then find the centers. Use the following as a reference for the precision of the mounting surface of the armature (adapter plate).

Size	Bore diameter ød [mm]	Centering dimension øD [mm]
21	30	52
25	40	72
31	60	90
32	60	100

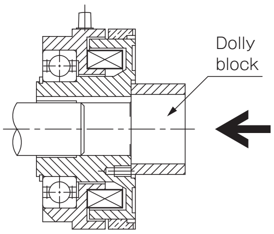
Armature (adapter plate) mounting surface precision



Size	X [mm]	Y [mm]
12	0.04	0.03
13	0.05	0.04
15	0.05	0.04
21	0.06	0.05
23	0.07	0.05
25	0.08	0.06
31	0.08	0.07
32	0.10	0.08

❼ Use two ball bearings in the flange (gear, sprocket, or the like) on which the armature (adapter plate) is mounted so that no vibration is generated in the armature.

❽ A pilot bore for mounting the spring pin has been drilled in the adapter plate. (This does not apply to size 12.) Although in some conditions its use can be omitted, we recommend that after the flange (gear, sprocket, or the like) that mounts on the adapter plate is mounted, additional processing gauged against actual objects be performed and spring pins be concurrently used. (Concurrent use of spring pins is not necessary for size 12.) For details, see the section on assembly of the armature part.



❾ Apply a small amount of adhesive to stop loosening to the bolt that mounts the adapter plate on the gear, sprocket, or the like.

❿ When inserting the stator side onto the shaft, damage can result from strong pounding with a hammer or pushing on the outer circumference part. Press a pipe-shaped dolly block near the shaft bore of the boss part and carefully insert it. The material is soft, so do not bend it as you insert.

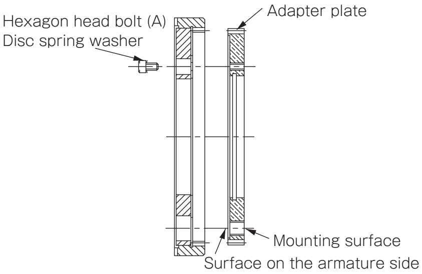
⓫ Hold the stator only in the direction of rotation, using the cut-out for stopping rotation. Be careful not to apply pressure on the cut-out in the shaft direction at this time.

⓬ We recommend applying lubricant (molybdenum disulfide grease) to the teeth tips to improve the wear resistance of the teeth tips.

⓭ Hold it so that no force is applied that might pull on or damage leads.

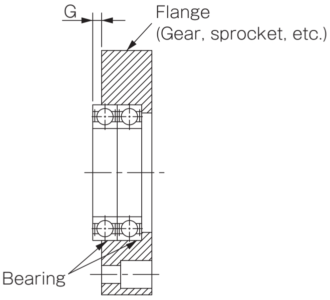
Assembly of Armature Components

❶ Remove the hexagon head bolt [A] previously fixed in place from the armature side and separate the armature and adapter plate. At this time, make fitting marks with a marker to show where the armature and adapter plate fit together to facilitate re-assembly.



❷ Press-fit the bearing onto the flange (gear, sprocket, etc.). If there are bearing centering marks, use a flange design that results in the bearing projection (dimension G) being the value in the table below.

Bearing projection



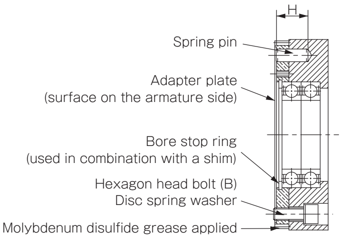
Unit [mm]

Size	Dimension G
12	1.3
13	1.4
15	2.2
21	2.8
23	3.3
25	4.3
31	5.3
32	6.3

* When press-fitting a bearing, apply bearing mount (adhesive) to the outer circumference of the bearing.
* Finish the depth of the bearing insertion bore to the positive tolerance (we recommend 0 to +0.1) and adjust with shims so there is no play (rattle) in the thrust direction.

❸ Snap the C-shaped snap ring in the C-shaped snap ring groove of the adapter plate. Use shims to adjust the air gap between the bearing and snap ring (for rattle).

❹ Mount the adapter plate on the flange and tighten the hexagon head bolt (B) to secure it.



* Pay attention to the orientation of the adapter plate.
* Apply a small amount of adhesive to the hexagon head bolt.
* See the table below for the hexagon head bolt tightening torque.

Adapter plate mounting bolt tightening torque

Size	Bolt	Tightening torque [N·m]	
		When spring pin is used	When no spring pin is used
		Bolt strength category 8.8 or higher	Bolt strength category 10.9 or higher
12	3-M4	–	3.4
13	3-M5	5.2	7.0
15	3-M6	8.8	11.8
21	3-M8	22.0	29.5
23	3-M8	22.0	29.5
25	3-M12	77.0	104.0
31	6-M12	77.0	104.0
32	6-M12	77.0	104.0

❺ Use the adapter plate's pilot bore for pins to simultaneously drill the spring pin bore. (Burr must be removed.) Consult the following table's recommended bore drilling dimensions for spring pin parts when drilling pin bores.

Recommended bore drilling dimensions for spring pin parts

Unit [mm]

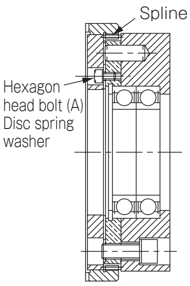
Size	Bore drilling dimension	Recommended depth H	Spring pin
13	$5^{+0.12}_{0}$	13	5 × 10
15	$5^{+0.12}_{0}$	13	5 × 10
21	$6^{+0.12}_{0}$	15	6 × 12
23	$8^{+0.15}_{0}$	19	8 × 16
25	$10^{+0.15}_{0}$	21	10 × 18
31	$10^{+0.15}_{0}$	25	10 × 22
32	$13^{+0.2}_{0}$	25	13 × 22

* Recommended depth H includes the adapter plate drilling margin.

❻ Hammer a spring pin into the bore drilling site.
Hammer in the spring pin with the indexing direction facing the outer circumference (spline side). When doing so, be careful that the pin does not extend beyond the adapter plate surface. Have spring pins ready that meet the specifications of the table above.

❼ Completely remove any dust, powder or the like produced by bore drilling and wipe the spline part with molybdenum disulfide grease.

❽ Insert the adapter plate back onto the armature using the fitting marks previously drawn, and fasten with the hexagon head bolt [A] that you removed. (Do not use adhesives.) See the table below for the tightening torque.



Size	Bolt	Tightening torque [N·m]
12	M3 × 3	1.5
13	M3 × 4	1.5
15	M3 × 4	1.5
21	M4 × 6	3.4
23	M4 × 6	3.4
25	M4 × 8	3.4
31	M5 × 10	7.0
32	M6 × 10	11.8

Precautions for Use

❶ Tooth will not mesh together if the inertia on the driven side is too great. In such cases, we recommend lowering the rotation speed or also using a CENTAFLEX coupling to absorb shock.

❷ With single position tooth shapes, drag torque will be generated by contact between tooth tips until the tooth reach their engaging position after pull-in. Tooth clutches are structured, however, so the tooth do not form a magnetic circuit, meaning that drag torque is low and hardly ever a problem. When load torque is very small compared to clutch torque, however, drag turning may occur on the driven side. In such cases, a brake must also be used, to prevent drag turning.

❸ The keyway cannot be aligned with the adapter plate mounting holes in the engaging position. When alignment is necessary, adjust position with the paired side elements of the clutch.

❹ When used in stationary engagement, teeth may fail to engage and come into contact with other tooth tips when pull-in occurs. Rotation in this condition may result in teeth slipping rather than engaging, so adjust the acceleration speed of the drive side to engage.

❺ The operating power supply of the clutch is DC 24 V. Keep fluctuations of the applied voltage within -10% to +5%. Since optimal BES model power supplies are available for the tooth clutch, we recommend one of these be used for both.

❻ Install a switch on the DC side to turn the clutch on and off. Operating times will be slower if it is installed on the AC side. A varistor to protect contacts should also be connected in parallel to the clutch.

BRAKE MOTORS

Application Printing machinery, bookbinding machinery, food machinery, wrapping machinery, medical machinery

Induction Motors with Integrated Brakes

Brake motors incorporate an internal electromagnetic-actuated brake or spring-actuated brake without changing the dimensions of the induction motor. A compact power supply for the brake is built into the terminal box, so the brake motor can be simply connected and used. Choose from either base-mounted or flange-mounted types.

Same dimensions as induction motor

Since the brake is incorporated without changing the dimensions of the induction motor, mounting is easy.

Long service life

The large frictional surface area provides a long service life.

Built-in power supply

A small power supply is included in the product and handling is easy.

Quiet running (BMS models)

The rotating part (disc) is completely integrated into the motor shaft, so operation is quiet.

Manual release (BMS models)

The braking/holding state can be manually released using a release lever.

Stable rapid braking (BMM models)

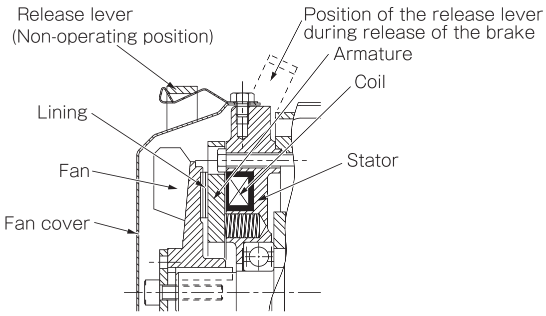
Torque is transmitted by a constant-load spring, enabling stable and rapid braking.

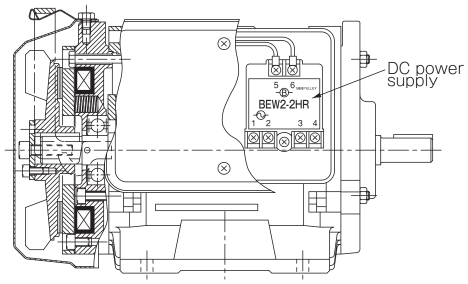
Available Models

	Model	Base-mounted	Flange-mounted	Motor output [kW]								
				0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11
Spring-actuated	**BMS**	●	●	●	●	●	●	—	—	—	—	—
Electromagnetic-actuated	**BMM**	●	●	●	●	●	●	●	●	▲	▲	▲

Structure

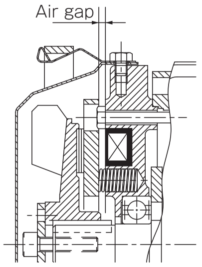
BMS Construction



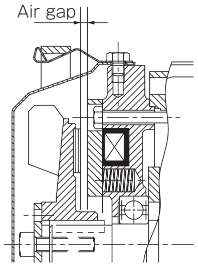


BMS Operating Principles

These brakes are spring actuated type brakes. When the power is turned on, the stator is magnetized simultaneous with the motor, and the generated attraction force pulls the armature to the stator, overcoming the pressure of the torque spring. An air gap between the disc and armature is created at that time, the brake is fully released, and the motor shaft rotates. When the current is shut off, the magnetic attraction force of the stator is extinguished, the armature is pushed back by the force of the torque spring, braking force is applied to the disc, and the motor shaft rapidly stops.

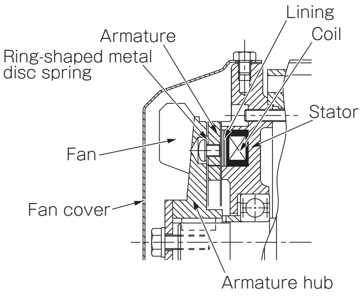


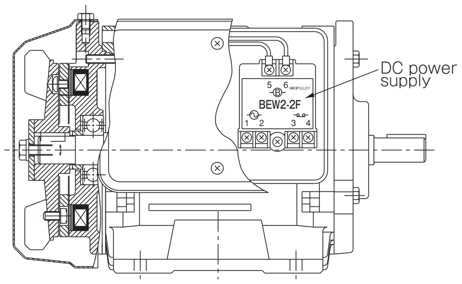
Brake activated when shielded



Brake released when energized

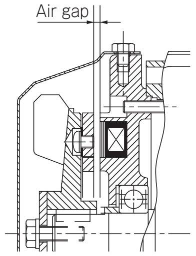
BMM Construction



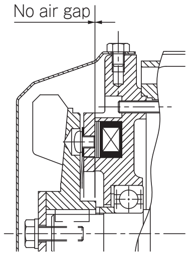


BMM Operating Principles

These brakes are electromagnetic actuated type brakes. When current flows to the coil, the stator is magnetized and the armature is pulled in. Frictional force working between the lining and armature then generates the braking torque of the brake. When the current is shut off, the armature is pulled back by the ring-shaped metal disc spring located between the armature and hub, and the lining and armature are instantly released.



Brake released when shielded



Brake activated when energized

BMS Models Spring-actuated Brake Motors

Specifications

Model	Motor		Brake								Rotating part moment of inertia J [kg·m²]	Allowable braking energy rate $P_{ba\ell}$ [W]	Total braking energy E_T [J]	Operating time			Mass [kg]
				Coil (at 20℃)					Air gap						Coastdown time		
	Frame No.	Output [kW] 4-poles	Torque T [N·m]	Voltage [V]	Current [A]	Resistance [Ω]	Wattage [W]	Heat resistance class	Control value [mm]	Limit value [mm]				Armature pull-in time t_a [s]	Simultaneous off [s]	DC off separately [s]	
BMS-024-NHBN	63	0.2	2	DC90	0.20	440	18	B	0.15 ～ 0.25	0.40	0.8×10^{-3}	18	3.5×10^{7}	0.04	0.1	0.08	7.5
BMS-024-NHFN																	8.5
BMS-044-NHB	71	0.4	4	DC90	0.28	324	25	B	0.15 ～ 0.25	0.40	1.5×10^{-3}	26.2	7.0×10^{7}	0.05	0.1	0.08	10
BMS-044-NHF																	11
BMS-074-HPB	80	0.75	8	DC90	0.33	270	30	B	0.20 ～ 0.30	0.50	4.3×10^{-3}	29.4	12.5×10^{7}	0.05	0.14	0.09	16.5
BMS-074-HPF																	19
BMS-154-HPB	90	1.5	15	DC90	0.34	261	31	B	0.20 ～ 0.30	0.60	8.1×10^{-3}	45.8	20.0×10^{7}	0.11	0.15	0.09	23
BMS-154-HPF																	26

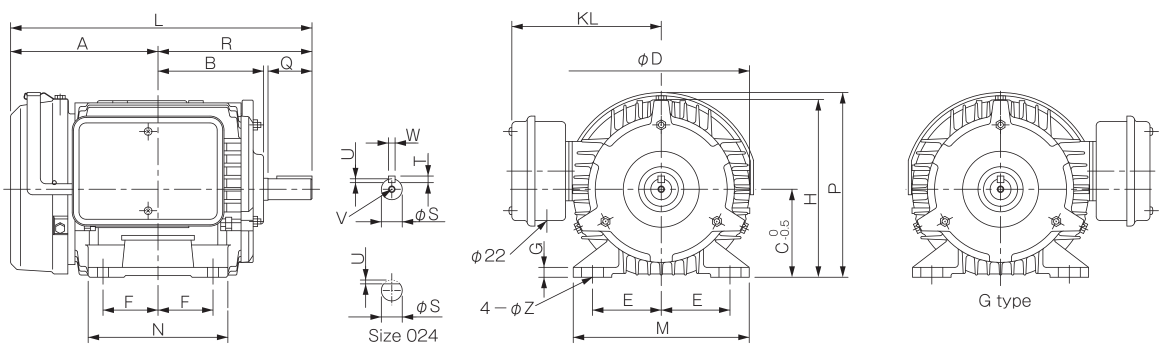
* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher). (made by Hitachi Industrial Equipment Systems)

* The power supplies for the motors are 3-phase, 200 V AC at 50 Hz, or 200/220 V AC at 60 Hz.

* See P.381 for the allowable braking frequency of brake motors. The specific frequency varies with load conditions, so confirm it in your selection calculations.

Dimensions

Base-mounted

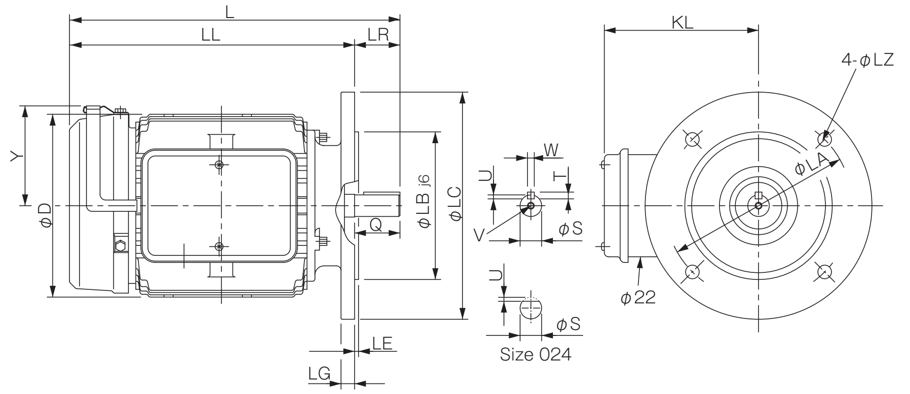


CAD

Unit [mm]

Model	Dimensions of part																			
	L	R	A	B	D	KL	H	P	C	F	E	N	M	G	Z	S	W	U	T	Q	V
BMS-024-NHBN	215	103	112	79	130	115	128	134	63	40	50	100	130	3.2	7 × 21	11 h6	–	1	–	23	–
BMS-044-NHB	244	120	124	87	145	141	143.5	150	71	45	56	115	140	3.2	7 × 20	14 j6	5	3	5	30	M5 × 0.8, length: 18
BMS-074-HPB	290.5	140	150.5	97	163	148	161.5	168	80	50	62.5	125	160	3.2	10 × 25	19 j6	6	3.5	6	40	M6 × 1, length: 20
BMS-154-HPB	329	168.5	160.5	114.5	182	144	178	188	90	62.5	70	155	170	10	10	24 j6	8	4	7	50	M6 × 1, length: 20

Flange-mounted



CAD

Unit [mm]

Model	Dimensions of part																
	L	LR	LL	D	KL	LC	Y	LB	LA	LE	LG	LZ	S	W	U	T	Q	V
BMS-024-NHFN	241	23	218	130	115	160	70	110	130	3.5	8	10	11 h6	–	1	–	23	–
BMS-044-NHF	265	30	235	145	134.5	160	79	110	130	3.5	10	10	14 j6	5	3	5	30	M5 × 0.8, length: 18
BMS-074-HPF	305	40	265	163	142	200	88	130	165	3.5	12	12	19 j6	6	3.5	6	40	M6 × 1, length: 20
BMS-154-HPF	349	50	299	176	144	200	98	130	165	3.5	12	12	24 j6	8	4	7	50	M6 × 1, length: 20

Options and Made to Order

Products with Motor Terminal Box Mounted in Reverse

Option symbol: G

The location where the brake motor is installed may make it impossible to mount the motor's terminal box in the standard location in some cases. In such cases, the mounting dimensions of the G types can be considered. Use the dimensions drawing to check the positions of the terminal boxes on G type motors.

Products with BEW2-2H Brake Rectifiers

Option symbol: 2H

By using a brake motor with an inverter or the like, the motor can be fitted with a power supply that shuts off DC separately (BEW2-2H) when fast response is needed.

List of Accessories

Brake motors come with the components listed at right.
When mounting a V pulley or the like on a brake motor output shaft, the V pulley or the like can be mounted simply on the motor shaft by concurrently using a motor shaft end face tap and the accessories listed at right.
For size 024, the motor output shaft has a flat face, so the shaft end face cannot be tapped and the accessories listed at right are not provided.

Unit [mm]

Size		024	044	074	154
Tightening collars: 1	**ϕ 6.5 × ϕ 35 × 3.2t**	–	○	○	○
Screw stocks: 1	**M5 × 70**	–	○		
	M6 × 100	–		○	○
Hexagonal nuts: 1	**M5**	–	○		
	M6	–		○	○

How to Place an Order

Base-mounted

0.2kW : BMS-024-NHBN-☐
└Option symbols

0.4kW : BMS-044-NHB -☐
└Option symbols

0.75kW : BMS-074-HPB -☐
└Option symbols

1.5kW : BMS-154-HPB -☐
└Option symbols

Flange-mounted

0.2kW : BMS-024-NHFN-☐
└Option symbols

0.4kW : BMS-044-NHF -☐
└Option symbols

0.75kW : BMS-074-HPF -☐
└Option symbols

1.5kW : BMS-154-HPF -☐
└Option symbols

BMM Models Electromagnetic-actuated Brake Motors

Specifications

Model	Motor			Brake							Rotating part moment of inertia J [kg·m²]	Allowable braking energy rate $P_{ba\ell}$ [W]	Total braking energy E_T[J]	Operating time		Mass [kg]
	Frame No.	Output [kW] 4-poles	Torque T [N·m]	Coil (at 20℃)				Heat resistance class	Air gap					Armature pull-in time t_a [s]	Armature release time t_{ar} [s]	
				Voltage [V]	Current [A]	Resistance [Ω]	Wattage [W]		Control value [mm]	Limit value [mm]						
BMM-024-NHBN	63	0.2	2.5	DC180	0.06	2956	11	B	0.10 ~ 0.20	0.30	0.9 × 10^{-3}	11	5.0 × 10^7	0.015	0.015	7
BMM-024-NHFN																8
BMM-044-NHB	71	0.4	5	DC180	0.07	2458	12.6	B	0.10 ~ 0.20	0.35	2.4 × 10^{-3}	26.2	7.0 × 10^7	0.030	0.030	9
BMM-044-NHF																10
BMM-074-HPB	80	0.75	10	DC180	0.089	2039	16	B	0.15 ~ 0.25	0.45	3.8 × 10^{-3}	32.7	17.0 × 10^7	0.040	0.040	14.5
BMM-074-HPF																16.5
BMM-154-HPB	90	1.5	20	DC180	0.123	1466	22.1	B	0.15 ~ 0.25	0.70	9.5 × 10^{-3}	45.8	25.0 × 10^7	0.060	0.060	22
BMM-154-HPF																25
BMM-224-HPB	100	2.2	30	DC180	0.167	1080	30	B	0.20 ~ 0.30	1.00	15.2 × 10^{-3}	58.9	50.0 × 10^7	0.070	0.070	32
BMM-224-HPF																37
BMM-374-HPB	112	3.7	50	DC180	0.17	1059	30.6	B	0.20 ~ 0.30	1.10	22.6 × 10^{-3}	73.6	75.0 × 10^7	0.070	0.080	42
BMM-374-HPF																47

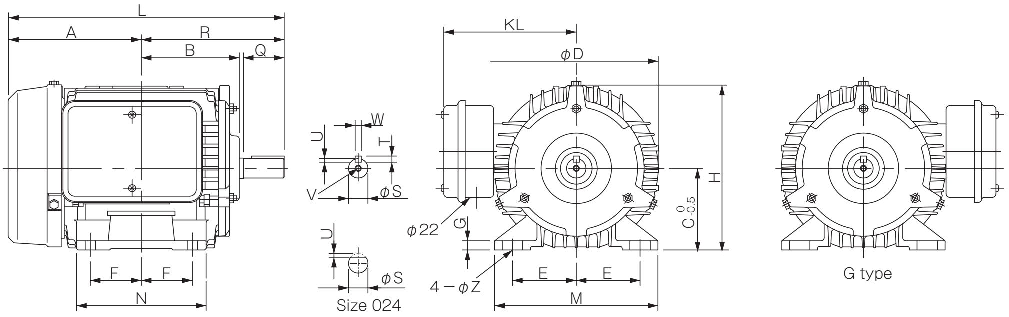
* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher). (made by Hitachi Industrial Equipment Systems)

* The power supplies for the motors are 3-phase, 200 V AC at 50 Hz, or 200/220 V AC at 60 Hz.

* See P.381 for the allowable braking frequency of brake motors. The specific frequency varies with load conditions, so confirm it in your selection calculations.

Dimensions

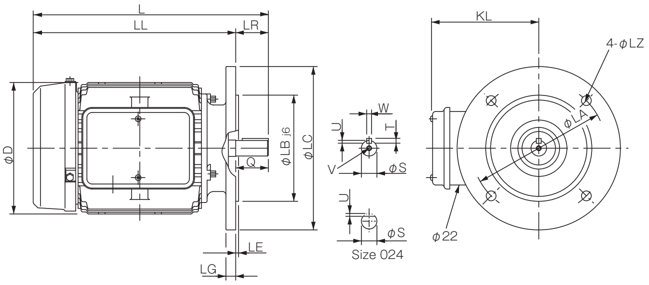
Base-mounted



Unit [mm]

Model	Dimensions of part																	
	L	R	A	B	D	KL	H	C	F	E	N	M	G	Z	S	W	U	T	Q	V
BMM-024-NHBN	215	103	112	80	130	115	128	63	40	50	100	130	3.2	7 × 21	11 h6	—	1	—	23	—
BMM-044-NHB	235.5	120	115.5	87	145	131	143.5	71	45	56	115	140	3.2	7 × 20	14 j6	5	3	5	30	M5 × 0.8, length: 18
BMM-074-HPB	280.5	140	140.5	97	163	138.5	161.5	80	50	62.5	125	160	3.2	10 × 25	19j6	6	3.5	6	40	M6 × 1, length: 20
BMM-154-HPB	321	168.5	152.5	114.5	182	144	178	90	62.5	70	155	170	10	10	24 j6	8	4	7	50	M6 × 1, length: 20
BMM-224-HPB	368.5	193	175.5	129	198	151	197.5	100	70	80	175	195	12.5	12	28 j6	8	4	7	60	M6 × 1, length: 20
BMM-374-HPB	397	200	197	136	225	164	219.5	112	70	95	175	224	14	12	28j6	8	4	7	60	M6 × 1, length: 20

Flange-mounted



Unit [mm]

Model	Dimensions of part															
	L	LR	LL	D	KL	LC	LB	LA	LE	LG	LZ	S	W	U	T	Q	V
BMM-024-NHFN	241	23	218	130	115	160	110	130	3.5	8	10	11 h6	—	1	—	23	—
BMM-044-NHF	256.5	30	226.5	145	124.5	160	110	130	3.5	10	10	14 j6	5	3	5	30	M5 × 0.8, length: 18
BMM-074-HPF	295	40	255	163	132	200	130	165	3.5	12	12	19 j6	6	3.5	6	40	M6 × 1, length: 20
BMM-154-HPF	341	50	291	176	144	200	130	165	3.5	12	12	24 j6	8	4	7	50	M6 × 1, length: 20
BMM-224-HPF	388.5	60	328.5	195	151	250	180	215	4.0	16	14.5	28 j6	8	4	7	60	M6 × 1, length: 20
BMM-374-HPF	422	60	362	215	164	250	180	215	4.0	16	14.5	28 j6	8	4	7	60	M6 × 1, length: 20

Optional

Made to Order

Products with Motor Terminal Box Mounted in Reverse

Option symbol: G

The location where the brake motor is installed may make it impossible to mount the motor's terminal box in the standard location in some cases. In such cases, the mounting dimensions of the G types can be considered.
Use the dimensions drawing to check the positions of the terminal boxes on G type motors.

Products with High Motor Output, 5.5 kW to 11 kW

We also support motors with high motor output (5.5 kW to 11 kW).
Consult Miki Pulley for details.

BMM-☐
Motor output/number of poles
554: 5.5 kW, 4-pole
754: 7.5 kW, 4-pole
1104: 11 kW, 4-pole

List of Accessories

Brake motors come with the components listed at right.
When mounting a V pulley or the like on a brake motor output shaft, the V pulley or the like can be mounted simply on the motor shaft by concurrently using a motor shaft end face tap and the accessories listed at right.
For size 024, the motor output shaft has a flat face, so the shaft end face cannot be tapped and the accessories listed at right are not provided.

Unit [mm]

Size		024	044	074	154	224	374
Tightening collars: 1	**ϕ 6.5 × ϕ 35 × 3.2t**	–	○	○	○	○	○
Screw stocks: 1	**M5 × 70**	–	○				
	M6 × 100	–		○	○	○	○
Hexagonal nuts: 1	**M5**	–	○				
	M6	–		○	○	○	○

How to Place an Order

Base-mounted

0.2kW : BMM-024-NHBN-☐
Option symbols
0.4kW : BMM-044-NHB -☐
Option symbols
0.75kW : BMM-074-HPB -☐
Option symbols
1.5kW : BMM-154-HPB -☐
Option symbols
2.2kW : BMM-224-HPB -☐
Option symbols
3.7kW : BMM-374-HPB -☐
Option symbols

Flange-mounted

0.2kW : BMM-024-NHFN-☐
Option symbols
0.4kW : BMM-044-NHF -☐
Option symbols
0.75kW : BMM-074-HPF -☐
Option symbols
1.5kW : BMM-154-HPF -☐
Option symbols
2.2kW : BMM-224-HPF -☐
Option symbols
3.7kW : BMM-374-HPF -☐
Option symbols

BMS/BMM Models

Selection

Study the following items, in order, to determine the final size and type.

• Operating condition settings	Set the application, torque, number of operations, etc.
• Consideration of torque	Confirm the torque using Eqs. (1) and (2).
• Provisional size and type selection	Provisionally select the size and type based on calculated torque values.
• Consideration of braking time	Provisionally select the braking time based on calculated torque values.
• Consideration of amount of energy	Confirm the energy amount using Eqs. (4) and (5).
• Consideration of number of braking operations	Confirm the number of braking operations using Eqs. (6) and (7).
• Determine size and type	

Consideration of Torque

$$T_M = \frac{9550 \cdot P}{n} \quad [N \cdot m] \quad \cdots\cdots (1)$$

T_M: Rated torque of motor [N•m]
P: Motor output [kW]
n: Rated rotation speed of motor [min^{-1}]

$$T_B = K \cdot T_M \ [N \cdot m] \quad \cdots\cdots (2)$$

T_B: Braking torque [N•m]
K: Safety factor (1.5 to 2.0)

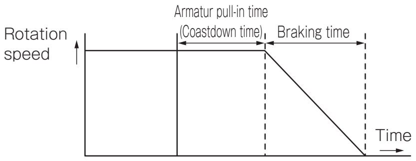
Consideration of Braking Time

The braking time can be found for brakes using the following equation.

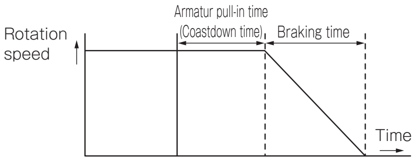
$$t_{ab} = \frac{J \cdot n}{9.55 \cdot (T \pm T_\ell)} \quad [s] \quad \cdots\cdots (3)$$

t_{ab}: Braking time [s]
J: Moment of inertia of brake shaft [kg•m^2]
n: Motor rotation speed [min^{-1}]
T: Rated torque of brake [N•m]
T_ℓ : Load torque [N•m]
(The sign of T_ℓ is positive when the load works in the direction that assists braking and negative when it works in the direction that opposes it.)

The time required from excitation of the brake coil to stopping of the load on BMM models is the braking time t_{ab} found with the preceding equation plus the armature pull-in time.



The time required from cutting off the power supply of a BMS model brake motor to stopping of the load is the braking time t_{ab} found with the above equation plus the armature release time.



When brakes are used for long periods of time, they wear, air gaps grow, and it becomes impossible to pull in the armature even when the coil is excited. If re-adjustment becomes necessary, adjust the air gap as described in the maintenance and inspection section of the operating manual.

Consideration of Amount of Energy

The braking energy rate can be found for brakes using the following equation.

$$P = \frac{J \cdot n^2}{182} \cdot \frac{T}{(T \pm T_\ell)} \cdot \frac{S}{60} \quad [W] \quad \cdots\cdots (4)$$

P: Braking energy rate [W]
S: Frequency of braking (braking operations/min)

Set a frequency that results in a value P obtained in the above equation that is no greater than the allowable braking energy rate $P_{ba\ell}$.

$$P \ll P_{ba\ell} \quad \cdots\cdots (5)$$

Consideration of Number of Braking Operations

Use the following equation to find the number of operations before readjustment of the air gap of the brake.

$$E_b = \frac{J \cdot n^2}{182} \cdot \frac{T}{(T \pm T_\ell)} \quad [J] \quad \cdots\cdots (6)$$

E_b: Braking energy of one braking operation [J]

$$L = \frac{E_T}{E_b} \ [\text{braking operations}] \quad \cdots\cdots (7)$$

L: Number of operations before readjustment [braking operations]
E_T: Total braking energy [J]

Items Checked for Design Purposes

Precautions for Handling

What is the best way to ensure that the design allows brake motors used in machinery and equipment to perform and function adequately? We describe here approaches to design that we feel are useful in improving machinery reliability. Consult the catalog of the motor manufacturer for information on connecting motors to machinery using V pulleys or the like.

- Design in a reasonable space on the fan cover side to allow for cooling, maintenance and inspections.
- Operating temperature range: −10℃ to 40℃ . Contact Miki Pulley if you will use the product outside this range.
- If you are using this brake motor in a winch, lift, or the like, also use a brake of a different mechanism to prevent dangerous situations. Also, if you are using a standard shutoff circuit in an elevating winch or the like, there will be a θ load during the braking delay time and an electromotive force will occur in the motor part that will prevent the brake from engaging. For that reason, be sure to use a DC shutoff or separate shutoff circuit.
- If you are mounting a phase-advancing capacitor, consult Miki Pulley.
- Brake motors have consumable components such as linings, and thus have a finite service life. Please keep spares available. Also note that if the start frequency of the brake motor exceeds the allowed value, motor parts may burn or the brake lining may be subject to abnormal wear or damage. Check that the start frequency is staying within the allowed value. Also be aware of the capacitance of contacts for DC shutoff when you are inching at a frequency that exceeds the allowable start frequency.

Allowable start frequency of brake motor

Models	Motor output [kW]	Frequency [starts/h]		Moment of inertia of load J [kg·m²]
		40%ED	60%ED	
BMS	0.2	500	400	0.00125
	0.4	900	845	0.00128
	0.75	460	430	0.0028
	1.5	370	290	0.0045
BMM	0.2	450	360	0.00125
	0.4	900	845	0.00128
	0.75	460	430	0.0028
	1.5	370	290	0.0045
	2.2	180	145	0.010
	3.7	180	145	0.015

* These values are for 4 poles and a frequency of 50 Hz using the moment of inertia J of the load from the above table as the condition. For 60 Hz, use frequencies of about 70% of the above values.

* Frequency is a total value for the motor part and brake together. Their values as stand-alones are different.

* %ED is the percentage duty cycle during repeated operation.

* The table's example of moment of inertia J of the load is virtually the same as the moment of inertia J of the motor part.

* The approximate temperature of the outer surface of the motor is 80° C to 90° C (for an ambient temperature of 40° C).

- If using an inverter or reduced-voltage starting, connect the brake or brake power supply to the power supply side of the inverter or reduced-voltage starter.
- If the wiring for the brake circuit is in the same conduit as the power lines, be sure to shield it.
- When inserting a capacitor for improving the power factor into the brake motor circuit, be sure to use a separate shutoff circuit.
- Grounding terminals are provided in or on the side of the terminal box or at the bottom of the frame. Be sure to do the grounding work. Mobile or movable machinery is covered by labor safety regulations as well. Be sure to ground it with large-gauge grounding wires to prevent accidents from shocks.
- Keep the voltage imbalance rate to 1% or less. Also keep the maximum current value for each phase to 105% or less of the nameplate current value when a voltage imbalance occurs.
- Always mount the cover on the terminal box after connections are made.
- Brake torque may vary somewhat. Break-in operation (40 to 60 brakings) is particularly advisable at initial use.
- If power goes out, be sure to turn the power switch off. Accidents can occur if the electricity comes back on unexpectedly.
- Before starting a BMS model, always check that the release lever is in the non-operating position before starting machinery operation.

Wiring

■ BMS

A power supply with built-in relays (BEW2-2HR) is incorporated into BMS models, so BMS models generally have a responsiveness close to that of separate DC shutoff, and are adequate for use. By concurrently using an inverter or the like, the motor can be fitted with a power supply that shuts off DC separately (BEW2-2H) when even faster response is needed. This is supported as an option. Please specify it in advance.

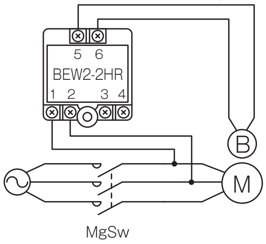
BEW2-2HR:	Brake power supply for building into relays for BMS (built into terminal box)
MgSw:	Electromagnetic switch
M:	Motor
B:	Brake

The power supply, motor terminal block, and brake are connected in advance, so the unit can be used by wiring only the U, V, and W leads of the motor.

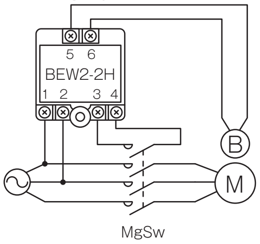
BEW2-2H: Separate shutoff power supply for BMS

(Specify in advance when ordering a brake motor.)

Simultaneous cutting



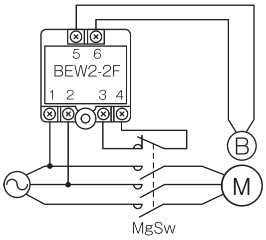
Cutting by DC



■ BMM

BEW2-2F:	Brake power supply for BMM (built into terminal box)
MgSw:	Electromagnetic switch
M:	Motor
B:	Brake

(BEW2-2F is connected in advance.)



Precautions for Use

Inspect the following items periodically.

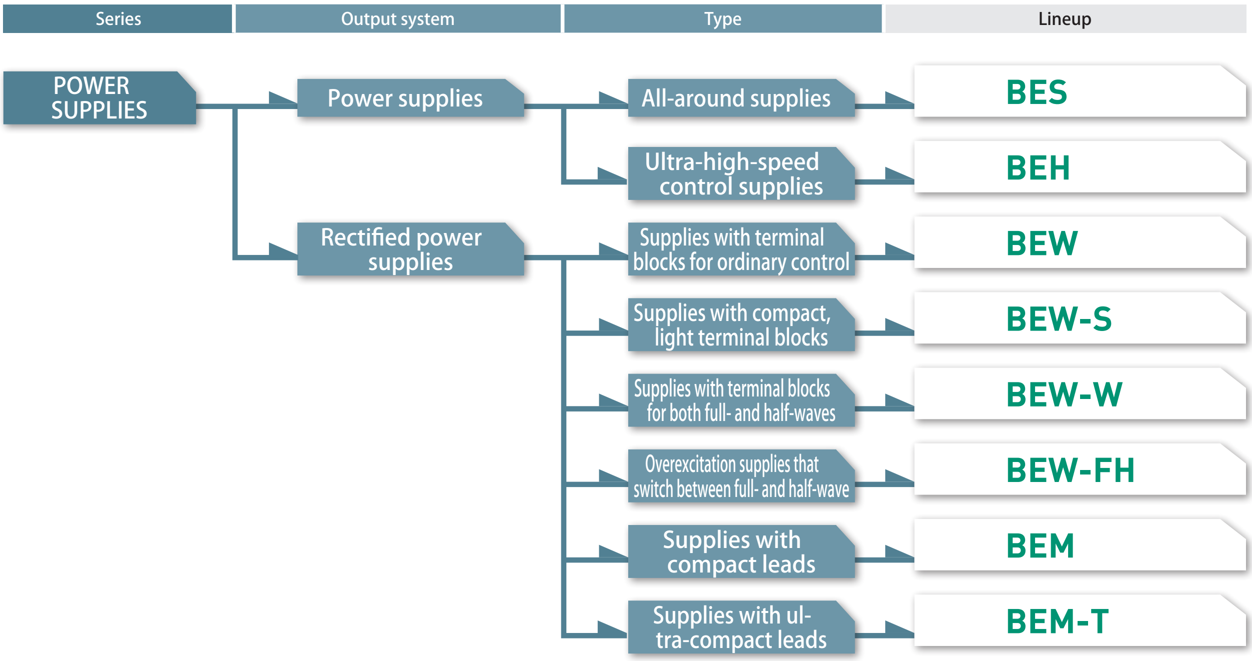
- Is the device operating properly?
- Has water or oil penetrated the brake part?
- Has tightening of the mounting screws of all parts been completed?
- During periodic inspections, remove the motor fan cover and use compressed air to blow out wear debris created by friction to eliminate it or pull-in it up with a dust collector.
- Check whether the air gap is within its service life limit. If it is at the limit value, adjust it to the prescribed air gap stated in the operating manual.
- If the limit air gap has been exceeded, BMS models are particularly prone to the brake becoming unable to release due to malfunctioning armature pull-in, which can lead to problems such as motors burning.

POWER SUPPLIES

Power Supplies to Get the Best Performance from Electromagnetic Clutches and Brakes

Compatible with AC 100, 200, and 400 V input power supplies. Outputs DC 24, 45, 90, and 180 V specifications for electromagnetic clutches and brakes. Broadly divided into power supplies for electromagnetic-actuated devices, which primarily require high-speed and ultra-high-speed control, and rectified power supplies, which are used by spring-actuated brakes and the like. A broad selection of power supplies are available.

Available Models



Model Selection

Model/Type	Applicable clutches and brakes			Input voltage			Output voltage				Function		
	Electromagnetic-actuated	Tooth	Spring-actuated	100V	200V	400V	24V	45V	90V	180V	Overexcitation	Reverse excitation	Weak excitation
BES	◎	◎	◎	◎	◎		◎	◎	◎		◎		
BEH	◎	◎		◎	◎		◎				◎	◎	

Model/Type	Applicable clutches and brakes			Input voltage			Output voltage				Function		
	Electromagnetic-actuated	Tooth	Spring-actuated	100V	200V	400V	24V	45V	90V	180V	Overexcitation	Reverse excitation	Weak excitation
BEW			◎	◎	◎	◎		◎	◎	◎			
BEW-S			◎	◎	◎	◎		◎	◎	◎			
BEW-W			◎	◎	◎	◎		◎	◎	◎			
BEW-FH			◎	◎	◎	◎		◎	◎	◎	◎		◎
BEM			◎	◎	◎	◎		◎	◎	◎			
BEM-T			◎	◎	◎	◎		◎	◎	◎			

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA

SERIES
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES
ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES
ELECTROMAGNETIC CLUTCH & BRAKE UNITS
SPRING-ACTUATED BRAKE
ELECTROMAGNETIC TOOTH CLUTCHES
BRAKE MOTORS
POWER SUPPLIES

MODELS
BES
BEH
BEW
BEW-S
BEW-W
BEW-FH
BEM
BEM-T

Product Lineup

BES For ordinary high-speed control

RoHS

All-around types suitable for the full range of electromagnetic clutches and brakes

Built-in overexcitation function

Can operate at high frequency and high precision.

Zero standby power

When used with one of our spring-actuated brakes, power consumption can be reduced by over 70%.

Light and compact

All terminals are contactless.

Compatible with international standards

UL listed. Products compatible with EMC directives (EN standard) are available as options.

Applicable clutches and brakes

Electromagnetic-actuated clutches and brakes
Tooth clutches
Spring-actuated brake

Input voltage

AC100V/200V

Output voltage

DC24V/45V/90V

BEH For ultra-high-speed control

RoHS

Top-of-the-line ultra-high-speed control, high-precision types with built-in overexcitation/reverse excitation functions

Quiet design

There is no excitation noise while operating.

Combination control is easy

Operations that frequently switch clutches and brakes, such as inching, can be performed using only a single input signal.

An array of operating modes

Compatible with a diverse range of applications.

Auto-tuning function

Easy to set for the optimum operating conditions. Causes of problems can also be easily identified using the alarm displays.

Applicable clutches and brakes

Electromagnetic-actuated clutches and brakes
Tooth clutches

Input voltage

AC100V/200V

Output voltage

DC24V

BEW For ordinary control

RoHS

Basic power supply device model for electromagnetic clutch and brake control

Diverse array of specifications

Power supplies are available with a variety of specifications, including half-wave rectified and full-wave rectified.

Terminal block type

These are of the terminal block type, which allows easy connection, with a DC switching terminal.

Applicable clutches and brakes

Spring-actuated brake
Electromagnetic-actuated clutches and brakes

Input voltage

AC100V/200V/400V

Output voltage

DC45V/90V/180V

BEW-S Compact, light

RoHS

Power supplies for ordinary control of spring-actuated brakes

Half-wave rectified

Compact, light models with selected functions.

Terminal block type

These are types with terminal blocks that make connection easy. They are simple power supplies that are set on only the input side and output side.

Applicable clutches and brakes

Spring-actuated brake

Input voltage

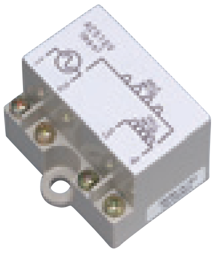
AC100V/200V/400V

Output voltage

DC45V/90V/180V

BEW-W For both full- and half-wave rectification

RoHS



Spring-actuated brakes with different specifications can be handled by a single unit

For both full- and half-wave rectification

Half-wave and full-wave rectified output can be handled by changing the connection method.

Compact, high wattage

Take a wide range of electrical inputs, from low voltage to high.

Terminal block type

These are types with terminal blocks that make connection easy. They are simple power supplies that are set on only the input side and output side.

Applicable clutches and brakes

Spring-actuated brake

Input voltage

AC100V/200V/400V

Output voltage

DC45V/90V/180V

BEW-FH Compact overexcitation power supplies

RoHS

Can be set for the outcome you desire: higher operating speed, longer service life, and more

Used as overexcitation supplies

These provide benefits such as super-long (roughly double) service lives and shorter (roughly halved) armature pull-in times for electromagnetic clutches and brakes.

Used as weak excitation supplies

These provide benefits such as lower power consumption (roughly one quarter), suppressed heat generation (roughly one quarter) in the stator (electromagnetic coil), and shorter armature release times.

Terminal block type

These are of the terminal block type, which allows easy connection, with a DC switching terminal.

Applicable clutches and brakes

Spring-actuated brake

Input voltage

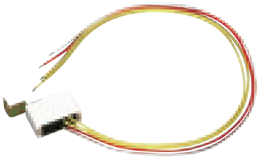
AC100V/200V/400V

Output voltage

DC45V/90V/180V

BEM Compact, light

RoHS



Power supplies for ordinary control of spring-actuated brakes

Lead type

These are lead input/output types that are suited to relay connections.

Usable in adverse environments

Since the entire case is molded of resin, they can be used in atmospheres such as dusty locations.

Applicable clutches and brakes

Spring-actuated brake

Input voltage

AC100V/200V/400V

Output voltage

DC45V/90V/180V

BEM-T Ultra-compact, light

RoHS

Power supplies for ordinary control of spring-actuated brakes

Easy connection

Uses tab terminals on the output side to achieve reductions in connection space and man-hours.

Mounting freedom

These are compact, slim, and can be installed anywhere. The mountings are also movable, so the input/output direction can be set freely.

Usable in adverse environments

Since the entire case is molded of resin, they can be used in atmospheres such as dusty locations.

Applicable clutches and brakes

Spring-actuated brake

Input voltage

AC100V/200V/400V

Output voltage

DC45V/90V/180V

BES Models For Ordinary High-speed Control

Specifications

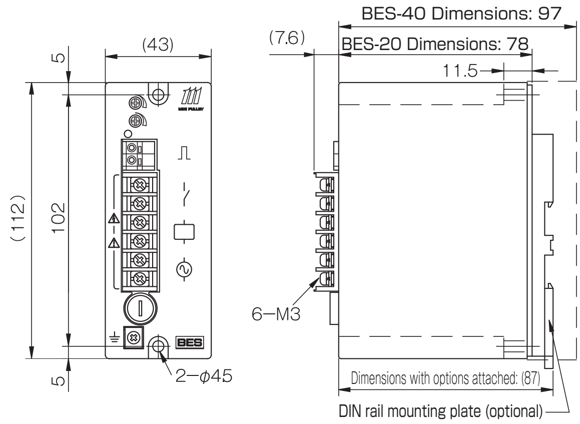
Model	BES-20-□-1	BES-40-□-1	BES-20-□	BES-40-□
Input voltage	AC100V ± 10% 50/60Hz		AC200V ± 10% 50/60Hz	
Output current	2.0A	4.0A	2.0A	4.0A
Voltage control system	PWM control			
Constant excitation voltage	Adjusted for each model and size at the time of shipment			
Overexcitation voltage	DC 90 V Full-wave (with AC 100 V input)		DC 180 V Full-wave (with AC 200 V input)	
Overexcitation time	Adjusted for each model and size at the time of shipment			
Protective functions	Input side Quick-acting fuse (5A)			
Insulating resistance	DC 500 V With Megger 100 M Ω (between terminal and main body)			
Dielectric strength voltage	AC 1000 V 50 Hz 1 min. (between terminal and main body)			
Usage environment	-10 to +50℃ /10 to 90%RH (with no condensation)			
Mass	0.3kg	0.7kg	0.3kg	0.7kg

* The voltage that is output is not insulated from the power supply, so shocks can result if touched.

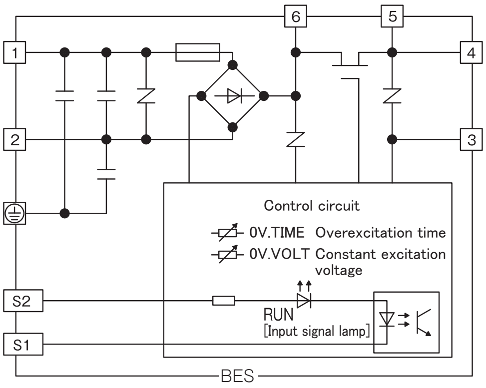
Terminals and Functions

Terminal symbol	Terminal name	Function description
1-2	Power supply input terminal	Connector for a commercial power supply
3-4	Output terminal	Connector for an electromagnetic clutch or brake
5-6	Control terminal 1	Output is controlled by opening and closing between terminals using a relay or the like.
	Ground terminal	External ground terminal (third class ground or more)
S1-S2	Control terminal 2	Output is controlled by turning the DC 24 V on and off (30 mA, smoothing power supply)

Dimensions



Structure



How to Place an Order

BES-20-10-1 DIN

Output current 20: 2 A
40: 4 A
Refer to the power supply size compatibility table
Input voltage 1: 100 V AC
Blank: 200 V AC
Mounting method
DIN: Mounting by DIN mounting rail
Blank: Direct mounting
*The DIN mounting rail mounting option can only be set for BES-20.

Options (Sets that meet EMC directives)

Equipment can conform to EMC directives (EN standard) if you also order, using the following model number, a noise filter (one) and ferrite cores (two) as a set to meet EMC directives.

BES-20-EMC

Table of Power Supply/Size Correspondence

MIKI PULLEY electromagnetic-actuated clutch/brake size		02	025	03	04	05	06	08	10	12	16	20	25
Nominal power supply output current		20											40
Power supply size	Excitation voltage For 24 V	05					10			16		20	25

MIKI PULLEY electromagnetic tooth clutch sizes		12	13	15	21	23	25	31	32
Nominal power supply output current		20						40	
Power supply size	Excitation voltage For 24 V	51			52			53	

MIKI PULLEY spring-actuated brake size		01	02	03	04	05	06	08	10	12	14	16	18	20	25
Nominal power supply output current		20													
Power supply size	Excitation voltage 45/90 V	61								62			63		
	Excitation voltage For 24 V	71								72			73		

* The exciting voltages shown in the table above are nominal. Actual output voltages may differ depending on the control method, etc.
* The constant excitation voltage for the 45/90 V excitation voltages of spring-actuated brakes is the DC 45 V specification for an input of AC 100 V and the DC 90 V specification for an input of AC 200 V.

Characteristics

Operating Response

All circuits have been made contactless, and response from signal input to output to the electromagnetic-actuated clutch or brake is fast and stable.

Energy Saving

Standby power is 〝zero.〞 Absolutely no electricity is wastefully consumed.

By combining this power supply with a MIKI PULLEY spring-actuated brake, the electricity consumption and heat generation of the spring-actuated brake is reduced by more than 70%, saving energy.

Noise During Operation

BES models use a quiet design, but electromagnetic clutches and brakes may produce excitation noise when operating under some mounting conditions. This noise is not abnormal and is not cause for concern.

Two Types of Control Systems

You can operate under either PLC control (which uses voltage control via programmable controllers or the like) or contactor control (which controls using relays and the like).

In the case of contactor control, however, a power controller for controlling the power supply line must be used.

Supply Voltage Fluctuations and Output Voltage

BES model power supplies are designed to operate reliably even when supply voltage fluctuates. Characteristically, however, their output voltage will rise or fall along with rises and falls of supply voltage. To fulfill electromagnetic clutch/brake performance, supply voltage fluctuations should be kept within a range of ±10%.

Precautions for Use

Circuit Protector

BES models incorporate circuit protectors, so there is no need to connect circuit protectors to the output side (between 3 and 4). Also, since voltage is controlled using PWM, the actual voltage output is the same level as the input voltage. This means that connecting the varistor that comes with 24 V-specification clutches and brakes or the like may result in explosion of the varistor or damage to the power supply. Never connect such devices.

Protective Functions

BES models contain fuses on the input side. When a fuse engages, the likely cause is a malfunction on the output side.

- Short on output side
- Ground fault on output side
- Malfunction on output side (electromagnetic-actuated clutch/brake)

Thoroughly verify that there are no malfunctions on the output side before resuming operation.

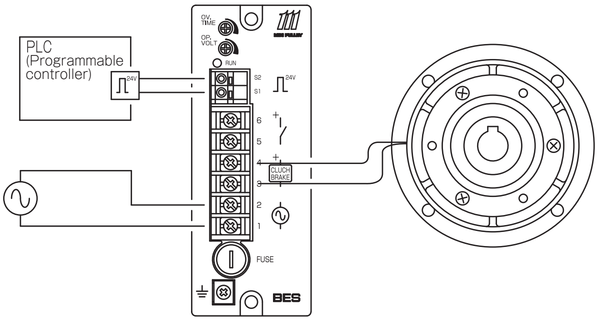
How to Check Output Voltage Values

If you are checking the output voltage with a voltage meter, tester or the like, check the value with a load such as an electromagnetic clutch or brake connected to the output side.

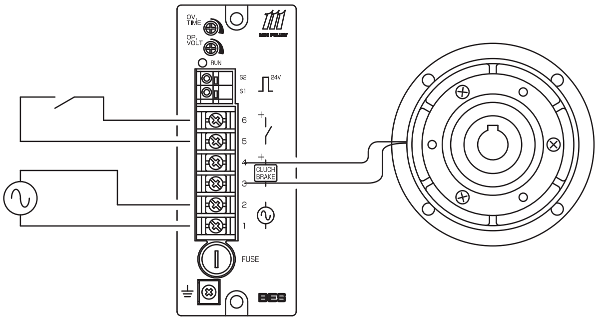
If nothing is connected, it shows a value close to the supply voltage.

Wiring Methods and Timing Charts

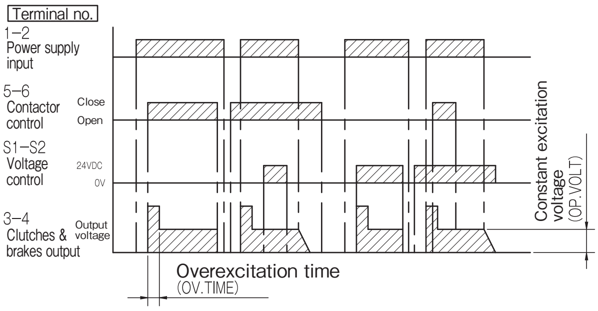
Wiring 1 (PLC Control)



Wiring 2 (Contactor Control)



Time Chart



BEH Models For Ultra-high-speed Control

Specifications

Model		BEH-10G	BEH-20G	BEH-20G-1
Input voltage		AC200V ± 10%	AC200V ± 10%	AC100V ± 10%
		Single phase, 50/60 Hz		
Output voltage	Overexcitation voltage	Initial value 100 V, 0 to 250 V variable		
	Constant excitation voltage	Initial value 24 V, 0 to 250 V variable		
	Reverse excitation voltage	Initial value 100 V, 0 to 250 V variable		
	Voltage control system	PWM control		
Output current		2A	4A	4A
Applicable clutch/ brake size		02 ～ 16	02 ～ 32	
		MIKI PULLEY electromagnetic-actuated clutches and brakes Rated voltage DC 24 V		
Protective functions		Undervoltage protection, overvoltage protection, overcurrent protection/detection, break detection, element overheating protection, input-side fuse (20 A)		
Usage environment		-10 - +50℃ / 10 - 90%RH		
Mass		0.85kg	0.9kg	0.9kg

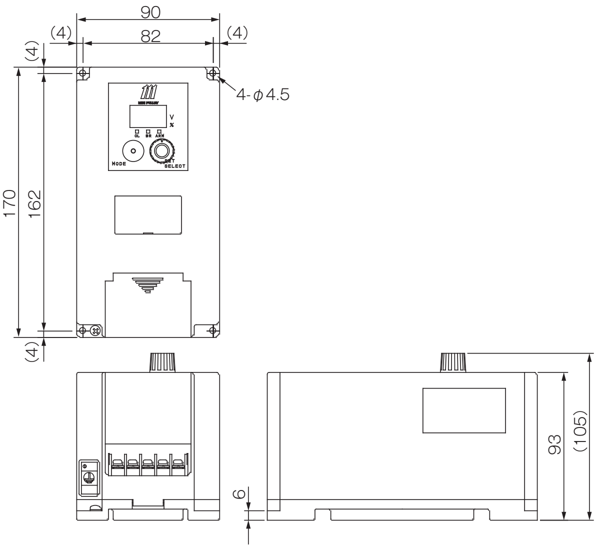
Operating Settings

Operating settings SW (SW3) Switch No.		ON (up)	OFF (down)	Settings when shipped
1	Setup/operating mode	Setup mode	Operation mode	OFF
2	Stand-alone/ interlocked mode	Stand-alone mode	Interlocked mode	OFF
3	Break/overcurrent detection	Enabled	Disabled	OFF
4	Current/voltage control	Current control	Voltage control	OFF
5	Control AUX	Enabled	Disabled	OFF
6	Jog operation	Enabled	Disabled	OFF
7	Slope operation	Enabled	Disabled	OFF
8	One-shot operation	Enabled	Disabled	OFF

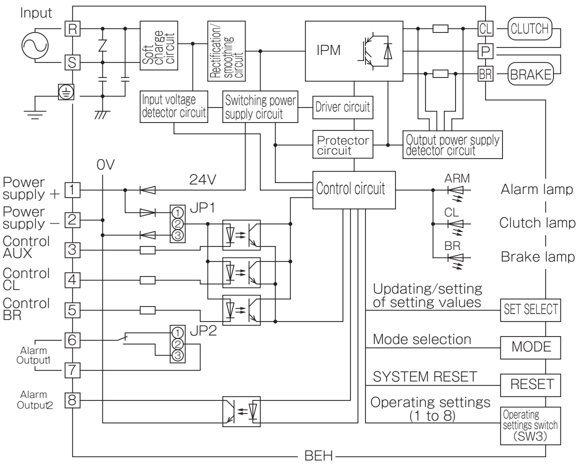
Terminals and Functions

Terminal symbol	Terminal name	Function description
R-S	Power supply input terminal	Connector for a commercial power supply
CL-P	Clutch output terminal	Connector for a clutch
BR-P	Brake output terminal	Connector for a brake
⏚	Ground	External ground terminal (third class ground or more)
1	Power supply terminal +	Positive terminal of control power supply (shared with the internal supply's +24 V)
2	Power supply terminal -	Negative terminal of control power supply (shared with the internal supply's 0 V)
3	Control AUX	When operating switch 5 (AUX operation) is on, executes the operation of the conditions set in the table.
4	Control clutch	Turns output between P and CL on and off.
5	Control brake	Turns output between P and BR on and off.
6・7	Alarm output 1	A relay that operates during an alarm stop (relay output)
8	Alarm output 2	Output operates during an alarm stop (transistor output)

Dimensions



Structure



Characteristics

Operating Response

The circuit construction is completely contactless, and response from signal input to output to the electromagnetic-actuated clutch or brake is fast and stable. The operating speed of the electromagnetic clutch or brake is also increased to the limit speed by the overexcitation and reverse excitation functions.
This is the top-of-the-line model for electromagnetic clutch/brake power supplies. It achieves ultra-high-speed control and high precision.

Noise During Operation

The BEH models are quiet power supplies.
Electromagnetic clutches and brakes normally produce howling sounds during operation. The quiet design of BEH models eliminates such sounds.

Output Control System

You can select either Stand-alone Mode, which controls stand-alone electromagnetic clutches and brakes independently, or Interlocked Mode, which is suited to combination control of electromagnetic clutches and brakes.
There is also a diverse array of other operating modes, such as current control mode and jog mode. These are compatible with a diversity of applications.

Supply Voltage Fluctuations and Output Voltage

BEH models control output voltage to be constant even with a certain amount of supply voltage fluctuation. This ensures stable output even in locations with a bad power supply environment. Variations in electromagnetic clutch/brake response disappear.
However, overly large voltage fluctuations will be sensed as abnormal voltages and set off an alarm. To ensure proper operation, keep supply voltage fluctuation to within a range of ± 10%.

Precautions for Use

Circuit Protector

BEH models incorporate circuit protectors, so there is no need to connect circuit protectors to the output side (between CL, P and BR). When a circuit protector is included, the alarm goes off and operation stops. Also, since voltage is controlled using PWM, the actual voltage output is the same level as the input voltage. This means that connecting the varistor that comes with 24 V-specification clutches and brakes or the like may result in explosion of the varistor or damage to the power supply. Never connect such devices.

Power Supply Protective Functions

These power supplies are equipped with a variety of protective functions.
These functions also alert the user to the cause of the alarm when the various alarms engage. Thoroughly verify that the cause of the alarm has been cleared and that there are no abnormalities before resuming operation.

How to Check Output Voltage Values

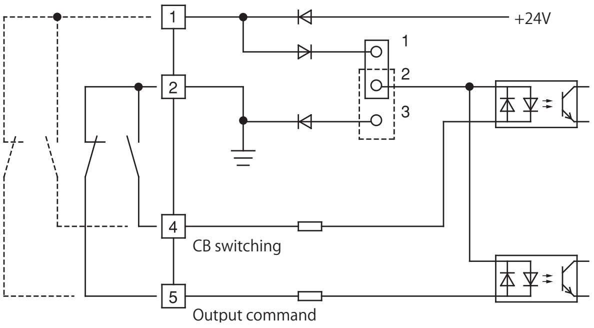
If you are checking the output voltage with a voltage meter, tester or the like, check the value with a load such as an electromagnetic clutch or brake connected to the output side.
If nothing is connected, the protective functions of break detection engage, and a value around the DC 280 V charged in the capacitor is shown, due to the characteristics of this power supply.

Applicable Ranges and Special Adjustments

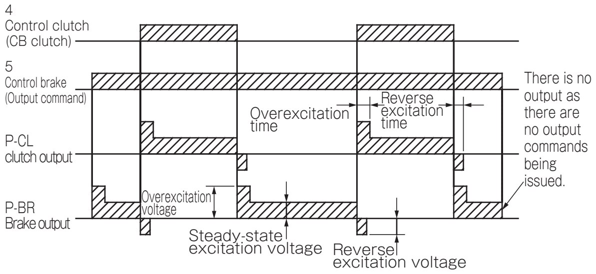
These power supplies can be used as supplies for all electromagnetic coils, not just electromagnetic clutches and brakes. The conducting conditions can be altered freely by changing internal settings. Feel free to consult Miki Pulley regarding settings, operating methods, and the like.

Wiring Methods and Timing Charts

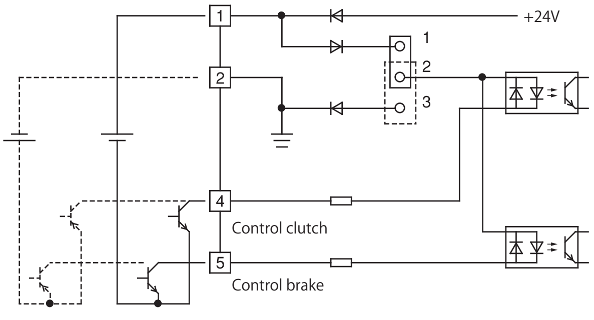
Interlocked Mode (Operating Settings SW-2 Off)



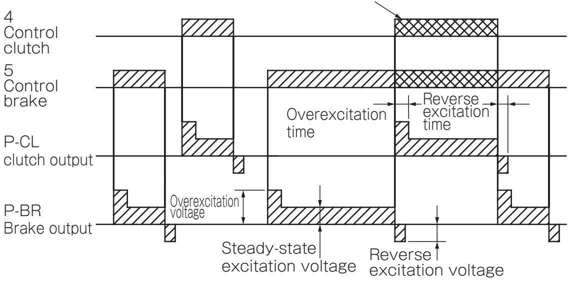
Terminal no. Toggles between the clutch and brake using a single input signal.



Stand-alone Mode (Operating Settings SW-2 On)



Terminal no. The corresponding clutch/brake operates using the signals received by the input terminals.
(Clutches and brakes cannot release output at the same time.)
The priority to determine the order of importance for signals received simultaneously can be set as desired.
*The factory default setting is clutch priority.



How to Place an Order

BEH-20G-1

Output capacity
10: 50 W
20: 100

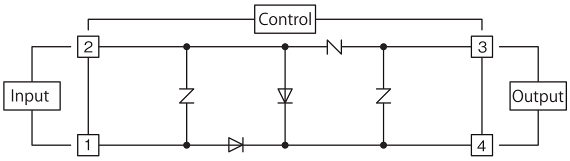
Input voltage specifications
Blank: 200 V AC
1: 100 V AC

BEW Models Supplies with Terminal Blocks for Ordinary Control

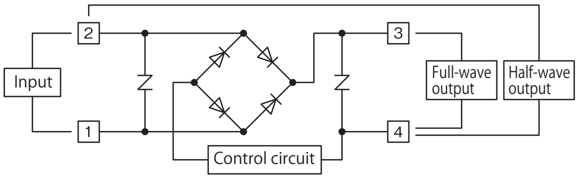
Specifications

Model			BEW-2G		BEW-4G			BEW-1R		BEW-2R		BEW-4R	
Input voltage	AC100V	± 10% 50/60Hz	●		●			●					
	AC200V			●		●				●			
	AC400V						●					●	
	Input voltage range		AC 280 V max.		AC 480 V max.			AC90 ～ 140V		AC180 ～ 280V		AC360 ～ 480V	
Rectification method			Half-wave rectification					For both half- and full-wave rectification					
								Half-wave	Full-wave	Half-wave	Full-wave	Half-wave	Full-wave
	Output voltage		DC45V	DC90V	DC45V	DC90V	DC180V	DC45V	DC90V	DC90V	DC180V	DC180V	DC360V
Output current	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		DC1.0A (DC0.7A)		DC1.0A (DC0.7A)			DC2.0A (DC1.5A)		DC1.0A (DC0.7A)		DC0.7A (DC0.5A)	
Output Wattage	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		45W (25W)	90W (50W)	45W (25W)	90W (50W)	180W (100W)	90W (50W)	180W (100W)	90W (50W)	180W (100W)	126W (90W)	252W (180W)
Size setting	Voltage specification Numbers in parentheses are input voltages		DC45V (AC100V)	DC90V (AC200V)	DC45V (AC100V)	DC90V (AC200V)	DC180V (AC400V)	DC45V (AC100V)	DC90V (AC100V)	DC90V (AC200V)	DC180V (AC200V)	DC180V (AC400V)	DC360V (AC400V)
	● Applicable △: Applicable depending on clutch/brake model	01	●	●	●	●	●	●	●	●	●	●	
		02	●	●	●	●	●	●	●	●	●	●	
		03	●	●	●	●	●	●	●	●	●	●	
		04	●	●	●	●	●	●	●	●	●	●	
		05	●	●	●	●	●	●	●	●	●	●	
		06	●	●	●	●	●	●	●	●	●	●	
		08	●	●	●	●	●	●	●	●	●	●	
		10	●	●	●	●	●	●	●	●	●	●	
		12		●		●	●		●	●	●	●	
		14		●		●	●		●	●	●	●	
		16		●		●	●		●	●	●	●	
		18		△		△	●		●	△	●	●	
		20		△		△	●		●	△	●	●	
		25		△		△	●		●	△	●	●	
Applied clutches/ brakes	MIKI PULLEY electromagnetic-actuated clutches and brakes Rated voltage DC 45/90/180 V DC45/90/180V		Spring-actuated brake					All					
Insulating resistance	Between terminal and body		DC 500 V, 100 M Ω with Megger										
Dielectric strength voltage			1500 V AC, 50 Hz, 1 min.		2000 V AC, 50 Hz, 1 min.			1500 V AC, 50 Hz, 1 min.				2000 V AC, 50 Hz, 1 min.	
Usage environment	With no condensation		-20 - +60℃										
Mass	Per product		0.04kg										

Structure

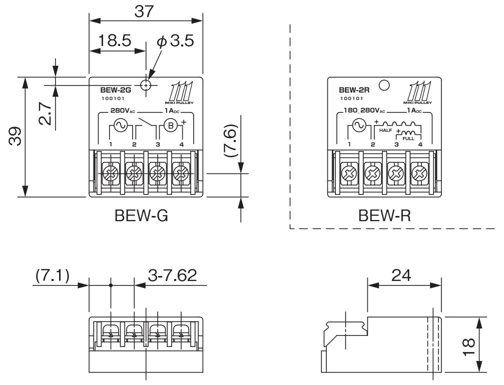


BEW-2G/4G



BEW-1R/2R/4R

Dimensions



Terminals and Functions

Model	Terminal symbol	Terminal name	Function description
BEW-G	1-2	Power supply input terminal	Connector for a commercial power supply
	2-3	Control terminal	Output is controlled by opening and closing between terminals with a relay or other contact
	3-4	Output terminal	Connector for an electromagnetic clutch or brake
BEW-R	1-2	Power supply input terminal	Connector for a commercial power supply
	2-4	Output terminal (half-wave)	Connector for an electromagnetic clutch or brake (when half-wave rectified)
	3-4	Output terminal (full-wave)	Connector for an electromagnetic clutch or brake (when full-wave rectified)

Characteristics

Output System

Two systems are available, half-wave rectified and full-wave rectified. Half-wave rectified takes a commercial power supply as the input and generates a half-wave rectified DC voltage on the output side. These power supply devices are known for their very simple construction and low cost, but their voltage pulse is large. They are therefore prone to generating variations in operating response in electromagnetic clutches and brakes, they produce a howling noise when conducting, and they tend to generate more heat from their electromagnetic coils than full-wave rectified supplies or smoothing supplies.

When the above are to be avoided, consider changing to a full-wave rectified supply, smoothing supply, or a DC 24 V specification.

Full-wave rectified power supply devices are known for having smaller voltage pulses than half-wave rectified supplies and tending to have little variation in electromagnetic clutch and brake operating response. They can thus be used not just for spring-actuated brakes but also for electromagnetic-actuated clutches and brakes.

Note that when the rated voltage of the electromagnetic coil does not match the voltage output from the power supply device, you will not be able to obtain the electromagnetic clutch/brake characteristics given in the specifications.

Precautions for Use

Circuit Protector

These power supply devices have built-in circuit protectors (varistors) on the input and output sides. There basically is no need, therefore, to install external circuit protectors.

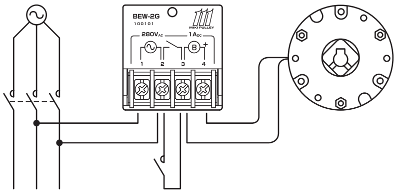
Primary and Secondary Control Methods

Primary control, which uses on/off of the input voltage to control electromagnetic clutches/brakes, saves wiring, but makes the armature release time extremely long, so the braking time of the brake becomes long. (No surge voltage is generated.)

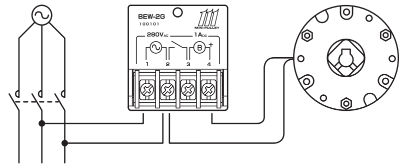
With secondary control (which controls terminals 2-3 with a relay or other contact), armature release time is shorter, as is the braking time of the brake, but there is more wiring and some surge voltages occur. Select primary or secondary control based on the characteristics you desire.

Wiring Methods and Timing Charts

BEW-G Secondary Control (Basic Wiring)

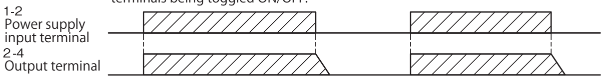


BEW-G Primary Control (Wire Saving)



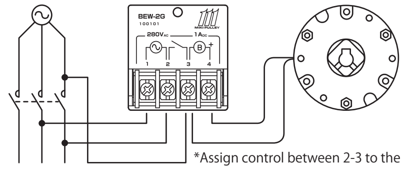
Terminal No.

<Primary side control method>
The output for the 3-4 terminals is controlled by the input power to the 1-2 terminals being toggled ON/OFF.



*Check the above before use as even though the back voltage from the coil will no longer generate when the power supply is toggled ON/OFF, the armature release time will increse.

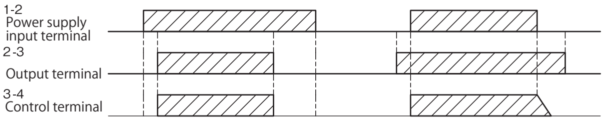
BEW-G Secondary Control (Wire Saving)



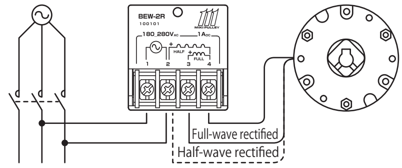
*Assign control between 2-3 to the same phase.

Terminal No.

<Secondary side control method>
The output for the 3-4 terminals is controlled by the input power to the 1-2 terminals being left on and the 2-3 terminals being toggled ON/OFF.

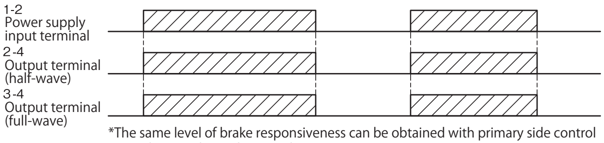


BEW-R Primary Control



Terminal no.

<BEW/R>
The output for the 2-4 terminals(half-wave) or 3-4 terminals(full-wave) is controlled by the input power to the 1-2 terminals being toggled ON/OFF.



*The same level of brake responsiveness can be obtained with primary side control as with secondary side control.

How to Place an Order

BEW-2G

Specifications — G: Standard
R: Relay included

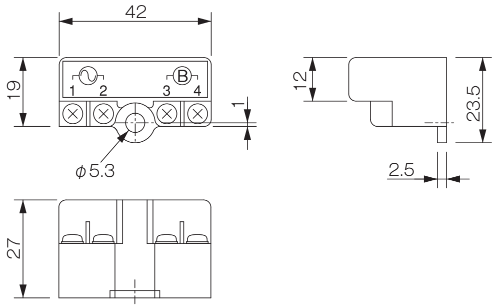
Input voltage specifications — Rated input 1: 100 V AC
Rated input 2: 200 V AC
Rated input 4: 400 V AC

BEW-S Types Compact, Light Supplies with Terminal Blocks

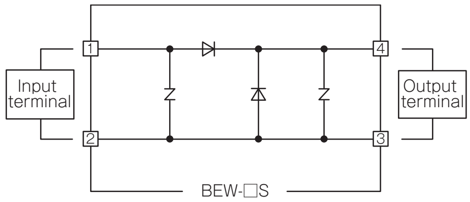
Specifications

Model			BEW-2S		BEW-4S		
Input voltage	AC100V	± 10% 50/60Hz	●		●		
	AC200V			●		●	
	AC400V						●
	Maximum input voltage		AC250V		AC510V		
Rectification method			Half-wave rectification				
	Output voltage		DC45V	DC90V	DC45V	DC90V	DC180V
Output current	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		DC1.0A (DC0.6A)				
Output Wattage	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		45W (25W)	90W (50W)	45W (25W)	90W (50W)	180W (100W)
Size setting	Voltage specification Numbers in parentheses are input voltages		DC45V (AC100V)	DC90V (AC200V)	DC45V (AC100V)	DC90V (AC200V)	DC180V (AC400V)
	●: Applicable △: Applicable depending on clutch/brake model	01	●	●	●	●	●
		02	●	●	●	●	●
		03	●	●	●	●	●
		04	●	●	●	●	●
		05	●	●	●	●	●
		06	●	●	●	●	●
		08	●	●	●	●	●
		10	●	●	●	●	●
		12		●		●	●
		14		●		●	●
		16		●		●	●
		18		△		△	●
		20		△		△	△
		25		△		△	△
Applied clutches/brakes	MIKI PULLEY electromagnetic-actuated clutches and brakes Rated voltage DC 45/90/180 V		Spring-actuated brake				
Insulating resistance	Between terminal and body		DC 500 V, 100 M Ω with Megger				
Dielectric strength voltage			1000 V AC, 50 Hz, 1 min.		2000 V AC, 50 Hz, 1 min.		
Usage environment	With no condensation		-20～+60℃				
Mass	Per product		0.021kg				

Dimensions



Structure



Terminals and functions

Terminal symbol	Terminal name	Function description
1-2	Power supply input terminal	Connector for a commercial power supply
3-4	Output terminal	Connector for an electromagnetic clutch or brake

Characteristics

Output System

BEW-2S/4S types take a commercial power supply as the input and generate a half-wave rectified DC voltage on the output side. These power supply devices are known for their very simple construction and low cost, but their voltage pulse is large. They are therefore prone to generating variations in operating response in electromagnetic clutches and brakes, they produce a howling noise when conducting, and they tend to generate more heat from their electromagnetic coils than full-wave rectified supplies or smoothing supplies.

When the above are to be avoided, consider changing to a full-wave rectified supply (BEW-R types), smoothing supply, or a DC 24 V specification.

How to Calculate Output Voltage

Output voltage = Input voltage × a (a set coefficient)

*** a (set coefficient) = 0.45: half-wave rectification**

(Ex.)

BEW-2S: AC100V × 0.45 = DC45V

BEW-4S: AC400V × 0.45 = DC180V

Note that when the rated voltage of the electromagnetic coil does not match the output voltage calculated above, you will not be able to obtain the electromagnetic clutch/brake characteristics given in the specifications.

Precautions for Use

Circuit Protector

These power supply devices have built-in circuit protectors (varistors) on the input and output sides. There basically is no need, therefore, to install external circuit protectors.

Primary and Secondary Control Methods

These power supply devices use primary control, in which electromagnetic clutches and brakes are controlled by turning input voltage on and off, as their basic control.

This control system saves wiring, but has a longer armature release time than secondary control, extending the braking time of spring-actuated brakes.

This phenomenon becomes more marked the larger the electromagnetic clutch or brake is. Primary control is thus used predominantly on small spring-actuated brakes.

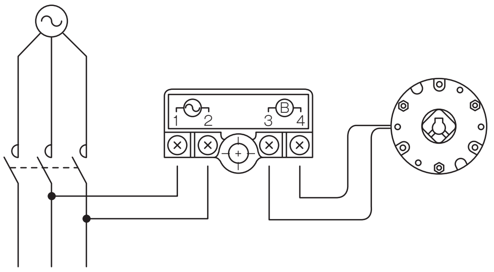
Also, primary control does not generate the surge voltage (counterelectromotive voltage) when the electromagnetic clutch or brake goes off that secondary control does, so it is very effective in machinery when noise must be avoided.

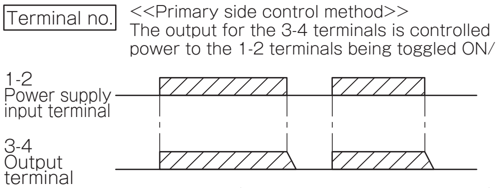
When secondary control is used to improve response, install relay contacts between the output terminals and electromagnetic clutches/brakes as shown in the wiring diagram at right.

At this time, you must install discharge elements such as varistors between relay contacts or in parallel to the electromagnetic clutch/brake.

Wiring Methods and Timing Charts

Primary Control

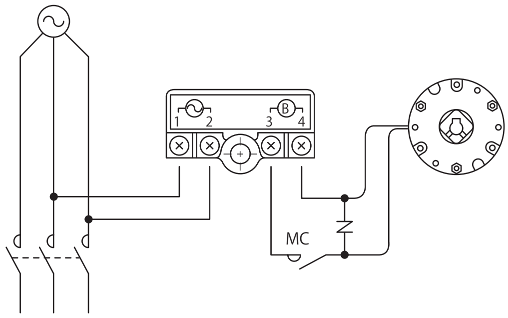


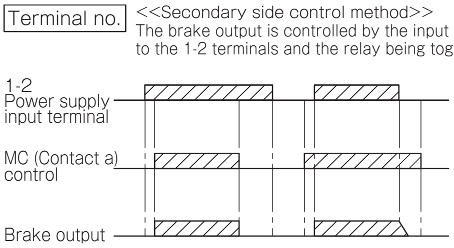


<<Primary side control method>>
The output for the 3-4 terminals is controlled by the input power to the 1-2 terminals being toggled ON/OFF.

*Check the above before use as even though the surge voltage from the electromagnetic coil will no longer generate when the power supply is toggled ON/OFF, the armature release time will increse.

Secondary Control





<<Secondary side control method>>
The brake output is controlled by the input power being input to the 1-2 terminals and the relay being toggled ON/OFF.

How to Place an Order

BEW-2S

Input voltage specifications

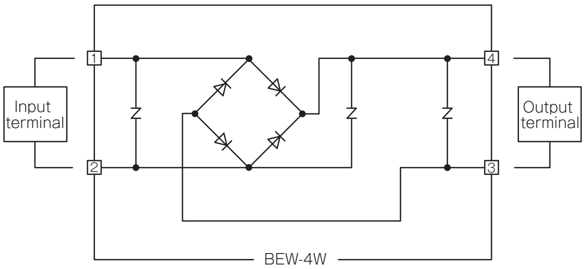
2: Rated input voltage of 200 V AC
4: Rated input voltage of 400 V AC

BEW-W Types Supplies with Terminal Blocks for Both Full- and Half-waves

Specifications

Model			BEW-4W					
Input voltage	AC100V	± 10% 50/60Hz	●					
	AC200V				●			
	AC400V						●	
	Maximum input voltage		AC510V					
Rectification method			For both half- and full-wave rectification					
			Half-wave	Full-wave	Half-wave	Full-wave	Half-wave	Full-wave
Output voltage			DC45V	DC90V	DC90V	DC180V	DC180V	DC360V
Output current	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		DC3.0A (DC2.5A)					
Output Wattage	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		135W (112W)	270W (225W)	270W (225W)	540W (540W)	540W (540W)	1080W (900W)
Size Settings	Voltage specification Numbers in parentheses are input voltages		DC45V (AC 100 V half-wave)	DC90V (AC 100 V full-wave)	DC90V (AC 200 V half-wave)	DC180V (AC 200 V full-wave)	DC180V (AC 400 V half-wave)	DC360V (AC 400 V full-wave)
	● : Applicable △ : Applicable depending on model of clutch or brake	01	●	●	●	●	●	
		02	●	●	●	●	●	
		03	●	●	●	●	●	
		04	●	●	●	●	●	
		05	●	●	●	●	●	
		06	●	●	●	●	●	
		08	●	●	●	●	●	
		10	△	●	●	●	●	
		12	△	●	●	●	●	
		14	△	●	●	●	●	
		16	△	●	●	●	●	
		18	△	●	●	●	●	
		20	△	●	●	●	●	
		25	△	●	●	●	●	
Applied clutches/brakes	MIKI PULLEY electromagnetic-actuated clutches and brakes Rated voltage DC 45/90/180 V		Spring-actuated brake					
Insulating resistance	Between terminal and body		DC 500 V, 100 M Ω with Megger					
Dielectric strength voltage			2200 V AC, 50 Hz, 1 min.					
Usage environment	With no condensation		-20 ～ +60℃ / 10 ～ 90%RH					
Mass	Per product		0.045kg					

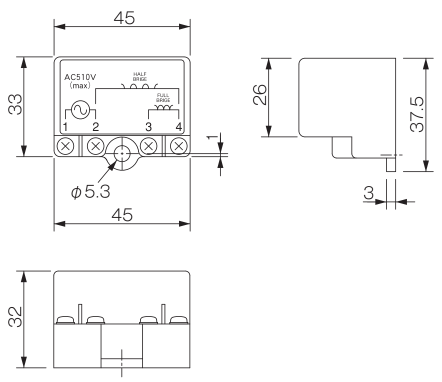
Structure



Terminals and Functions

Terminal symbol	Terminal name	Function description
1 - 2	Power supply input terminal	Connector for a commercial power supply
3 - 4	Output terminal	Connector for an electromagnetic clutch or brake

Dimensions



Characteristics

For Both Half-wave Rectified and Full-wave Rectified

For BEW-4W types, you can select between half-wave rectified and full-wave rectified by changing the connections of the wiring as shown in the figure at right.
These power supply devices are high Wattage and allow a wide range of voltage inputs, from low voltage to high. As a result, a wide variety of electromagnetic clutches and brakes can be handled by a single BEW-4W power supply alone.
You can either focus on the type of brake, assuming you will rewire, or conversely, handle a variety of types of brakes with a BEW-4W power supply alone.

How to Calculate Output Voltage

Output voltage = Input voltage × a (a set coefficient)

*** a (set coefficient) = 0.45: half-wave rectified/0.9: full-wave rectified**

(Ex.)

Half-wave: AC200V × 0.45 = DC90V

Full-wave: AC100V × 0.9 = DC90V

Note that when the rated voltage of the electromagnetic coil does not match the output voltage calculated above, you will not be able to obtain the electromagnetic clutch/brake characteristics given in the specifications.

Precautions for Use

Primary and Secondary Control Methods

These power supply devices use primary control, in which electromagnetic clutches and brakes are controlled by turning input voltage on and off, as their basic control.
This control system saves wiring, but has a longer armature release time than secondary control, extending the braking time of spring-actuated brakes.
This phenomenon becomes more marked the larger the electromagnetic clutch or brake is. Primary control is thus used predominantly on small spring-actuated brakes.
Also, primary control does not generate the surge voltage (counterelectromotive voltage) when the electromagnetic clutch or brake goes off that secondary control does, so it is very effective in machinery when noise must be avoided.

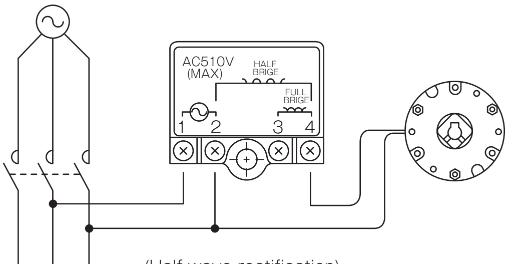
When secondary control is used to improve response, install relay contacts between the output terminals and electromagnetic clutches/brakes as shown in the wiring diagram at right.
At this time, you must install discharge elements such as varistors between relay contacts or in parallel to the electromagnetic clutch/brake.

How to Place an Order

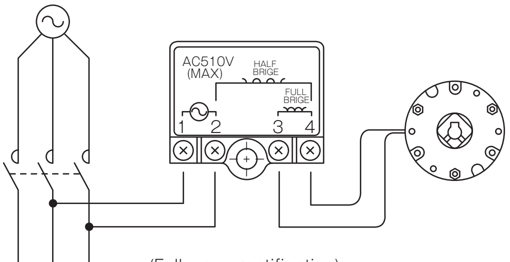
BEW-4W

Wiring Methods and Timing Charts

Primary Control

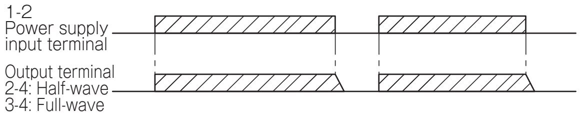


(Half-wave rectification)



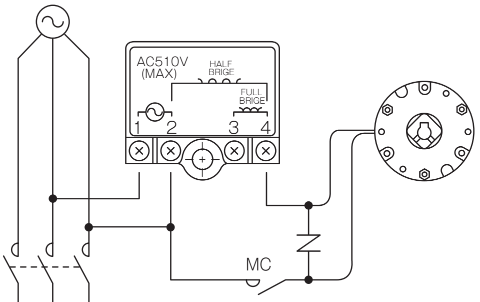
(Full-wave rectification)

Terminal no. <<Primary side control method>>
The output for the 3-4 terminals is controlled by the input power to the 1-2 terminals being toggled ON/OFF.

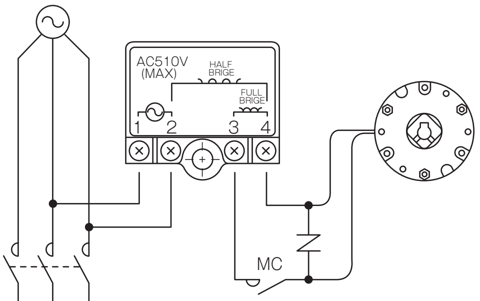


* There is no longer a surge voltage from the electromagnetic coil when power goes on or off, but armature release time is longer, so confirm this prior to use.

Secondary Control

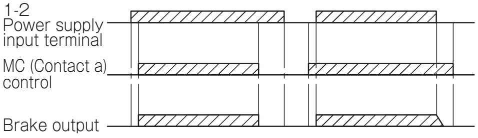


(Half-wave rectification)



(Full-wave rectification)

Terminal no. <<Secondary side control method>>
The brake output is controlled by the input power being input to the 1-2 terminals and the relay being toggled ON/OFF.



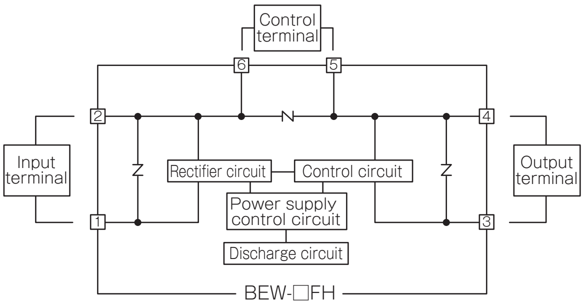
COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES
ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES
ELECTROMAGNETIC CLUTCH & BRAKE UNITS
SPRING-ACTUATED BRAKE
ELECTROMAGNETIC TOOTH CLUTCHES
BRAKE MOTORS
POWER SUPPLIES
MODELS
BES
BEH
BEW
BEW-S
BEW-W
BEW-FH
BEM
BEM-T

BEW-FH Types Overexcitation Supplies that Switch Between Full- and Half-wave

Specifications

Model			BEW-1FH		BEW-2FH		BEW-4FH	
Input voltage	AC100V	± 10% 50/60Hz	●					
	AC200V				●			
	AC400V						●	
	Input voltage range		AC80 ～ 130V		AC170 ～ 300V		AC80 ～ 480V	
Control method			Overexcitation (full-wave rectified) for 0.5 sec followed by constant excitation (half-wave rectified)					
			Overexcitation	Constant excitation	Overexcitation	Constant excitation	Overexcitation	Constant excitation
Output voltage			DC90V	DC45V	DC180V	DC90V	DC360V	DC180V
Output current	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		DC1.6A (DC1.3A) Constant excitation		DC1.6A (DC1.3A) Constant excitation		DC1.2A (DC1.0A) Constant excitation	
Output Wattage	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		72W (58W) Constant excitation		144W (117W) Constant excitation		216W (180W) Constant excitation	
Size Settings	Purpose of use		Using overexcitation	Using weak excitation	Using overexcitation	Using weak excitation	Using overexcitation	Using weak excitation
	Clutch/brake rated voltage		DC45V	DC90V	DC90V	DC180V	DC180V	DC360V
	● Applicable	01	●	●	●	●	●	
		02	●	●	●	●	●	
		03	●	●	●	●	●	
		04	●	●	●	●	●	
		05	●	●	●	●	●	
		06	●	●	●	●	●	
		08	●	●	●	●	●	
		10	●	●	●	●	●	
		12		●	●	●	●	
		14		●	●	●	●	
		16		●	●	●	●	
		18		●	●	●	●	
		20		●	●	●	●	
		25		●	●	●	●	
Applied clutches/brakes	MIKI PULLEY electromagnetic-actuated clutches and brakes Rated voltage DC 45/90/180 V		Spring-actuated brake					
Insulating resistance	Between terminal and body		DC 500 V, 100 M Ω with Megger					
Dielectric strength voltage			2000 V AC, 50 Hz, 1 min.					
Usage environment	With no condensation		-20 ～ +60℃					
Mass	Per product		0.065kg					

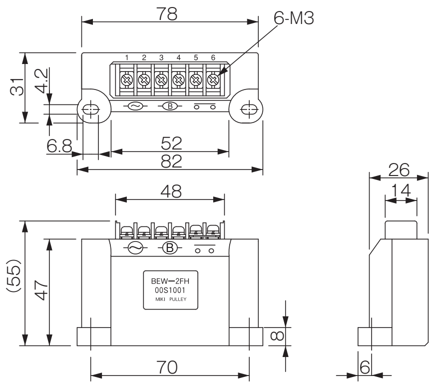
Structure



Terminals and Functions

Terminal symbol	Terminal name	Function description
1-2	Power supply input terminal	Connector for a commercial power supply
3-4	Output terminal	Connector for an electromagnetic clutch or brake
5-6	Control terminal	Output is controlled by opening and closing between terminals with a relay or other contact

Dimensions



Characteristics

Used as Overexcitation Supplies

BEW-FH models go through about 0.5 sec of full-wave rectified output and then transition to half-wave rectified output. BEW-FH power supply devices create an overexcitation state by matching their constant excitation voltage to the rated voltage of the electromagnetic clutch/brake to obtain the following effects.

- Longer electromagnetic clutch/brake service life (about double)
- Shorter armature pull-in time (about half) to achieve high frequency operation
- Longer service life (about double)
- Reduced startup interference by combined use of a spring-actuated brake and a motor

Also, the following effects can also be obtained by determining the specifications of the spring-actuated brake under the assumption that a BEW-FH power supply will be used.

- Higher torque
- Slimmer and more compact

Used as Weak Excitation Supplies

Conversely, BEW-FH power supply devices create a weak excitation state after armature pull-in by matching their overexcitation voltage to the rated voltage of the electromagnetic clutch/brake to obtain the following effects.

- Lower electricity consumption (about 1/4)
- Lower stator (electromagnetic coil) heat production (about 1/4)
- Shorter armature release time

Precautions for Use

Circuit Protector

These power supply devices have built-in circuit protectors (varistors) on the input and output sides. There basically is no need, therefore, to install external circuit protectors.

Primary and Secondary Control Methods

Primary control, which uses on/off of the input voltage to control electromagnetic clutches/brakes (shorting terminals 5-6), saves wiring, but makes the armature release time extremely long, so the braking time of the brake becomes long. (No surge voltage is generated.)

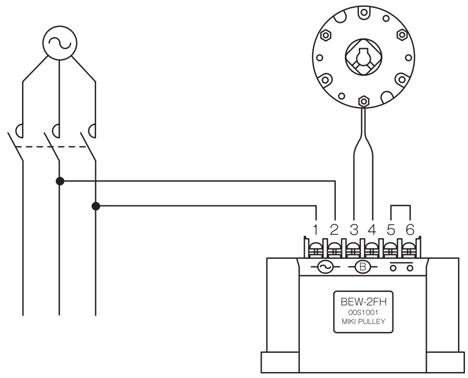
With secondary control (which controls terminals 5-6 with a relay or other contact), armature release time is shorter, as is the braking time of the brake, but there is more wiring and some surge voltages occur.

Select primary or secondary control based on the characteristics you desire.

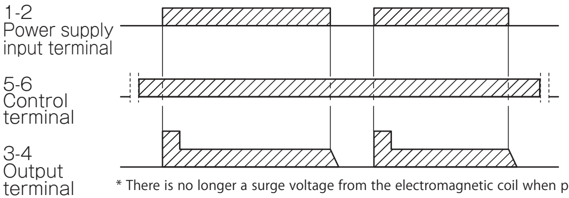
Terminals 5-6 are part of the circuit that flows into the brake, so add voltage and current to the considerations when you select relay contacts and the like.

Wiring Methods and Timing Charts

Primary Control

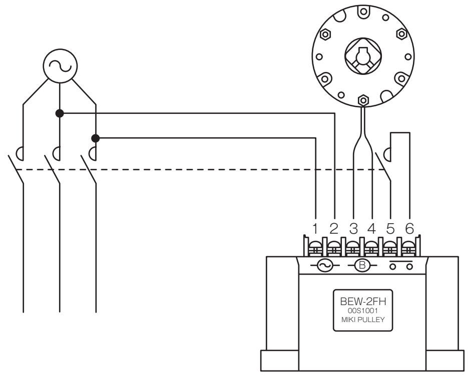


Terminal no. <<Primary side control method>>
5-6 terminals are short-circuited and the output for the 3-4 terminals is controlled by the input power to the 1-2 terminals being toggled ON/OFF.

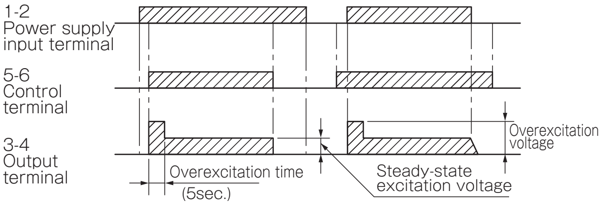


* There is no longer a surge voltage from the electromagnetic coil when power goes on or off, but armature release time is longer, so confirm this prior to use.

Secondary Control



Terminal no. <<Secondary side control methods>>
The output from the 3-4 terminal is controlled by the input power to the 1-2 terminal being left on and the 5-6 terminal being toggled ON/OFF.



How to Place an Order

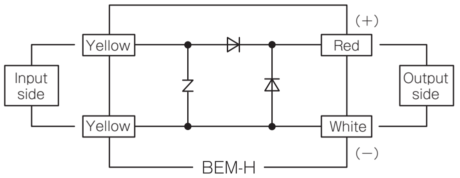
BEW-1FH
Input voltage specifications
Rated input 1: 100 V AC
Rated input 2: 200 V AC
Rated input 4: 400 V AC

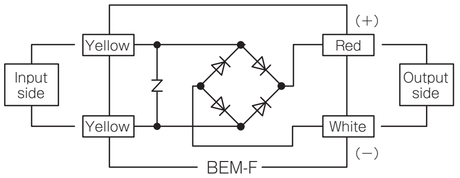
BEM Models Supplies with Compact Leads

Specifications

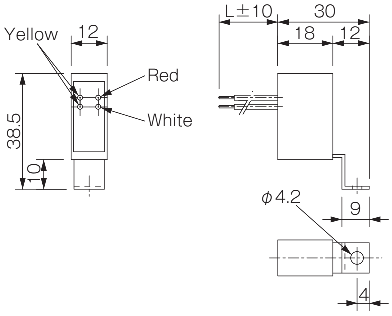
Model			BEM-2H		BEM-4H			BEM-2F	
Input voltage	AC100V	± 10% 50/60Hz	●		●			●	
	AC200V			●		●			●
	AC400V						●		
	Maximum input voltage		AC250V		AC510V			AC250V	
Rectification method			Half-wave rectification					Full-wave rectification	
	Output voltage		DC45V	DC90V	DC45V	DC90V	DC180V	DC90V	DC180V
Output current	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		DC1.0A (DC0.6A)		DC1.0A (DC0.6A)			DC1.0A (DC0.6A)	
Output Wattage	When the ambient temperature is 20℃ Values in () are for an ambient temperature of 60℃		45W (25W)	90W (50W)	45W (25W)	90W (50W)	180W (100W)	90W (50W)	180W (100W)
Size setting	Voltage specification Numbers in parentheses are input voltages		DC45V (AC100V)	DC90V (AC200V)	DC45V (AC100V)	DC90V (AC200V)	DC180V (AC400V)	DC90V (AC100V)	DC180V (AC200V)
	● : Applicable △ : Applicable depending on clutch/brake model	01	●	●	●	●	●	●	●
		02	●	●	●	●	●	●	●
		03	●	●	●	●	●	●	●
		04	●	●	●	●	●	●	●
		05	●	●	●	●	●	●	●
		06	●	●	●	●	●	●	●
		08	●	●	●	●	●	●	●
		10	●	●	●	●	●	●	●
		12		●		●	●	●	●
		14		●		●	●	●	●
		16		●		●	●	●	●
		18		△		△	●	△	●
		20		△		△	△	△	●
		25		△		△	△	△	●
Applied clutches/brakes	MIKI PULLEY electromagnetic-actuated clutches and brakes Rated voltage DC 45/90/180 V		Spring-actuated brake						
Insulating resistance	Between terminal and body		DC 500 V, 100 M Ω with Megger						
Dielectric strength voltage			1500 V AC, 50 Hz, 1 min.		2200 V AC, 50 Hz, 1 min.			1500 V AC, 50 Hz, 1 min.	
Usage environment	With no condensation		-15 ～ +60℃						
Mass	Per product		0.020kg		0.021kg			0.023kg	

Structure





Dimensions



Terminals and Functions

Lead color	Function name	Function description
Yellow (two)	Input side	Connector for a commercial power supply
Red/white	Output side	Connector for an electromagnetic clutch or brake

Characteristics

For Both Half-wave Rectified and Full-wave Rectified

BEM-2H/4H types take a commercial power supply as the input and generate a half-wave rectified DC voltage on the output side. These power supply devices are known for their very simple construction and low cost, but their voltage pulse is large.They are therefore prone to generating variations in operating response in electromagnetic clutches and brakes, they produce a howling noise when conducting, and they tend to generate more heat from their electromagnetic coils than full-wave rectified supplies or smoothing supplies.
When the above are to be avoided, consider changing to a full-wave rectified supply (BEM-2F types), smoothing supply, or a DC 24 V specification.

BEM-2F types generate a full-wave rectified DC voltage. These power supply devices are known for having smaller voltage pulses than half-wave rectified supplies and tending to have little variation in electromagnetic clutch and brake operating response.

How to Calculate Output Voltage

Output voltage = Input voltage × a (a set coefficient)

*** a (set coefficient) = 0.45: half-wave rectified/0.9: full-wave rectified**

(Ex.)

BEM-2H, -4H: 200 V AC × 0.45 = 90 V DC

BEM-2F: AC100V × 0.9 = DC90V

Note that when the rated voltage of the electromagnetic coil does not match the output voltage calculated above, you will not be able to obtain the electromagnetic clutch/brake characteristics given in the specifications.

Precautions for Use

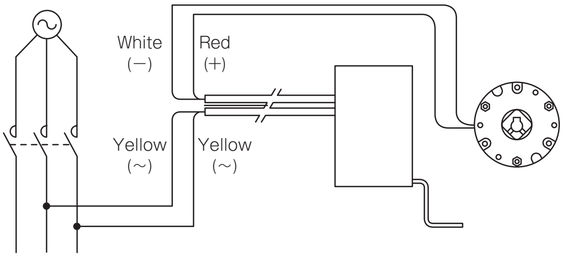
Primary and Secondary Control Methods

These power supply devices use primary control, in which electromagnetic clutches and brakes are controlled by turning input voltage on and off, as their basic control.
This control system saves wiring, but has a longer armature release time than secondary control, extending the braking time of spring-actuated brakes.
This phenomenon becomes more marked the larger the electromagnetic clutch or brake is. Primary control is thus used predominantly on smaller spring-actuated brakes.
Also, primary control does not generate the surge voltage (counterelectromotive voltage) when the electromagnetic clutch or brake goes off that secondary control does, so it is very effective in machinery when noise must be avoided.

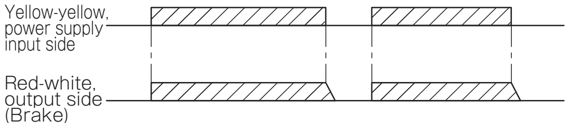
When secondary control is used to improve response, install relay contacts between the output terminals and electromagnetic clutches/brakes as shown in the wiring diagram at right.
At this time, you must install discharge elements such as varistors between relay contacts or in parallel to the electromagnetic clutch/brake.

Wiring Methods and Timing Charts

Primary Control

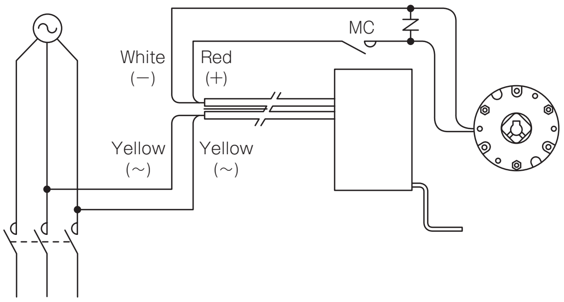


Lead wires <<Primary side control method>>
The output for the (red/white) output lead wire is controlled by the input power to the (yellow) input lead wire being toggled ON/OFF.

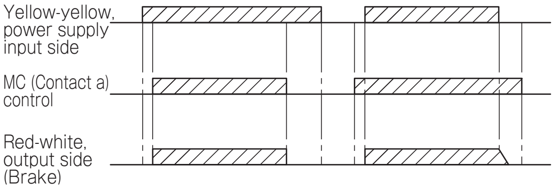


* There is no longer a counterelectromotive voltage from the electromagnetic coil when power goes on or off, but armature release time is longer, so confirm this prior to use.

Secondary Control



Lead wires <<Secondary side control method>>
The brake output is controlled by the input power being input to the (yellow) input lead wire and the relay being toggled ON/OFF.



How to Place an Order

BEM-2H 120L

Input voltage specifications
Rated input 2: 200 V AC
Rated input 4: 400 V AC

Rectification method
H: Half-wave rectification
F: Full-wave rectification

Lead wire length, three options available
120: 120 mm
240: 240 mm
360: 360 mm

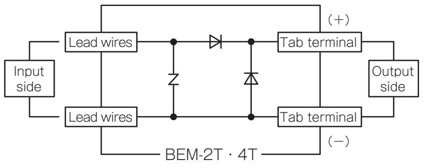
COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES
ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES
ELECTROMAGNETIC CLUTCH & BRAKE UNITS
SPRING-ACTUATED BRAKE
ELECTROMAGNETIC TOOTH CLUTCHES
BRAKE MOTORS
POWER SUPPLIES
MODELS
BES
BEH
BEW
BEW-S
BEW-W
BEW-FH
BEM
BEM-T

BEM -T Types Supplies with Ultra-compact Leads

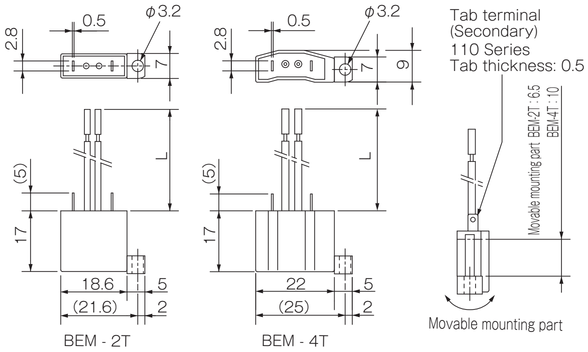
Specifications

Model			BEM-2T		BEM-4T		
Input voltage	AC100V	±10% 50/60Hz	●		●		
	AC200V			●		●	
	AC400V						●
	Maximum input voltage		AC280V		AC480V		
Rectification method			Half-wave rectification				
Output voltage			DC45V	DC90V	DC45V	DC90V	DC180V
Output current	When the ambient temperature is 20℃ Values in parentheses are for an ambient temperature of 60℃		DC1.0A (DC0.6A)		DC0.7A (DC0.5A)		
Output Wattage	When the ambient temperature is 20℃ Values in parentheses are for an ambient temperature of 60℃		45W (25W)	90W (50W)	30W (20W)	60W (40W)	125W (90W)
Size setting	Voltage specifications Figures in parentheses are input voltages		DC45V (AC100V)	DC90V (AC200V)	DC45V (AC100V)	DC90V (AC200V)	DC180V (AC400V)
	●: Applicable △: Applicable depending on clutch or brake model	01	●	●	●	●	●
		02	●	●	●	●	●
		03	●	●	●	●	●
		04	●	●	●	●	●
		05	●	●	●	●	●
		06	●	●	●	●	●
		08	●	●	●	●	●
		10	●	●	●	●	●
		12		●		●	●
		14		●		△	●
		16		●		△	●
		18		△		△	●
		20		△		△	△
		25		△		△	△
Applied clutches/brakes	MIKI PULLEY electromagnetic-actuated clutches and brakes Rated voltage DC 45/90/180 V		Spring-actuated brake				
Insulating resistance	Between terminal and body		DC 500 V, 100 MΩ with Megger				
Dielectric strength voltage			1500 V AC, 50 Hz, 1 min.		2000 V AC, 50 Hz, 1 min.		
Usage environment	With no condensation		-20 ～ +60℃				
Mass	Per product		0.008kg		0.011kg		

Structure



Dimensions



Terminals and Functions

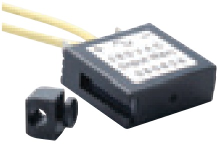
Terminal	Function name	Function description
Leads (two)	Input side	Connector for a commercial power supply
Tab terminals (two locations)	Output side	Connector for an electromagnetic clutch or brake

Recommended Products for the Tab Terminal Partner Side

• Receptacle	170043-1	(made by AMP)
• Insulation sleeve	170823-1	(made by AMP)
• ICT insulation-covered terminal, FA type, 110 series		
• ICTDEN	280509-FA	(made by Nichifu)
• Flat insertion terminal	CSS 62853-F	(made by Nichifu)
• Insulation cap	62826-F	(made by Nichifu)

Design of Mounting Part

The standard mounting feet can not only be moved, they can be removed and a dedicated mount used. Design using the following figure as a guide or consult Miki Pulley.



Recommended mounting dimensions

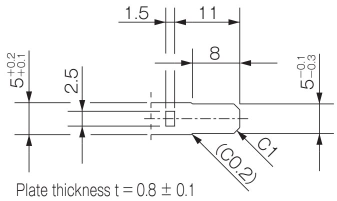


Plate thickness t = 0.8 ± 0.1

Characteristics

Output System

BEM-2T/4T types take a commercial power supply as the input and generate a half-wave rectified DC voltage on the output side. These power supply devices are known for their very simple construction, compact size, and low cost, but their voltage pulse is large. They are therefore prone to generating variations in operating response in electromagnetic clutches and brakes, they produce a howling noise when conducting, and they tend to generate more heat from their electromagnetic coils than full-wave rectified supplies or smoothing supplies.

When the above are to be avoided, consider changing to a full-wave rectified supply (BEM-2F types), smoothing supply, or a DC 24 V specification.

How to Calculate Output Voltage

Output voltage = Input voltage × a (a set coefficient)

*** a (set coefficient) = 0.45: half-wave rectification**

(Ex.)

BEM-2T: AC200V × 0.45 = DC90V

Note that when the rated voltage of the electromagnetic coil does not match the output voltage calculated above, you will not be able to obtain the electromagnetic clutch/brake characteristics given in the specifications.

Precautions for Use

Primary and Secondary Control Methods

These power supply devices use primary control, in which electromagnetic clutches and brakes are controlled by turning input voltage on and off, as their basic control.

This control system saves wiring, but has a longer armature release time than secondary control, extending the braking time of spring-actuated brakes.

This phenomenon becomes more marked the larger the electromagnetic clutch or brake is. Primary control is thus used predominantly on smaller spring-actuated brakes.

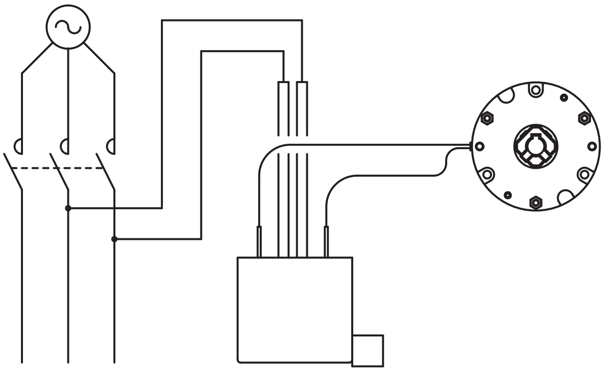
Also, primary control does not generate the surge voltage (counterelectromotive voltage) when the electromagnetic clutch or brake goes off that secondary control does, so it is very effective in machinery when noise must be avoided.

When secondary control is used to improve response, install relay contacts between the output terminals and electromagnetic clutches/brakes as shown in the wiring diagram at right.

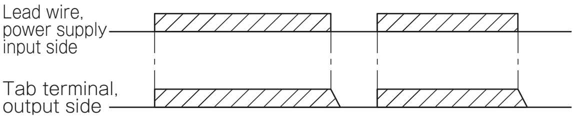
At this time, you must install discharge elements such as varistors between relay contacts or in parallel to the electromagnetic clutch/brake.

Wiring Methods and Timing Charts

Primary Control

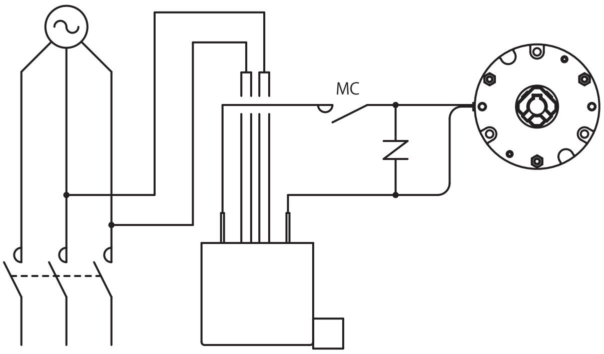


<<Primary side control method>>
The output for the tab terminal on the output side is controlled by the input power to the input lead wire being toggled ON/OFF.

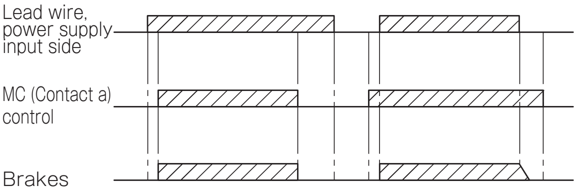


*Check the above before use as even though the back voltage from the electromagnetic coil will no longer generate when the power supply is toggled ON/OFF, the armature release time will increse.

Secondary Control



<<Secondary side control method>>
The brake output is controlled by the input power being input to the input lead wire and the relay being toggled ON/OFF.



How to Place an Order

BEM-2T 120L

Input voltage specifications
2T: 200 V AC
4T: 400 V AC

Lead wire length, three options available
120: 120 mm
240: 240 mm
360: 360 mm

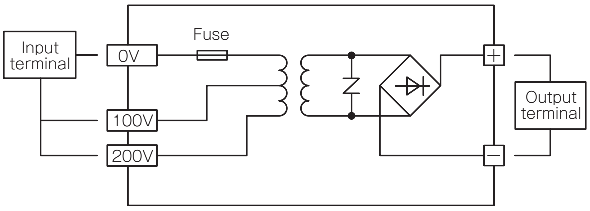
Types of Power Supply Devices

Power supply devices are necessary for electromagnetic clutches and brakes to operate. MIKI PULLEY's electromagnetic clutches and brakes all use DC power supply coils, so commercial power supplies must be converted to DC voltages by any one of a variety of methods and that voltage then supplied to the clutch or brake.

There are many ways to create a DC power supply voltage. The operating characteristics of the electromagnetic clutch and brake are greatly affected by the type and specifications of that power supply device.

Transformer Stepdown/Single-phase Full-wave Rectified System

This is the most commonly used system for power supplies for electromagnetic clutches/brakes. This system is used with DC 24 V electromagnetic clutches/brakes, has a simple, sturdy construction, and has major resistance to surge voltages (counterelectromotive voltage) that are produced when electromagnetic clutches/brakes are turned on or off, making this a rectification system that is very easy to work with.

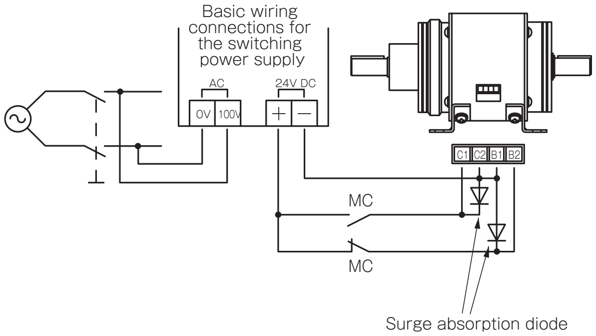


Switching Power Supplies (Off-the-shelf)

These are widely used as power supplies (usually DC 24 V) for relays, timers, programmable controllers, and a variety of other electrical equipment. They are light, compact power supply devices that generate smoothed, stable voltages.

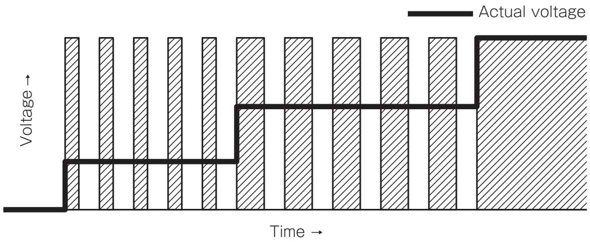
However, these power supplies are characteristically vulnerable to surge voltages generated when electromagnetic coils like those found in electromagnetic clutches and brakes turn on and off. Manufacturers of switching power supplies do not guarantee them for use in such applications. If you are using a switching power supply as the power supply device for an electromagnetic clutch or brake, you must connect a diode to serve as a surge absorber in parallel to the electromagnetic coil.

Surge absorbing diodes dramatically lengthen the armature release time, so care is advised in their use.



The PWM Control System

Repeatedly turning energization on and off is a system that creates a simulation of a given voltage as the effective value. Compared to the wasting of surplus electrical energy as heat in resistance control or the like, PWM control saves energy by turning energization on and off at high speed with control elements to get only the power needed, meaning that energy is not wasted as heat.



Half-wave Rectified Supplies (BEW and BEM Models)

Half-wave rectified power supply devices are circuits that contain two diodes, take commercial power supplies as direct input, and generate half-wave rectified DC voltage on the output side.

These power supply devices have very simple circuit structures compared to other power supply devices, and they are compact and low cost.

However, they produce variations of around 10 ms in electromagnetic clutch/brake operation due to the energizing system, which repeatedly starts and stops in a cycle of half of 50/60 Hz, the frequency of commercial power supplies. They are also prone to producing a howling noise when they are energized, and tend to generate more heat from their electromagnetic coils than full-wave rectified supplies or smoothing supplies.

This means they can be used when these trends will not have a major impact, in the event they occur. Miki Pulley recommends the use of half-wave rectified supplies in combination with spring-actuated brakes.

When variations in operation, howling noise when energized, and the like are to be avoided, consider changing to a full-wave rectified supply (BEW-1R/2R/4R types) or a DC 24 V specification.

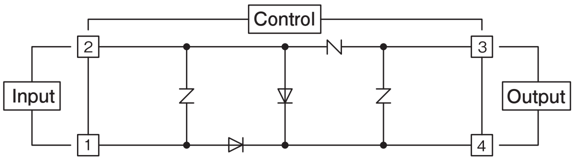
Calculating the Output Voltage from a Half-wave Rectified Power Supply

Output voltage = Input voltage × a (a set coefficient)

*** a (set coefficient) = 0.45: half-wave rectification**

(Ex.)

AC100V × 0.45 = DC45V
AC200V × 0.45 = DC90V
AC400V × 0.45 = DC180V



BEW-2G/4G

Full-wave Rectified Supplies (BEW and BEM Models)

Full-wave rectified power supply devices are circuits that contain four diodes, take commercial power supplies as direct input, and generate full-wave rectified DC voltages on the output side.

These power supplies are somewhat more expensive than half-wave rectified supplies, since they use more diodes to construct circuits, but they keep voltage pulses low, so they can suppress variation in electromagnetic clutch/brake operating times.

They can therefore be used as power supply devices for all electromagnetic clutches and brakes.

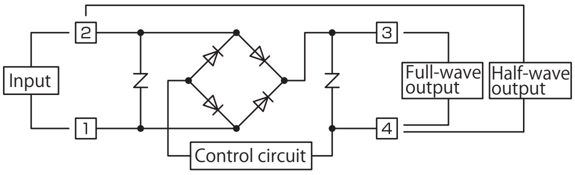
Calculating the Output Voltage from a Full-wave Rectified Power Supply

Output voltage = Input voltage × a (a set coefficient)

*** a (set coefficient) = 0.9: full-wave rectification**

(Ex.)

AC100V × 0.9 = DC90V
AC200V × 0.9 = DC180V



BEW-1R/2R/4R

Overexcitation Supplies (BES, BEH, and BEW-FH Models)

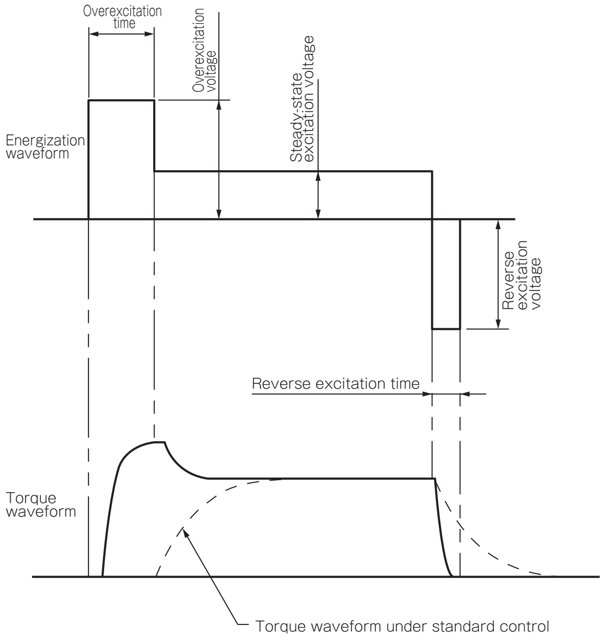
Overexcitation power supplies are power supply devices that apply and control voltage above the rated voltage for a certain set period of time with the goal of speeding up the armature pull-in time of electromagnetic clutches and brakes, boosting the torque generated, and lengthening service life (electromagnetic-actuated clutches/brakes).
By using these power supplies, the above described electromagnetic clutch and brake characteristics are notably improved.
Caution is advised, however, because if the conducting frequency and time of the electromagnetic clutch/brake are not set appropriately, the coil of the electromagnetic clutch/brake will generate abnormal heat, potentially leading to damage.

Reverse Excitation Function (BEH Models)

The reverse excitation function is a conductance system that, when energization to the electromagnetic clutch/brake is turned off, applies and controls, for a certain set period of time, a voltage of opposite polarity to the voltage just prior to energization going off, with the goal of shortening the armature release time of electromagnetic clutch/brake.
These power supply devices are more effective the larger the electromagnetic clutch or brake is. With our clutch/brake size 25, it achieves five times the responsiveness of an ordinary transformer stepdown/single-phase full-wave rectified system.
This is a big help in improving high-frequency operation and fighting phenomena.

* MIKI PULLEY overexcitation power supply devices are pre-set to optimal values.
They are pre-set to the optimal value for the given size of MIKI PULLEY electromagnetic clutch or brake, so no special adjustments are needed when installing. If you are not combining the power supply with a MIKI PULLEY electromagnetic clutch/brake, these are not optimal value conditions. Please consultMiki Pulley.

* BEH models are smoothing overexcitation power supply devices.
BEH models, which are smoothing power supplies, have very stable electromagnetic clutch/brake operating response characteristics compared to non-smoothed supplies.



Weak Excitation Supplies (BES and BEW-FH Models)

In recent years, the dimensions of electromagnetic coils and structural components have become more complex and capacities larger to meet demands for spring-actuated brakes that are more compact, slimmer, and provide higher torque.
Directly opposing societal demands for greater energy savings, greater recyclability, and avoidance of toxic materials have meanwhile created a challenging environment for electromagnetic clutches and brakes.

Spring-actuated brakes by their nature require a strong attraction force when the armature is being pulled in, but once they are pulled in, can be held in place with only a tiny amount of power.
Power beyond that required to maintain the spring-actuated brake in a released state can be considered wasted power; spring-actuated brakes waste very large amounts of such power.
Weak excitation power supplies remedy this problem of spring-actuated brakes and achieve the following sorts of effects.
Miki Pulley can design many types of both spring-actuated brakes and power supply devices to resolve such problems. Do not hesitate to consult us.

■ Compact, slim, high torque, high responsiveness, and long service life

A compact, slim, high-torque, and highly responsive spring-actuated brake with a long service life is achieved by designing the brake assuming that it will use a weak excitation power supply.

■ Energy saving

By creating a weak excitation state, they cut ordinary power by more than 90% while similarly reducing heat generated by electromagnetic coils by more than 90%.

■ Reducing the fault rate

They dramatically reduce burning of spring-actuated brakes caused by abnormal heat generation in electromagnetic coils or rises in ambient temperature, as well as burning in the periphery of spring-actuated brakes.

■ Increasing recyclability

They can be broken down into their constituent raw materials, increasing the recyclability of structural components.

Control of Electromagnetic Clutches and Brakes

Power supply devices are what is required to make electromagnetic clutches and brakes work, but control devices are necessary for freely controlling electromagnetic clutches and brakes consistent with machinery operation, so this portion must be installed separately.

Miki Pulley's BEH models, which are high-performance power supplies, get minute control input from programmable controllers or the like and perform high-Wattage energization control.

However, other power supply devices are constructed so that the power applied to the electromagnetic clutches and brakes is applied unaltered to control contacts or the like, meaning that power relays and other power control equipment is needed for control.

Each piece of control equipment has its own features, so those features must be adequately studied and control equipment selected that is matched to the machinery specifications.

Power Relays (Off-the-shelf)

There are relays that can control relatively large currents up to 10 A, which are generally called power relays.

These relays guarantee power control of high voltage and current values for AC power supplies, but in DC power supply control, they must be used within extremely low specification value ranges when the load is a DC inductive load.

This is because relay contacts are heavily worn by surge voltage (counterelectromotive voltage) generated during electromagnetic coil control. Since electromagnetic clutches and brakes have electromagnetic coils, check the catalog specification values at the conditions of the DC inductive load of the power relay you will use.

General guideline values are given below.

For LY series, made by Omron

Primary Control of Electromagnetic Clutches and Brakes

AC voltage: AC 110 V (no more than the maximum AC 250 V)
AC current: AC 4 A max.
Wattage: 100W max.

Secondary Control of Electromagnetic Clutches and Brakes

DC voltage: DC 24 V (no more than the maximum DC 125 V)
DC current: DC 1 A max.
Wattage: 25W max.

- * Secondary control values are for when a MIKI PULLEY varistor is used.
- * The above values must be within the specification value ranges for all three items.
- * For primary and secondary control, see the control wiring of the individual model of power supply.
- * When diodes are used as discharge elements, the specification values of primary control are allowed even with secondary control.

Electromagnetic Contactors (Off-the-shelf)

Electromagnetic contactors and electromagnetic switches, which are widely used in control of induction motors and the like, are very effective as control equipment for controlling large electromagnetic clutches and brakes.

These electromagnetic contactors can control several times as much voltage and current as power relays, and are particularly effective in high-voltage control.

Electromagnetic contactors are suited to high-power control, but a discharge element such as a varistor must be added for surge voltages (counterelectromotive voltages) generated when controlling electromagnetic clutches and brakes.

Were one to control a large electromagnetic clutch or brake without using a discharge element, the surge voltage generated might exceed 2000 V. This voltage easily exceeds the rated voltage of the electromagnetic contactor, ultimately greatly wearing the contacts, which is likely to prevent the equipment from having its expected service life.

General guideline values are given below.

For SC series, made by Fuji Electric

Primary Control of Electromagnetic Clutches and Brakes

AC voltage: AC 220 V (no more than the maximum AC 440 V)
AC current: AC 3 A max.
Wattage: 450 W max.

Secondary Control of Electromagnetic Clutches and Brakes

DC voltage: DC 220 V max.
DC current: DC 2 A max.
Wattage: 150W max.

- * Secondary control values are for when a MIKI PULLEY varistor is used.
- * The above values must be within the specification value ranges for all three items.
- * For primary and secondary control, see the control wiring of the individual model of power supply.
- * When diodes are used as discharge elements, the specification values of primary control are allowed even with secondary control.

Solid State Relays/SSR (Off-the-shelf)

SSRs used in control of the various load devices are highly suited to control by programmable controller. In recent years, their use has continued to grow. Most SSRs are intended for control of AC supplies; 80% of SSRs on the market are for AC power supply control.

When using an AC control SSR for an electromagnetic clutch/brake, the input voltage (which is the primary side of the power supply device) is controlled.

The "zero cross control" used in SSR control slows response when used with primary control, so be careful when using it with electromagnetic clutches and brakes.

Maximum rated voltage is a very important specification with DC supply control SSRs.

When controlling an electromagnetic clutch or brake with a DC SSR, the surge voltage generated must be kept within the SSR rating. In other words, a discharge element such as a varistor or diode must be used.

If no discharge element is added, the SSR will be damaged in a short time. For details, contact the SSR manufacturer or Miki Pulley.

Contactless Control (Power MOS-FET/Power Transistor)

The major goals of contactless control of electromagnetic clutches and brakes are high-frequency operation and high-precision operation.

Such control is suited to cases in which delay of output vis-a-vis input signals, as happens with control using contacts, is undesirable. It offers major advantages such as the doing away with the need for wear-related maintenance and the ability to make devices smaller by making a control board.

Although contactless control has these many advantages, caution is advisable when selecting elements. Should a selection be made badly, not only will the electromagnetic clutch or brake not deliver the desired characteristics, the elements will be damaged in a short period of time, and peripherals could even be affected.

The following serves as a general guide for selecting elements.

Control of selection example 101-12-13 and an ordinary switching supply

Conditions

- **Clutch used: 101-12-13**
- **Rated voltage: DC 24 V**
- **Rated current: DC 1.09 A**
- **Varistor used: 82 V varistor (TNR7V820K)**

Elements selected

- **Rated voltage: 200 V min.**
- **Rated current: 5 A min.**

■ Key selection issues

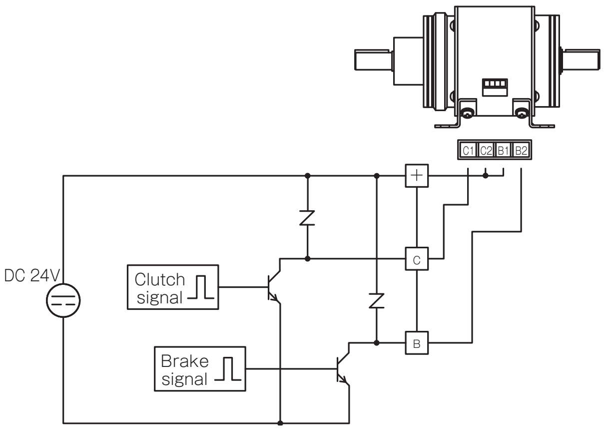
The rated voltage of the element must be at least the highest voltage applied to the element.

In the above example, the surge voltage generated when the electromagnetic clutch or brake is controlled by on/off is the highest value.

Varistors have variation in clamping voltages due to their operating characteristics, and a maximum clamping voltage is defined. Under these element conditions (82 V elements), that value is 135 V.

A safety factor for this voltage is required for the element. With a minimum safety factor of 1.3, 135 V × 1.3 = 175.5 V. Thus, the rated voltage of the element must be at least 200 V.

The rated current of the element must be at least three times the current value actually flowing. Also, the amount of heat generated by the element varies considerably with the type of element selected, energizing conditions, and ambient environment. In the end, evaluate the heat generation of the element under usage conditions, and check whether the amount of heat generated is within the specified value range of the element.



Other Control

■ Current control (electromagnetic-actuated clutches and brakes)

This control system is intended for torque control of electromagnetic clutches and brakes.

Electromagnetic clutches and brakes generate attraction force using the current flowing into the electromagnetic coil and transmit torque using that attraction force. The value of the current flowing into the electromagnetic coil must therefore be controlled in order to control torque.

Miki Pulley offers power supply devices for performing this current control. Feel free to consult Miki Pulley.

■ Voltage control

There are many different purposes to voltage control, and many different ways to implement that control. All of the following are voltage controls.

- Weak excitation control
  Simple torque control (using voltage regulation)
  Softens shocks upon engagement
  Speeds up armature release
  Suppresses heat generation in electromagnetic coils
- Overexcitation control
  Shortens armature pull-in time
  Boosts torque
- Rapid excitation control
  Shortens armature pull-in time
- Rapid overexcitation control
  Shortens armature pull-in time
  Boosts torque

To implement the control described above, the power supply voltage must be set to a prescribed state and some kind of control performed.

- Switching control, preparing several types of supply voltage
- Control of voltage using knob
- Switching control without using contacts
- Voltage control that inserts resistors in series to divide voltage

■ Rapid excitation control

This is a circuit that makes the time constant smaller to speed up the armature pull-in time of the electromagnetic clutch or brake.

The circuit places resistors in series with the electromagnetic clutch/brake and pre-sets the power supply voltage high. The supply voltage and the resistance values are set according to various conditions so that DC 24 V, which is the rated voltage, is applied to the electromagnetic coil.

This control method requires that a current similar to the current value flowing to the electromagnetic clutch/brake also flow to the resistors and that the resistance Wattage be set high. The heat generated by the resistors must also be considered.

* Time constant
The time constant exhibits the characteristic that the value of the current flowing inward gradually rises as DC voltage is applied, since the electromagnetic clutch or brake is an inductive load.
This characteristic has a value determined by the type and size of the electromagnetic clutch or brake, such that the larger the object, the slower the current movement becomes.

■ Rapid overexcitation control

The armature pull-in time can be made even shorter than with rapid excitation control by adding a large capacitor to the rapid excitation circuit.

An overexcitation voltage is generated by the capacitor, so the on/off times must be set factoring in the heat generated by the electromagnetic coil and the time to charge the capacitor.

Surge Voltages and Discharge Elements

What is Surge Voltage?

When current flows to the electromagnetic coil of an electromagnetic clutch or brake, the coil is excited, the pull-in force required by the clutch or brake is generated, and work is performed.

Energy is accumulated within the coil, which has reached the prescribed current value; the larger the clutch or brake size, the larger is the amount of that energy. At this time, if current is shut off, a surge voltage of only part of the accumulated energy is generated. This is generated by working to keep current flowing, since the electromagnetic clutches and brakes are inductive loads. Surge voltages are larger with larger sizes, as noted above, and voltages easily exceeding 1000 V are generated in control contacts and within electromagnetic coils. This phenomenon can cause contact burning or electromagnetic coil insulation breakdown. It is thus very important to use discharge elements to limit this surge voltage to an appropriate value.

In general, a high surge-limit voltage means a short armature release time; conversely, a low limit voltage tends to mean a longer time. When selecting a circuit protector, it is very important to factor in machinery specifications, power supply device/control circuit conditions, and the like.

The Role of Varistors

We recommend using a varistor for the discharge element.

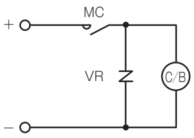
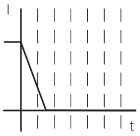
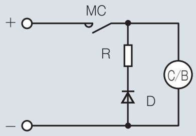
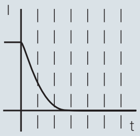
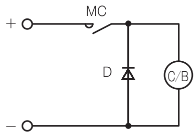
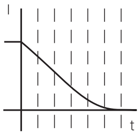
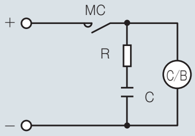
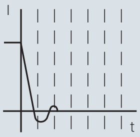
The reason is that it is easy to set the limit voltage needed for the varistor to appropriately control the electromagnetic clutch/brake; the element is also very small and can adequately handle different amounts of surge energy.

By selecting an appropriate varistor, the electromagnetic clutch/brake can be used without impairing innate characteristics.

When the selection has an inappropriately high limit voltage, control contact may be burned or the power supply device damaged.

Conversely, when the limit voltage is too low, the varistor may be burned by the power supply device or the power supply device may be damaged. Also, even when such phenomena do not occur, the armature release time is prone to becoming long.

Types of Discharge Elements

Element type	Circuit diagram	Current decay	Characteristics	Clutch/brake		Recommended product
				Size	Rated voltage (input voltage specification)	
Varistor			Very effective in keeping surge voltage small without adding delay to the armature release time.	Electromagnetic-actuated #02 to #25	DC24V	NVD07SCD082 or an equivalent (NVD14SCD082 or an equivalent)
				Electromagnetic-actuated #31 or over	DC24V	NVD14SCD082 or an equivalent
				Spring-actuated #01 to #18	DC24V	NVD07SCD082 or an equivalent
					DC 45 V (AC 100 V - half-wave rectified)	NVD07SCD220 or an equivalent
					DC 90 V (AC 100 V - full-wave rectified)	
					DC 90 V (AC 200 V - half-wave rectified)	NVD07SCD470 or an equivalent
					DC 180 V (AC 200 V - full-wave rectified)	
					DC 180 V (AC 400 V - half-wave rectified)	NVD14SCD820 or an equivalent
				Spring-actuated #20 or over	DC24V	NVD14SCD082 or an equivalent
					DC 45 V (AC 100 V - half-wave rectified)	NVD14SCD220 or an equivalent
					DC 90 V (AC 100 V - full-wave rectified)	
					DC 90 V (AC 200 V - half-wave rectified)	NVD14SCD470 or an equivalent
					DC 180 V (AC 200 V - full-wave rectified)	
					DC 180 V (AC 400 V - half-wave rectified)	NVD14SCD820 or an equivalent
Resistor + Diode			Can keep power consumption of the power supply part low and resistor Wattage low. The armature release time becomes somewhat longer, so care is required in high frequency use.	#01 to #25	DC24V	☐ Rated voltage of diode • DC 24 V: 100 V min. • AC 100 V: 400 V min. • AC 200 V: 800 V min. ☐ Rated current of diode • Specification of excitation current or more ☐ Resistance • About 10 times coil resistance
					DC 45 V (AC 100 V - half-wave)	
					DC 90 V (AC 100 V - full-wave)	
					DC 90 V (AC 200 V - half-wave)	
					DC 180 V (AC 200 V - full-wave)	
Diode			While the effect in suppressing surge voltage is very high, the armature release time becomes extremely long. Pay attention to high-frequency specifications and fighting between clutches and brakes.	#01 to #25	DC24V	☐ Rated voltage of diode • DC 24 V: 100 V min. • AC 100 V: 400 V min. • AC 200 V: 800 V min. ☐ Rated current of diode • Specification of excitation current or more
					DC 45 V (AC 100 V - half-wave)	
					DC 90 V (AC 100 V - full-wave)	
					DC 90 V (AC 200 V - half-wave)	
					DC 180 V (AC 200 V - full-wave)	
Resistor + Capacitor			Although armature release time becomes very short, a high-breakdown-voltage capacitor must be used and the device becomes large.	#01 to #25	DC24V	Capacitor C [μ F]: Ratio to contact current is: $\frac{C[\mu F]}{I[A]} = \frac{0.5 \sim 1}{1}$ Breakdown voltage: 600 [V] Resistance R [Ω]: Ratio to contact current is: $\frac{R[\Omega]}{E[V]} = 1$ Wattage = 1 [W]
					DC 45 V (AC 100 V - half-wave)	
					DC 90 V (AC 100 V - full-wave)	
					DC 90 V (AC 200 V - half-wave)	
					DC 180 V (AC 200 V - full-wave)	

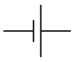
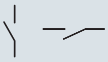
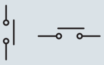
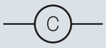
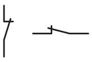
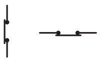
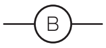
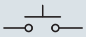
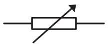
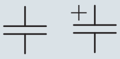
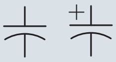
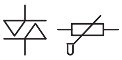
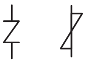
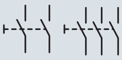
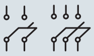
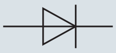
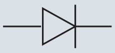
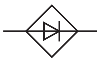
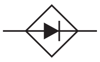
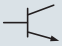
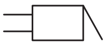
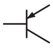
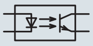
* Some spring-actuated brakes come with varistors other than those recommended above, depending on size.

* Recommended varistors with NVD☐ model names are made by KOA. Items in parentheses are the products that can be used.

Symbols Used in Electrical Circuits

Figure Notations

With rapid advances in science and technology, many new codes and symbols have been adopted in drawings. The drawing symbols below have been created based on JIS handbooks and code and on drawing symbol handbooks primarily for machinery and elements that have long been widely used. The IEC standard or commonly used symbol is labeled Symbol 1; previously used symbols are labeled Symbol 2,

Name	Symbol		Name	Symbol	
	Symbol 1 (IEC or equivalent)	Symbol 2 (old symbol)		Symbol 1 (IEC or equivalent)	Symbol 2 (old symbol)
DC power supply			Motor		
AC power supply			Induction motor		
Fuse			Generator		
Relay a-contact			Electromagnetic clutch		
Relay b-contact			Electromagnetic brake		
Pushbutton switch a-contact			Clutch or Brake		
Pushbutton switch b-contact			Transformer		
Limit switch a-contact			Resistor		
Limit switch b-contact			Variable resistor		
Timer (ON delay) a-contact			Capacitor		
Timer (ON delay) b-contact			Varistor		
Knife switch			Diode		
Magnetic contactor			Rectifier (bridge type)		
Lamp			Transistor (NPN type)		
Buzzer			Transistor (PNP type)		
Ground			Photocoupler		
Connect to outer case			Coil		

* This catalog uses the symbols that are currently the most common in its figures.

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
ELECTROMAGNETIC-ACTUATED CLUTCHES AND BRAKES
ELECTROMAGNETIC-ACTUATED MICRO CLUTCHES & BRAKES
ELECTROMAGNETIC-ACTUATED CLUTCHES & BRAKES
ELECTROMAGNETIC CLUTCH & BRAKE UNITS
SPRING-ACTUATED BRAKE
ELECTROMAGNETIC TOOTH CLUTCHES
BRAKE MOTORS
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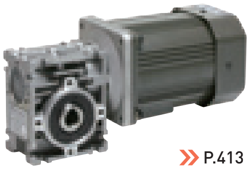
BEM-T

SPEED CHANGERS & REDUCERS

CONTENTS

Speed Changer and Reducer Models

Series	**HOLLOW SHAFT / SOLID SHAFT SPEED CHANGERS AND REDUCERS**			**BELT-TYPE STEPLESS SPEED CHANGER UNITS**
Device	Hollow Shaft Speed Changers and Reducers		Solid Shaft Speed Changers and Reducers	ANS Series
Model	RW mini	RWM BS	AXM	ANS
	 » P.413	 » P.416	 » P.424	 » P.430
	RWM	RWP	AXP	ANW
	 » P.414	 » P.418	 » P.426	 » P.432

Series	**STAND-ALONE BELT-TYPE STEPLESS SPEED CHANGERS**			
Device	Single Variable Pitch Pulleys			
Model	P	AP	PL	PK
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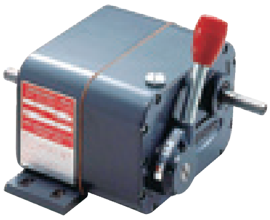
Series	**ZERO-MAX STEPLESS SPEED CHANGERS**	
Device	Stand-alone	With Motor
Model	S	MS
	 » P.488	 » P.490

ANG

» P.436

ACW

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ANB

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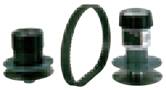
PDS Series

PDS



» P.446

PDC

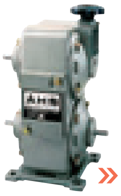
» P.448

PDG

» P.450

AH Series

AHS



» P.456

AHM

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Speed Changer Belts

BELT

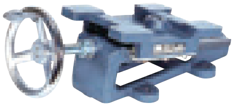
» P.463

PF

» P.474

Motor Slide Bases

R/RK/RH



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Intermediate Wheels

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DC MOTORS

DC Motors

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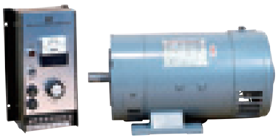
SYD



» P.500

ROTATION SPEED INDICATORS

Weight Type

SD Stand-alone

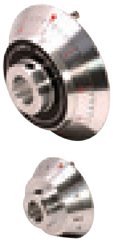
» P.508

SD with Handle

» P.508

Differential Type

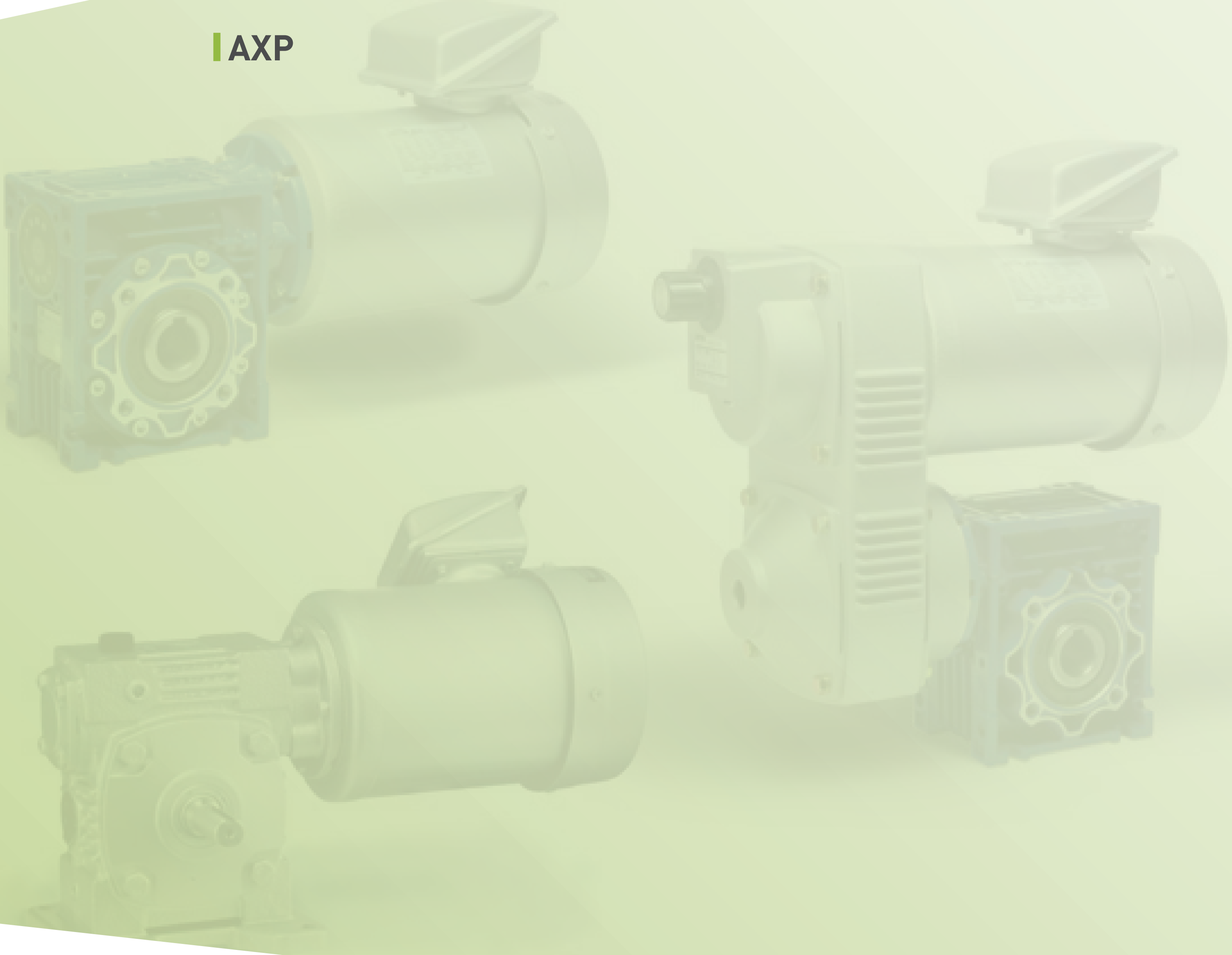
SD Differential Type



» P.510

HOLLOW SHAFT / SOLID SHAFT SPEED CHANGERS AND REDUCERS

- **RW mini**
- **RWM**
- **RWM BS**
- **RWP**
- **AXM**
- **AXP**

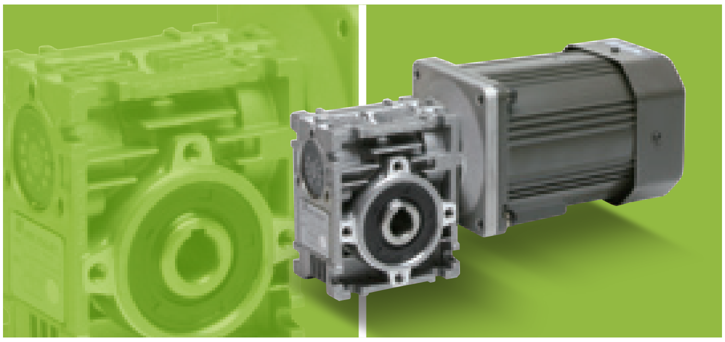


Hollow Shaft Geared Motor

RW mini

Motor output	60 W, 90 W (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30

Compact Orthogonal-type Hollow Shaft Geared Motors with a 60 W or 90 W Output



Enables Reduction in Size and Mass of Machines

Power transmission parts such as a coupling, chain, and sprocket are not necessary. And the use of aluminum die cast for the housing enables reducing the mass of machines.

High Safety

Since the product can be directly mounted, the rotating part is not exposed to the outside. Thus, high safety is ensured without installing a safety cover.

High Water and Dust Resistance

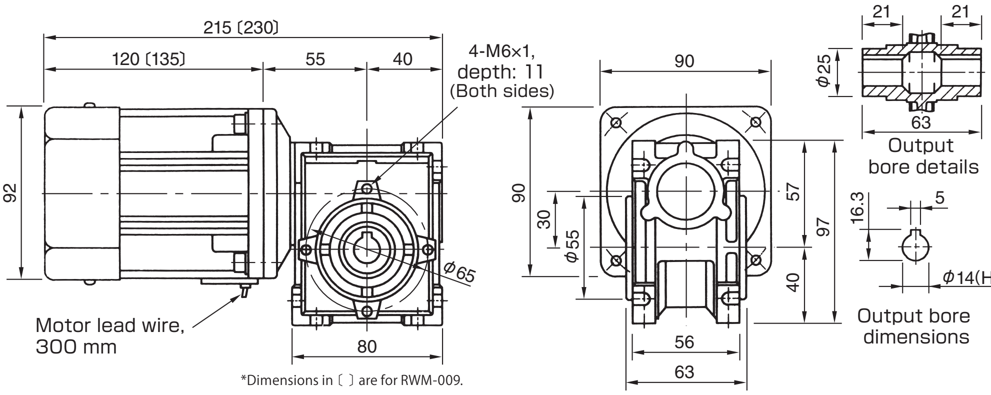
The motor and speed reducer have a high environmental resistance because they have an IP54-compliant structure.

Specifications

Model		Motor output [W]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed reduction ratio	Output shaft rotation speed [min⁻¹]		Output shaft torque [N・m]		Mass [kg]
						50Hz	60Hz	50Hz	60Hz	
RWM-006-30	-10	60	4	Three-phase, 200/50, 200・220/60	1/10	135	163	3.4	2.9	3.6
	-20	60	4	Three-phase, 200/50, 200・220/60	1/20	67.5	81.3	6.1	5.1	3.6
	-30	60	4	Three-phase, 200/50, 200・220/60	1/30	45	54.2	8.2	6.8	3.6
RWM-009-30	-10	90	4	Three-phase, 200/50, 200・220/60	1/10	133	160	5.2	4.3	4.1
	-20	90	4	Three-phase, 200/50, 200・220/60	1/20	66.3	80	9.2	7.7	4.1
	-30	90	4	Three-phase, 200/50, 200・220/60	1/30	44.2	53.3	12.3	10.3	4.1

* The output shaft rotation speed and output shaft torque values are based on the rated motor load.

Dimensions



*Dimensions in〔 〕are for RWM-009.

Unit [mm]

How to Place an Order

RWM-006-30-10-□-□

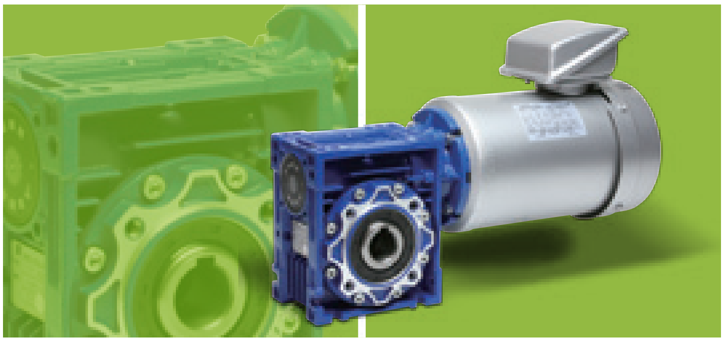
Size
Option
Nominal speed reduction ratio

Hollow Shaft Geared Motor

RWM

Motor output	0.2 kW to 1.5 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

Compact and Lightweight Hollow Shaft Geared Motors



Reduction in Mounting Time

All you need to do is just place the product in the driving part of the machine. It can be secured with an optional torque arm (rotation stopper) or an optional output flange.

Free Mounting Direction

The product can be mounted freely in any direction because the structure is sealed (there is no oil fill plug or air vent hole).

High Efficiency, Long Life, and Low Noise

The use of a highly efficient worm gear enables smoother movement and produces less noise than other gear mechanisms.

Light and Compact

An aluminum die cast housing enables significant reduction of mass and size.

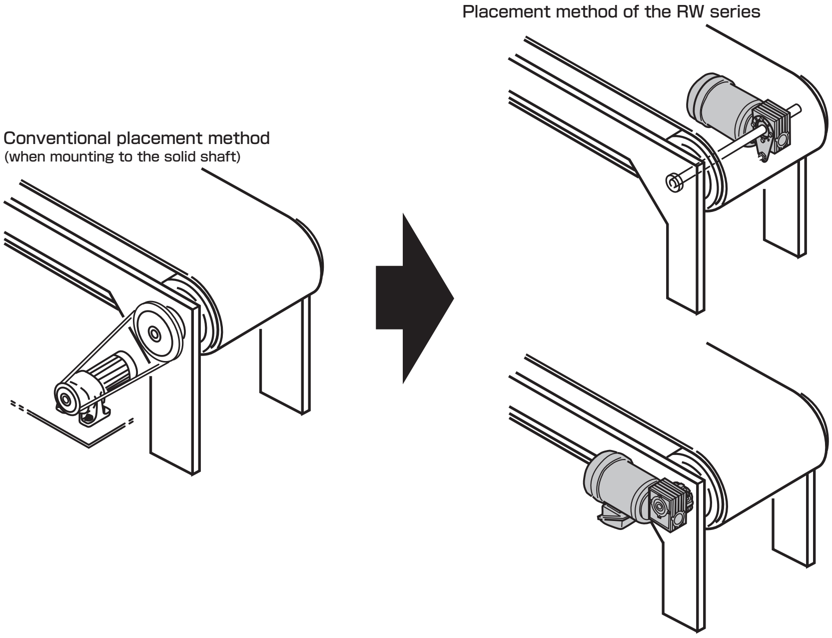
Oil Replacement Is Not Required

The use of special long life oil eliminates the need to replace oil.

Easy to Change Speed to Meet Requirements

Combined use with the inverter facilitates the addition of a speed changing function.

Placement Method



Specifications

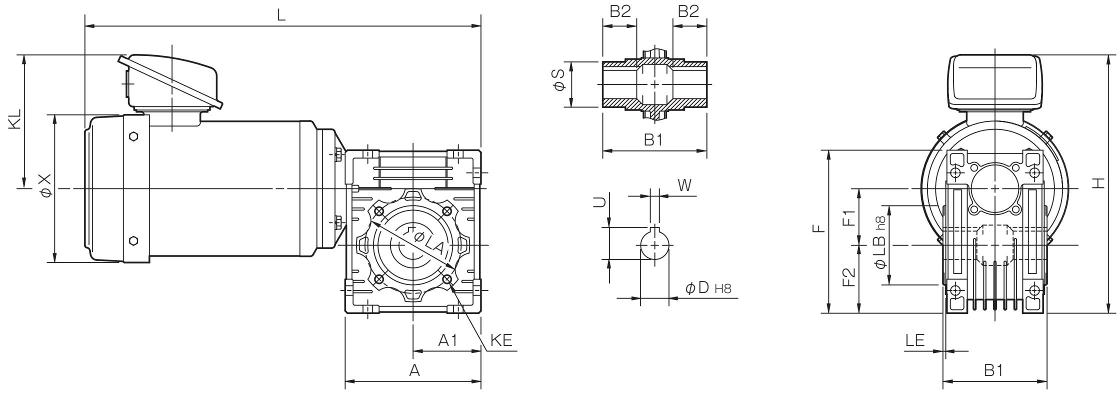
Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed reducer frame number	Speed reduction ratio						Mass [kg]
					10	20	30	40	50	60	
RWM-02-40-□-IE1	0.2	4	Three-phase, 200/50, 200・220/60	40	1/10	1/20	1/30	1/40	1/50	1/60	8.8
RWM-04-50-□-IE1	0.4	4	Three-phase, 200/50, 200・220/60	50	1/10	1/20	1/30	1/40	1/50	1/60	12
RWM-07-63N-□-IE3	0.75	4	Three-phase, 200/50, 200・220/60	63N	1/10	1/20	1/30	1/40	1/50	1/60	23.2
RWM-15-75N-□-IE3	1.5	4	Three-phase, 200/50, 200・220/60	75N	1/10	1/20	1/30	1/40	1/50	1/60	33

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

Model	Frequency [Hz]	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m] per speed reduction ratio											
		1/10		1/20		1/30		1/40		1/50		1/60	
		Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque
RWM-02-40-□-IE1	50	143	11.6	71.5	21.2	47.7	28.6	35.8	35.4	28.6	39	23.8	36
	60	171.5	9.6	85.8	17.7	57.2	23.8	42.9	29.5	34.3	35.2	28.6	36
RWM-04-50-□-IE1	50	142.5	23.5	71.3	43.2	47.5	59	35.6	73.2	28.5	73	23.8	68
	60	171	19.6	85.5	36	57	49.2	42.8	61	34.2	73	28.5	68
RWM-07-63N-□-IE3	50	144	44.7	72	83.3	48	114	36	144	28.8	135	24	130
	60	172.5	37.3	86.3	69.4	57.5	95.1	43.1	120	34.5	135	28.8	130
RWM-15-75N-□-IE3	50	145	94.9	72.5	179	48.3	230	36.3	220	29	210	24.2	200
	60	174	79.2	87	150	58	211	43.5	220	34.8	210	29	200

* The output shaft rotation speed and output shaft torque values are based on the 200V 50/60Hz rated load. However, the output shaft torque may be limited to the rated value of the speed reducer.

Dimensions



Unit [mm]

Model	Dimensions of part								Dimensions of output part									
	A	A1	F	F1	F2	H	KL	L	X	KE	LA	LB	LE	S	B1	B2	D	U	W
RWM-02-40-□-IE1	100	50	121.5	40	50	208	118	312.5	131	4-M6-8	75	60	2.5	30	78	26	18	20.8	6
RWM-04-50-□-IE1	120	60	144	50	60	228	118	350	131	4-M8-9	85	70	2.5	40	92	30	25	28.3	8
RWM-07-63N-□-IE3	144	72	179	63	72	263.5	128.5	414.5	162	8-M8-11	95	80	3	45	112	36	25	28.3	8
RWM-15-75N-□-IE3	178	89	209	75	86	302	141	480	187	8-M8-12	115	95	3	50	120	40	28	31.3	8

* The output part tap hole KE dimension is equal to the quantity minus the nominal diameter of the screw threads minus the screw depth, where the quantity is for one side.

How to Place an Order

RWM-07-63N-30-IE3-□-□

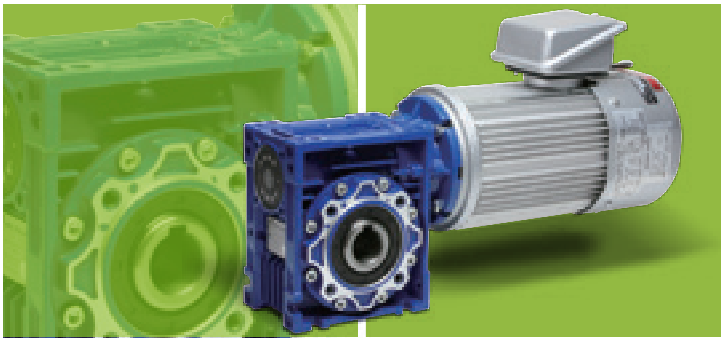
Size
Speed reducer frame number
Nominal speed reduction ratio
IE code
IE1: 02, 04
IE3: 07 or greater
Option

Hollow Shaft Geared Motor with Brake

RWM BS

Motor output	0.2 kW to 1.5 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

Hollow Shaft Geared Motor with Brake Using a Spring-actuated Brake Motor for the RWM Motor



Reduction in Mounting Space and Number of Mounting Parts

A mounting base, coupling, and chain are not required because the product can be mounted directly to the drive shaft of the machine.

Built-in Power Supply

A small power supply is included in the product and handling is easy.

Quiet Operation

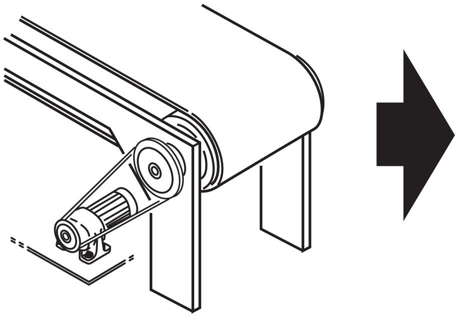
The rotating part (disc) is fully integrated with the motor shaft so the operation is quiet.

High Responsiveness

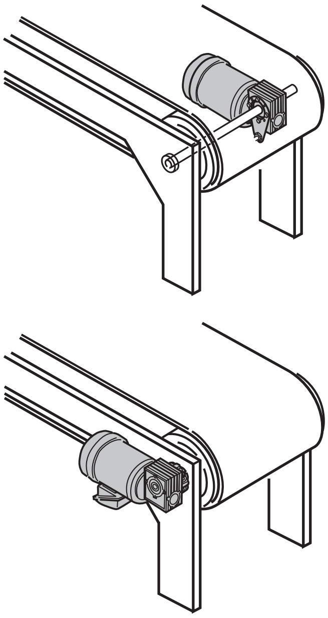
When the power is turned off, the motor is immediately braked and held. A release lever to manually release the brake comes with the motor.

Placement Method

Conventional placement method
(when mounting to the solid shaft)



Placement method of the RW series



Specifications

Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed reducer frame number	Speed reduction ratio						Mass [kg]
					10	20	30	40	50	60	
RWM-02BS-40-□	0.2	4	Three-phase, 200/50, 200・220/60	40	1/10	1/20	1/30	1/40	1/50	1/60	8.3
RWM-04BS-50-□	0.4	4	Three-phase, 200/50, 200・220/60	50	1/10	1/20	1/30	1/40	1/50	1/60	10.7
RWM-07BS-63N-□-IE3	0.75	4	Three-phase, 200/50, 200・220/60	63N	1/10	1/20	1/30	1/40	1/50	1/60	24
RWM-15BS-75N-□-IE3	1.5	4	Three-phase, 200/50, 200・220/60	75N	1/10	1/20	1/30	1/40	1/50	1/60	32

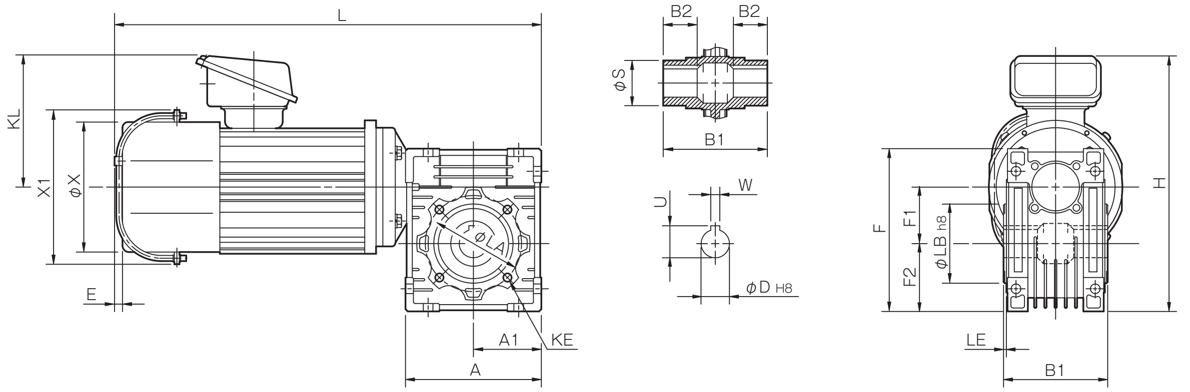
* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

Model	Braking method	Brake rated torque [N・m]	Brake voltage [V]	Brake current [A]	Brake heat-resistance class	Brake rating	Motor moment of inertia [kg・m^2]	Braking delay time [s]		Gap [mm]		Built-in brake power supply type
								Limit for AC	Limit for DC	Rating	Limit	
RWM-02BS-40-□	Spring-actuated	2	DC 90	0.2	B	Continuous	0.58×10^{-3}	0.1	0.03	0.2	0.5	BEM-A-62
RWM-04BS-50-□	Spring-actuated	4	DC 90	0.2	B	Continuous	0.8×10^{-3}	0.1	0.03	0.2	0.5	BEM-A-62
RWM-07BS-63N-□-IE3	Spring-actuated	8	DC 90	0.61	B	Continuous	2.3×10^{-3}	0.15	0.05	0.2	0.5	BEM-A-64
RWM-15BS-75N-□-IE3	Spring-actuated	15	DC 90	0.61	B	Continuous	4.5×10^{-3}	0.15	0.05	0.2	0.5	BEM-A-64

Model	Frequency [Hz]	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m] per speed reduction ratio											
		1/10		1/20		1/30		1/40		1/50		1/60	
		Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque
RWM-02BS-40-□	50	141.5	11.7	70.8	21.5	47.2	28.9	35.4	35.8	28.3	39	23.6	36
	60	170	9.7	85	17.9	56.7	24.1	42.5	29.8	34	35.5	28.3	36
RWM-04BS-50-□	50	138	24.3	69	44.6	46	60.9	34.5	75.6	27.6	73	23	68
	60	165	20.3	82.5	37.3	55	51	41.3	63.2	33	73	27.5	68
RWM-07BS-63N-□-IE3	50	144	45.7	72	85.1	48	117	36	145	28.8	135	24	130
	60	173	38.3	86.5	71.3	57.7	97.6	43.3	123	34.6	135	28.8	130
RWM-15BS-75N-□-IE3	50	144	93.9	72	177	48	230	36	220	28.8	210	24	200
	60	171.5	79.2	85.8	150	57.2	211	42.9	220	34.3	210	28.6	200

* The output shaft rotation speed and output shaft torque values are based on the 200V 50/60Hz rated load. However, the output shaft torque may be limited to the rated value of the speed reducer.

Dimensions



Unit [mm]

Model	Dimensions of part											Dimensions of output part									
	A	A1	E	F	F1	F2	H	KL	L	X	X1	KE	LA	LB	LE	S	B1	B2	D	U	W
RWM-02BS-40-□	100	50	7	121.5	40	50	206	116	339	124	137	4-M6-8	75	60	2.5	30	78	26	18	20.8	6
RWM-04BS-50-□	120	60	7	144	50	60	226	116	377	124	137	4-M8-9	85	70	2.5	40	92	30	25	28.3	8
RWM-07BS-63N-□-IE3	144	72	5	179	63	72	263	128	486	162	183	8-M8-11	95	80	3	45	112	36	25	28.3	8
RWM-15BS-75N-□-IE3	178	89	-	209	75	86	296	135	560.5	182	203	8-M8-12	115	95	3	50	120	40	28	31.3	8

* The output part tap hole KE dimension is equal to the quantity minus the nominal diameter of the screw threads minus the screw depth, where the quantity is for one side.

How to Place an Order

RWM-07BS-63N-30-IE3-□-□

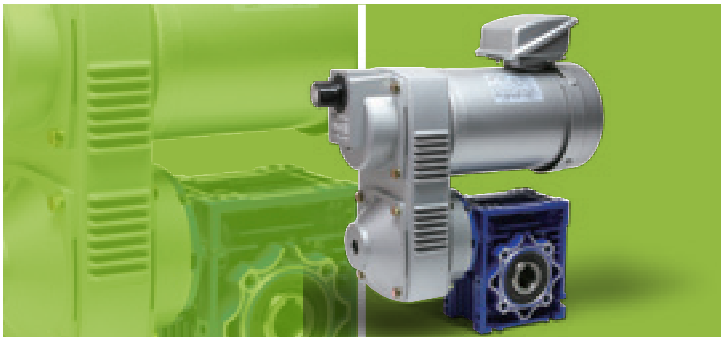
Size
Spring-actuated brake motor
Speed reducer frame number
Option
IE code
(for 07 or 15 only, use the IE3 designation)
Nominal speed reduction ratio

Hollow Shaft Belt-type Speed Changer Unit

RWP

Motor output	0.2 kW to 1.5 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

The Model Consisting of Hollow Shaft Geared Motor RWM and a Belt-type Stepless Speed Changer



Compact and Light

The mass is about 30% lighter and the size is about 20% smaller than our conventional 0.4-kW belt-type stepless speed changer unit.

Speed Is Changed with a Rotary Knob

Speed can easily be changed with your fingers using a rotary knob with a 27-mm external diameter (size: 02 and 04 only).

Simple Sealed Enclosure Type with High Environmental Resistance and High Safety

The use of a heat-resistant belt ensures a long life even when used in a sealed enclosure.

Torque Higher Than That of the Inverter

This model performs well even at low speeds where an inverter does not work well.

High torque operation at low speeds is also possible.

Easy Mounting, and Total Cost Can Be Reduced

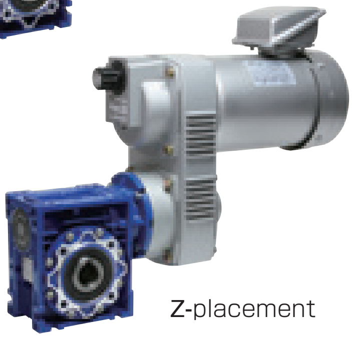
The product can be mounted directly to the input shaft of the machine, so the space of the driving part can be saved, and the mounting time and total cost can be reduced.

Type

C-placement

There are two types of P modules depending on the placement position of the speed reducer: C-placement module and Z-placement module.

Please choose any one according to the mounting space and the machine design.



Z-placement

The speed can be fine-tuned with a rotary knob with a scale of 0 to 10. Furthermore, when the speed is changed, the speed can be confirmed by the movement of the needle on the scale plate.

Specifications

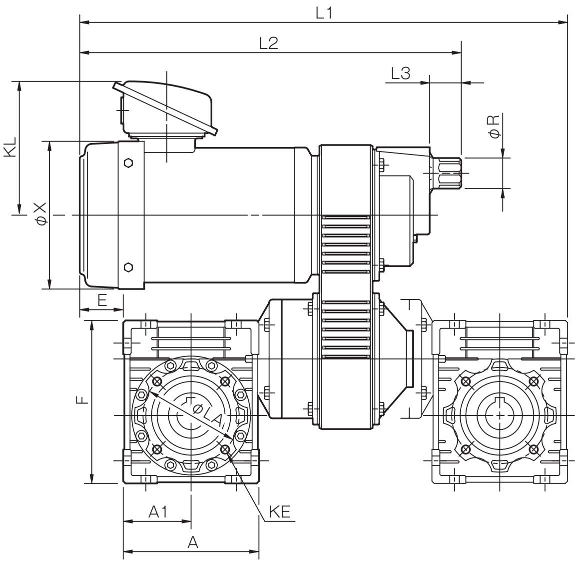
Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed reducer frame number	Speed reduction ratio						Mass [kg]
					10	20	30	40	50	60	
RWP-02-□-40-□-IE1	0.2	4	Three-phase, 200/50, 200・220/60	40	1/10	1/20	1/30	1/40	1/50	1/60	10.7
RWP-04-□-50-□-IE1	0.4	4	Three-phase, 200/50, 200・220/60	50	1/10	1/20	1/30	1/40	1/50	1/60	15.4
RWP-07-□-63N-□-IE3	0.75	4	Three-phase, 200/50, 200・220/60	63N	1/10	1/20	1/30	1/40	1/50	1/60	27.3
RWP-15-□-75N-□-IE3	1.5	4	Three-phase, 200/50, 200・220/60	75N	1/10	1/20	1/30	1/40	1/50	1/60	39.9

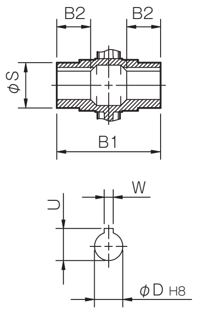
* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

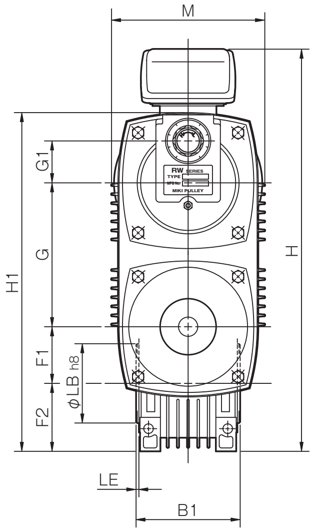
Model	Frequency [Hz]	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m] per speed reduction ratio					
		1/10	1/20	1/30	1/40	1/50	1/60
	50	50 ~ 200	25 ~ 100	17 ~ 68	12.5 ~ 50	10 ~ 40	8.5 ~ 34
	60	60 ~ 240	30 ~ 120	20 ~ 80	15 ~ 60	12 ~ 48	10 ~ 40
RWP-02-□-40-□-IE1	50	14.2 ~ 6.7	25.2 ~ 12.3	33.5 ~ 17	41 ~ 20.8	45 ~ 25.2	46 ~ 28.8
	60	13.6 ~ 5.1	24.1 ~ 9.4	32.1 ~ 13.1	39.4 ~ 16.1	45 ~ 19.5	45 ~ 22
RWP-04-□-50-□-IE1	50	29.2 ~ 13.6	53.3 ~ 25	71 ~ 35	84.4 ~ 43.5	91 ~ 51.2	83 ~ 57.6
	60	26.4 ~ 11.2	48.8 ~ 20.5	64.4 ~ 28.9	79.2 ~ 36.4	85 ~ 42.9	80 ~ 47.6
RWP-07-□-63N-□-IE3	50	55.9 ~ 25.8	101 ~ 48.6	130 ~ 66.6	163 ~ 84	173 ~ 99	160 ~ 112
	60	50.8 ~ 20.9	91.8 ~ 39.4	121 ~ 54	154 ~ 69.1	168 ~ 81.6	155 ~ 93.6
RWP-15-□-50N-□-IE3	50	113 ~ 53.9	207 ~ 103	277 ~ 141	280 ~ 181	250 ~ 190	240 ~ 180
	60	103 ~ 44	191 ~ 86	260 ~ 116	270 ~ 148	240 ~ 170	235 ~ 160

* The output shaft rotation speed and output shaft torque values are based on the 200V 50/60Hz rated load. However, the output shaft torque may be limited to the rated value of the speed reducer.

Dimensions







Unit [mm]

Model	Dimensions of part																	Dimensions of output part										
	A	A1	E	F	F1	F2	G	G1	H	H1	KL	L1	L2	L3	M	R	X	KE	LA	LB	LE	S	B1	B2	D	U	W
RWP-02-□-40-□-IE1	100	50	43	121.5	40	50	115	35	323	258	118	384	311	28	115	27	131	4-M6-8	75	60	2.5	30	78	26	18	20.8	6
RWP-04-□-50-□-IE1	120	60	38.5	144	50	60	127	37	355	299	118	432.5	337.5	28	136	27	131	4-M8-9	85	70	2.5	40	92	30	25	28.3	8
RWP-07-□-63N-□-IE3	144	72	11.5	179	63	72	156	45	419.5	367	128.5	510.5	390.5	41	168	37	162	8-M8-11	95	80	3	45	112	36	25	28.3	8
RWP-15-□-75N-□-IE3	178	89	-3	209	75	86	176	60	478	427	141	598	450.5	41	200	37	187	8-M8-12	115	95	3	50	120	40	28	31.3	8

* The output part tap hole KE dimension is equal to the quantity minus the nominal diameter of the screw threads minus the screw depth, where the quantity is for one side.

How to Place an Order

RWP-07-C-63N-30-IE3-□-□

Size

Placement
C-placement, Z-placement

Speed reducer frame number

Nominal speed reduction ratio

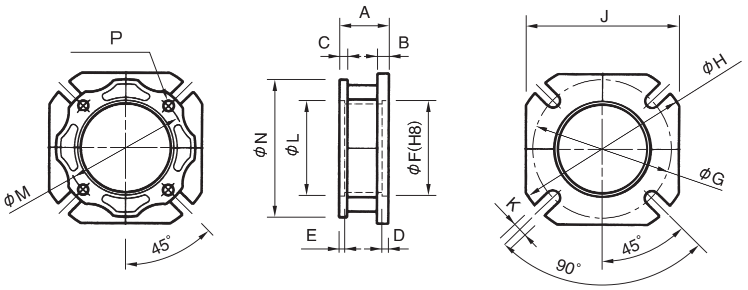
IE code
IE1: 02, 04
IE3: 07 or greater

Option

RW mini/RWM/RWM BS/RWP Models

Options

Output Flange F-□



Mounting surface on the speed reducer side

Mounting surface on the machine side

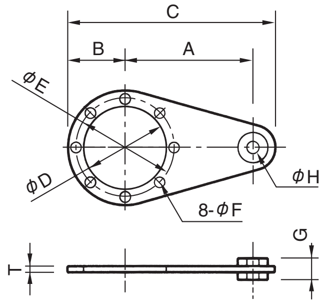
Unit [mm]

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Mass [kg]
F-30	25.5	6	6	4	4	50	68	80	70	6.5	55	65	75	4-φ6.5	0.07
F-40	30.5	7	5	4	3.5	60	87	110	95	9	60	75	87	4-φ6.5	0.14
F-50	46.5	9	8.5	5	4	70	90	125	110	11	70	85	100	4-φ9	0.23
F-63	29	10	—	6	6	115	150	180	142	11	80	95	110	8-φ9	0.29
F-75	54	13	—	6	7	130	165	200	170	14	95	115	140	8-φ9	0.65

* This can be mounted to either the right side or the left side of the flange part of the speed reducer. You can mount it in any direction.

* For output flange F-30, the mounting hole on the speed reducer side is at an angle of 45° to the mounting hole on the machine side.

Torque Arm TA-□



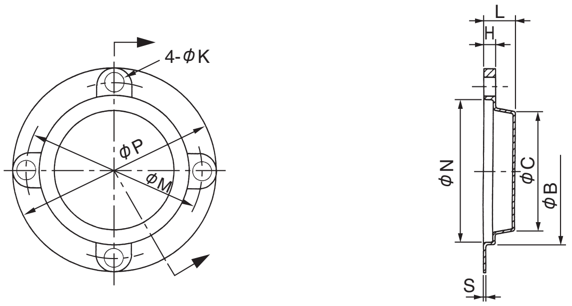
Unit [mm]

Model	A	B	C	D	E	F	G	H	T	Mass [kg]
TA-30	85	38	138	55	65	7	14	8	4	0.2
TA-40	100	44	162	60	75	7	14	9	4	0.23
TA-50	100	50	168	70	85	9	14	9	4	0.3
TA-63	150	55	223	80	95	9	14	9	6	0.58
TA-75	200	70	300	95	115	9	25	19	6	1.2

* This can be mounted to either the right side or the left side of the flange part of the speed reducer. You can mount it in any direction.

* The φ H part of TA-40 to 75 is provided with a rubber bushing for damping vibration.

Output Cover OC-□



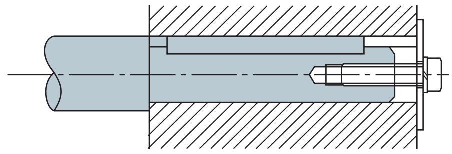
Unit [mm]

Model	P	M	K	N	C	B	S	H	L
OC-30	75	65	7	56	49	58	1	5	13
OC-40	87	75	8	62	51	64	1	5	13.5
OC-50	100	85	10	72	53	74	1	5	14
OC-63	110	95	10	82	61	84	1	5	15.5
OC-75	140	115	10	97	72	99	1	5	16.5

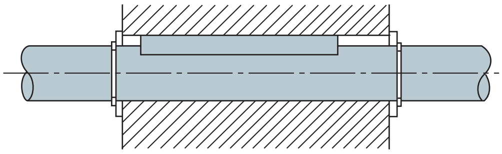
Items Checked for Design Purposes

Securing the Product to the Machine Shaft (Recommended Example)

If there is a step on the machine input shaft,
secure the product with a bolt from the shaft end.



If there is no step on the machine input shaft,
secure the product with a stop ring or something similar in the thrust direction.

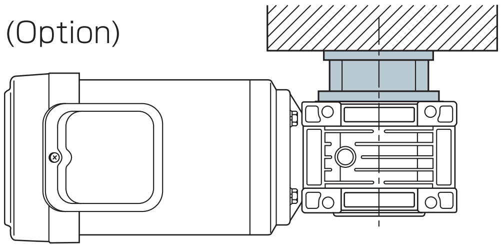


* Apply molybdenum disulfide grease (MoS_2) to the machine input shaft and inside the hole of the hollow shaft and then connect them.
* The recommended fitting tolerance for the machine input shaft is JIS:h7.

Mounting

The following two mounting methods are recommended.

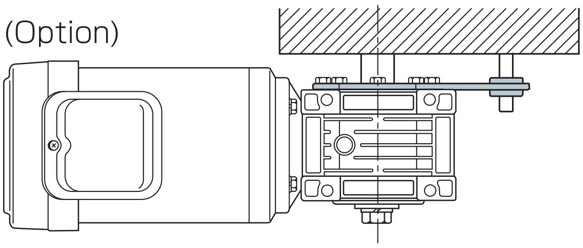
Output flange



* The output flange can be mounted to either the right side or the left side of the output part of the speed reducer.
* When securing with an output flange, you need to consider the centering (concentricity, perpendicularity, etc).
* Be careful not to apply excessive force to the machine input shaft and speed reducer case bearing.
* The output flange mounting bolts for the speed reducer main unit are included in the accessories.

* If you want to use a mounting method other than the output flange and torque arm mounting methods, please consult with us.

Torque arm



* The rotation stop part of torque arms of size #40 or more is provided with a rubber bushing for damping vibration and shock.
* The torque arm can be mounted to either the right side or the left side of the output part of the speed reducer.
* You need to provide some flexibility to the rotation stop part of the torque arm to make sure that excessive force is not applied to the joint between the speed reducer and machine input shaft.
* The torque arm mounting bolts for the speed reducer main unit are included in the accessories.

Output Cover

* A cover for the speed reducer output part is available for the RW series to increase safety.
* The rotating part is not exposed to the outside by attaching the output flange (F) and output cover (OC).
* The output cover can be mounted to either the right side or the left side of the output part of the speed reducer.

Recommended output cover mounting bolts

Frame number	Bolt size
30	M6 × 12
40	M6 × 12
50	M8 × 12
63	M8 × 12
75	M8 × 12

Oil Seal

The RW series uses an oil seal for the shaft seal device for oil. This is a contact oil seal so it has a limited life span. Check the oil seal at the following intervals depending on the operating condition, and if an oil leak is found, please contact us.

1. In normal operating condition
   Check at an interval of one or two years.
2. In harsh operating condition
   Check at an interval of one year.
3. Use with a food machine, etc.
   If the product is used, in particular, with equipment susceptible to oil, provide a protective cover and grease tray or something similar, or please consult with us in advance.

Harsh condition examples
The ambient temperature exceeds 35℃ .
The daily operating time exceeds 12 hours.
The on-off operation or normal-reverse operation are performed frequently.
There is a lot of dust.
Corrosive gases, chemical vapors, etc. are present in the atmosphere.

RW mini/RWM/RWM BS/RWP Models

Wire Connection (RWM-☐BS)

For details on the wire connection method, refer to the figure below. The power supply is installed in the terminal box of the motor.

If you need quick braking, use the DC switching. In addition, use a varistor as a protection element.

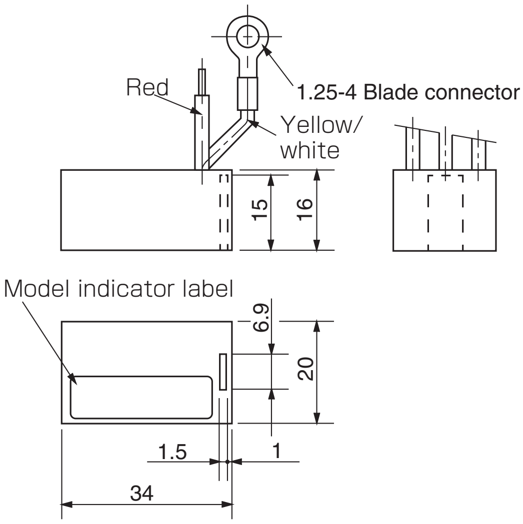
When braking with a brake using an inverter, be sure to use a combination of the circuit using an inverter shown in the figure below and the inverter's free-run stop.

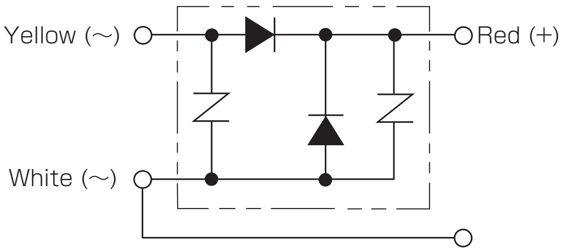
Varistor Specification

Motor capacity	Rated varistor voltage	Varistor voltage	Rated varistor power
0.2/0.4kW	250VAC	470V	0.2W
0.75/1.5kW	250VAC	470V	0.6W

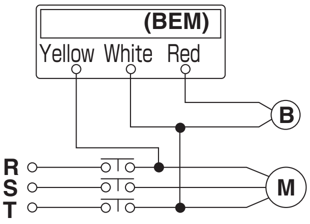
Power Supply

Model	Applied motor output
BEM-A-62	0.2・0.4kW
BEM-A-64	0.75・1.5kW

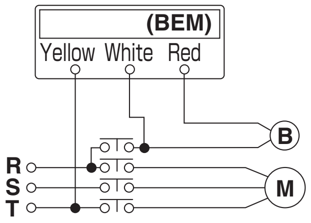




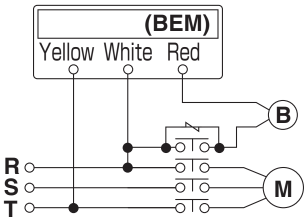
AC simultaneous switching off



AC separate switching off



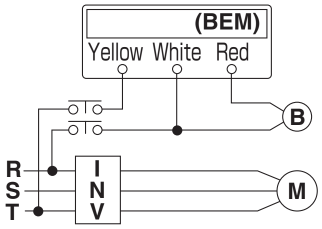
DC separate switching off



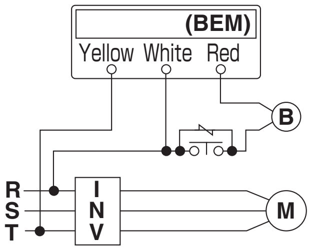
Symbol explanation

M: Motor
B: Brake
Z: Varistor
INV: Inverter
200 VAC input between yellow and white
90 VDC output between red and white

AC separate switching off (when using an inverter)



DC separate switching off (when using an inverter)



Selection

Selection Procedure

1. Torque value (load)

Check the machine load, and select the speed reducer frame number by estimating the factor based on the rated torque in the catalog.

2. Output rotation speed (speed reduction ratio)

Determine and select the output rotation speed based on the rated rotation speed in the catalog. Selection of the output rotation speed is important for a hollow shaft speed reducer.

* Unlike with a solid shaft speed reducer, the rotation speed cannot be adjusted later by changing the sprocket or pulley.

3. Operating time (hours/day) and start frequency (number of starts/hour)

Check the operating time and start frequency when you select the speed reducer frame number.

4. Ambient temperature

Determine the service factor (K) based on the operating ambient temperature.

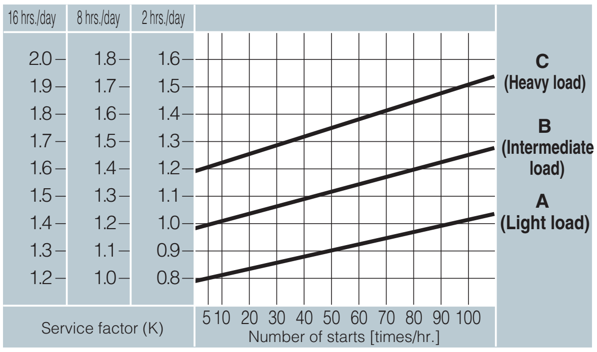
Service Factor (K)

The service factor (K) is an important element for selection. Please give it sufficient consideration when making the selection.

1. Determine the type of machine load, A, B, or C, from the table below.

Type of load	Operating condition	
A (light load)	Uniform load without impact	Conveyor (uniform load), etc.
B (intermediate load)	Light impact load	Conveyor (variable feed), etc.
C (heavy load)	Heavy impact load	Press, crushing machine, etc.

2. Obtain the service factor (K) from the graph based on the operating time and number of starts.



* If you need to perform operation for more than 16 hours/day, please consult with us.
* If the number of starts is large or if the GD^2 value is large, please consult with us.

3. Correct the service factor (K) you obtained based on the table below.

Ambient temperature	Corrected value
-10 ～ 30℃	K × 1.0
30 ～ 40℃	K × 1.1 ～ 1.2

Selection Example

General-purpose conveyor (uniform load)

Torque value: 40 N·m (50 Hz)
Rotation speed: about 50 min^{-1} (50 Hz)
Speed reduction ratio: 1/30
Operating time: 8 hours/day
Start frequency: Several times/day
Ambient temperature: 20° C indoors (with air-conditioner)

1. Determine the type of load from the table.
   Type of load = Uniform load without impact: A (light load)
2. Find the intersection between the A (light load) line and frequency 5 times/hour line in the graph, and obtain the service factor (K) value for the operating time of 8 hours/day.
   K=1.0
3. Correct the service factor (K) based on the table.
   1.0 x 1.0 = 1.0 (overall service factor K)
4. Based on the above, select the frame number whose speed reduction ratio is 1/30 and whose torque value is greater than 40 N・m (50 Hz) and closest to 40 N・m.

Final selected model	RWM-04-50-30 (50Hz, 47.5 min^{-1}, 59N・m)

Induction conveyor (variable feed)

Torque value: 40 N·m (50 Hz)
Rotation speed: about 50 min^{-1} (50 Hz)
Speed reduction ratio: 1/30
Operating time: 14 hours/day
Start frequency: 100 times/hour
Ambient temperature: 35° C indoors (with air-conditioner)

1. Follow the same procedure as that for the above selection example to find the intersection between the B (intermediate load) line and frequency 100 times/hour line, and obtain the service factor (K) value for the operating time of 16 hours/day.
   K = 1.65
2. Correct the service factor (K) based on the table.
   1.65 x 1.2 = 1.98 (overall service factor K)
3. Based on the above, select the frame number whose speed reduction ratio is 1/30 and whose torque value is greater than 79.2 N·m (40 N·m x 1.98) and closest to 79.2 N・m.

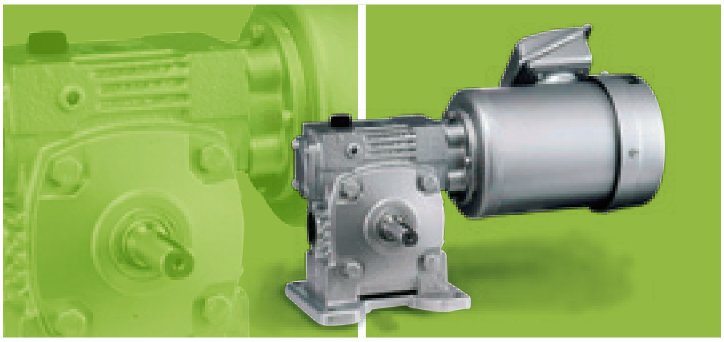
Final selected model	RWM-07-63N-30 (50Hz, 47.3 min^{-1}, 114N・m)

Solid Shaft Geared Motor

AXM

Motor output	0.2 kW to 1.5 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

Solid Shaft Geared Motor with 0.2-kW to 1.5-kW Motor Output (4-pole)



Module Consisting of a Speed Reducer and Motor

An extremely compact design using the B14 flange motor helps save machine space.

Compact and Easy to Handle

Compact with B14 flange. Easy-to-handle solid shaft type.

Speed Changer also Available

While an inverter can be used for changing speeds, our lineup of AXP models have a belt-type stepless speed changer built in and are worry free. Can be installed interchangeably.

Specifications

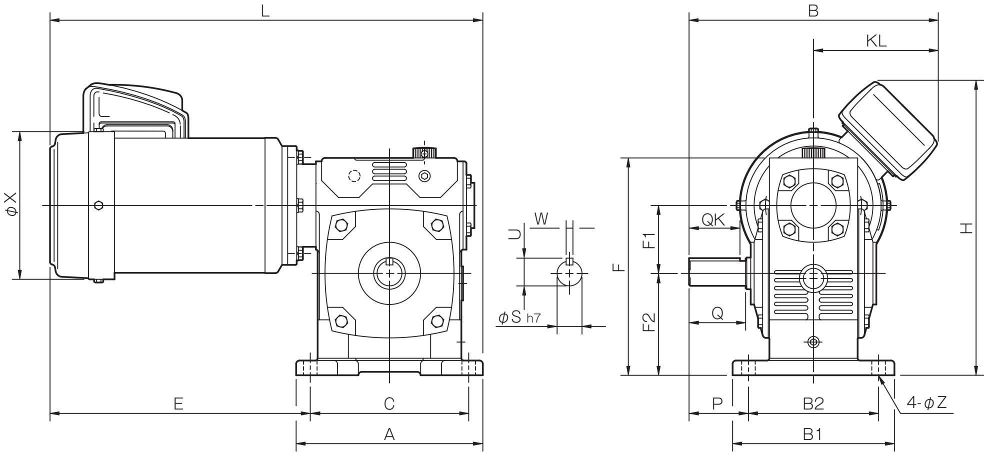
Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed reducer frame number	Speed reduction ratio 10	20	30	40	50	60	Mass [kg]
AXM-02-50-□-□-IE1	0.2	4	Three-phase, 200/50, 200・220/60	50	1/10	1/20	1/30	1/40	1/50	1/60	12.5
AXM-04-60-□-□-IE1	0.4	4	Three-phase, 200/50, 200・220/60	60	1/10	1/20	1/30	1/40	1/50	1/60	18
AXM-07-70-□-□-IE3	0.75	4	Three-phase, 200/50, 200・220/60	70	1/10	1/20	1/30	1/40	1/50	1/60	32.5
AXM-15-80-□-□-IE3	1.5	4	Three-phase, 200/50, 200・220/60	80	1/10	1/20	1/30	1/40	1/50	1/60	45.5

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

Model	Frequency [Hz]	Output shaft rotation speed [min $^{-1}$] and output shaft torque [N・m] per speed reduction ratio											
		1/10		1/20		1/30		1/40		1/50		1/60	
		Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque	Rotation speed	Torque
AXM-02-50-□-□-IE1	50	143	10.7	71.5	18.7	47.7	26.2	35.8	30.3	28.6	36.7	23.8	40.9
	60	171.5	9.1	85.8	16	57.2	22.6	42.9	26.4	34.3	32.1	28.6	35.9
AXM-04-60-□-□-IE1	50	142.5	21.7	71.3	39.5	47.5	54.1	35.6	66.4	28.5	75.4	23.8	75.5
	60	171	18.3	85.5	33.6	57	46.4	42.8	57.2	34.2	64.6	28.5	70.9
AXM-07-70-□-□-IE3	50	144	41.3	72	76.9	48	105	36	133	28.8	112	24	114
	60	172.5	34.6	86.3	65.1	57.5	88.1	43.1	114	34.5	105	28.8	106
AXM-15-80-□-□-IE3	50	145	84.8	72.5	156	48.3	215	36.3	193	29	191	24.2	162
	60	174	71.5	87	132	58	183	43.5	179	34.8	177	29	151

* The output shaft rotation speed and output shaft torque values are based on the 200V 50/60Hz rated load. However, the output shaft torque may be limited to the rated value of the speed reducer.

Dimensions



Unit [mm]

Model	Dimensions of part															Dimensions of output part				
	A	B	B1	B2	C	E	F	F1	F2	H	KL	L	P	X	Z	Q	QK	S	U	W
AXM-02-50-□-□-IE1	142	204	124	100	118	218.5	165	50	80	239	109	347.5	45	131	10	40	35	17	19	5
AXM-04-60-□-□-IE1	165	219	143	115	140	230	192	60	90	258	109	375	52.5	131	12	50	45	22	24.5	6
AXM-07-70-□-□-IE3	190	246.5	160	130	160	270.5	225	70	105	291.5	116.5	445.5	65	162	14	60	55	28	31	8
AXM-15-80-□-□-IE3	220	265.5	170	140	190	298.5	252	80	112	317	125	503.5	70	187	14	65	60	32	35	10

How to Place an Order

AXM-07-70-30-R-IE3

Size

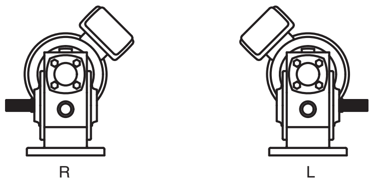
Speed reducer frame number

Nominal speed reduction ratio

Model

IE code
IE1: 02, 04
IE3: 07 or greater

Type



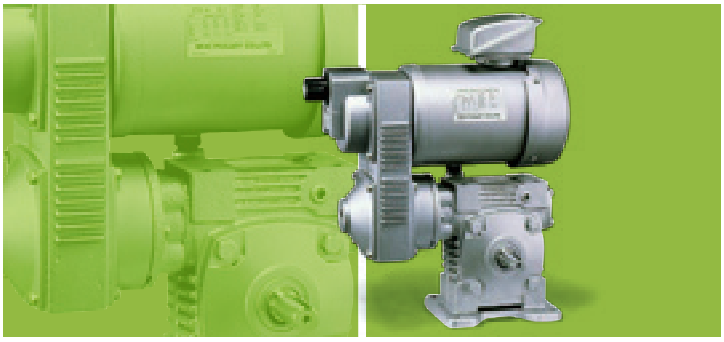
* The R (right) and L (left) letters indicate the output shaft directions viewed from the input shaft of the speed reducer.

Solid Shaft Belt-type Speed Changer Unit

AXP

Motor output	0.2 kW to 1.5 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

The Model Consisting of Solid Shaft Geared Motor AXM and a Belt-type Stepless Speed Changer



Compact and Light

The mass is about 20% lighter and the size is about 20% smaller than our conventional 0.4-kW belt-type stepless speed changer unit.

Speed Is Changed with a Rotary Knob

Speed can easily be changed with your fingers using a rotary knob with a 27-mm external diameter (size: 02 and 04 only).

Simple Sealed Enclosure Type with High Environmental Resistance and High Safety

The use of a heat-resistant belt ensures a long life even when used in a sealed enclosure.

Torque Higher Than That of the Inverter

This model performs well even at low speeds where an inverter does not work well.
High torque operation at low speeds is also possible.

Rotation Adjustment

The speed can be fine-tuned with a rotary knob with a scale of 0 to 10.
Furthermore, when the speed is changed, the speed can be confirmed by the movement of the needle on the scale plate.

Specifications

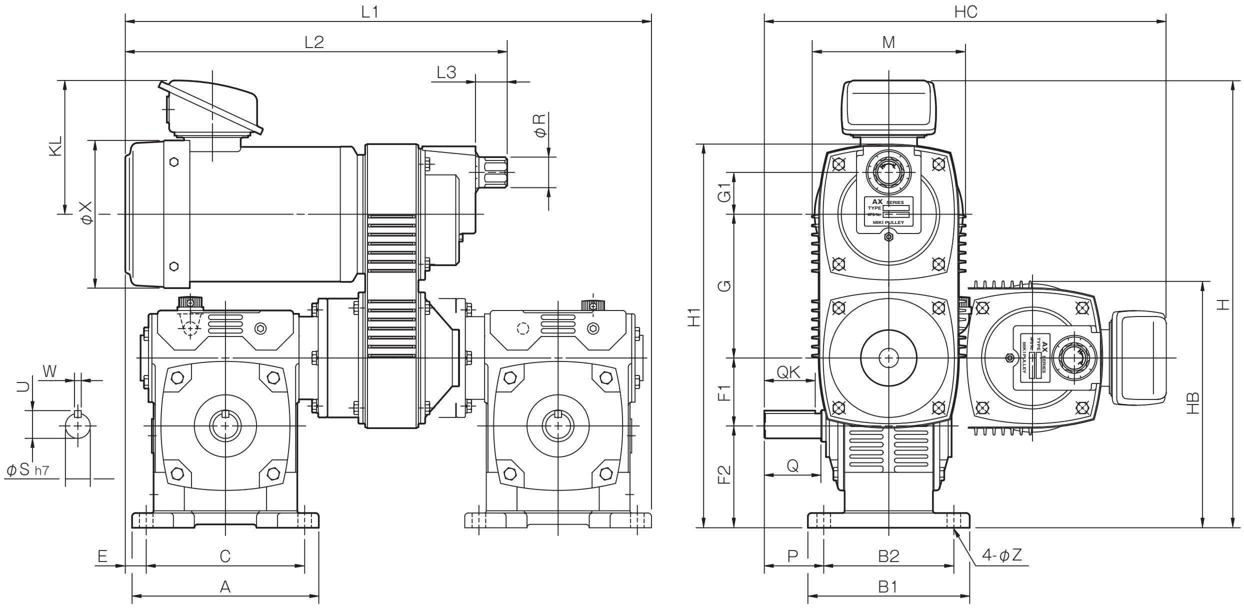
Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed reducer frame number	Speed reduction ratio						Mass [kg]
					10	20	30	40	50	60	
AXP-02-□-50-□-□-IE1	0.2	4	Three-phase, 200/50, 200・220/60	50	1/10	1/20	1/30	1/40	1/50	1/60	14
AXP-04-□-60-□-□-IE1	0.4	4	Three-phase, 200/50, 200・220/60	60	1/10	1/20	1/30	1/40	1/50	1/60	21
AXP-07-□-70-□-□-IE3	0.75	4	Three-phase, 200/50, 200・220/60	70	1/10	1/20	1/30	1/40	1/50	1/60	36.5
AXP-15-□-80-□-□-IE3	1.5	4	Three-phase, 200/50, 200・220/60	80	1/10	1/20	1/30	1/40	1/50	1/60	54

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

Model	Frequency [Hz]	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m] per speed reduction ratio					
		1/10	1/20	1/30	1/40	1/50	1/60
	50	50～200	25～100	17～68	12.5～50	10～40	8.5～34
	60	60～240	30～120	20～80	15～60	12～48	10～40
AXP-02-□-50-□-□-IE1	50	14～7	22～12	31～17	34～19	41～24	45～27
	60	13～5	22～9	30～13	33～15	40～18	44～20
AXP-04-□-60-□-□-IE1	50	28～13	49～24	65～33	77～41	84～47	96～54
	60	25～11	44～20	59～27	71～33	78～38	89～44
AXP-07-□-70-□-□-IE3	50	53～25	95～46	123～63	155～81	151～87	151～102
	60	48～20	87～37	113～50	143～65	145～70	144～82
AXP-15-□-80-□-□-IE3	50	106～51	187～94	250～131	263～164	252～166	215～143
	60	96～41	170～76	228～106	251～132	242～159	204～143

* The output shaft rotation speed and output shaft torque values are based on the 200V 50/60Hz rated load. However, the output shaft torque may be limited to the rated value of the speed reducer.

Dimensions



Unit [mm]

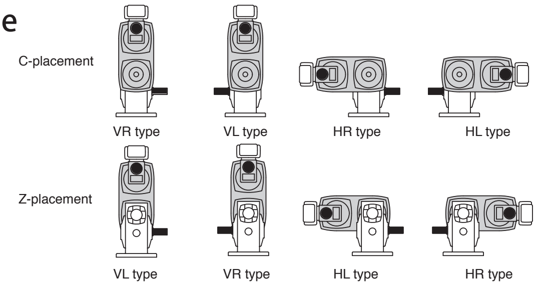
Model	Dimensions of part																					Dimensions of output shaft				
	A	B1	B2	C	E	F1	F2	G	G1	H	H1	HB	HC	KL	L1	L2	L3	M	P	R	X	Z	Q	QK	S	U	W
AXP-02-□-50-□-□-IE1	142	124	100	118	19	50	80	115	35	363	301	195.5	328	118	420	311	28	115	45	27	131	10	40	35	17	19	5
AXP-04-□-60-□-□-IE1	165	143	115	140	18.5	60	90	127	37	395	339	218	355	118	465	337.5	28	136	52.5	27	131	12	50	45	22	24.5	6
AXP-07-□-70-□-□-IE3	190	160	130	160	4.5	70	105	156	45	460	407	414.5	259	128.5	541.5	390.5	41	168	65	37	162	14	60	55	28	31	8
AXP-15-□-80-□-□-IE3	220	170	140	190	-9.5	80	112	176	60	509	458	457	292	141	621.5	450.5	41	200	70	37	187	14	65	60	32	35	10

How to Place an Order

AXP-07-C-70-30-VR-IE3

Size
Placement
C-placement, Z-placement
Speed reducer frame number
Nominal speed reduction ratio
Model
IE code
IE1: 01, 02
IE3: 07 or greater

Type



* The R (right) and L (left) letters indicate the output shaft directions viewed from the input shaft of the speed reducer.

AXM/AXP Models

Items Checked for Design Purposes

- * Avoid a humid place, a place where the ambient temperature is high, a place exposed to water or oil, and a place where corrosive and flammable gases are present, and select a well-ventilated place. In addition, mount the device in a location that provides easy access for inspection. The operating ambient temperature range is -10℃ to +40℃ .
- * Mount the device on the floor surface, and select a stable mounting base to make sure it does not vibrate. When you mount the device above the floor level, make sure the base surface is somewhat higher than the floor surface and moisture is not absorbed. The device may vibrate during use if it is not mounted properly. Be sure to mount it securely using mounting bolts of an adequate strength.
- * Be sufficiently careful to avoid the overhang load when mounting the sprocket and gear to the output shaft. When connecting the output shaft directly to the machine, use a flexible coupling or something similar, and align the shaft center and mount it.
- * For the output shaft rotation direction, you can use any direction.
- * Before changing between the normal and reverse directions, make sure the motor is stopped.
- * Break-in is recommended to condition the engaging surfaces of gear teeth of the speed reducer.
- * Do not turn the handle when the speed changer is stopped. (When using the AXP model)
- * Before using the device, please carefully read the instruction manual.

Oil Seal

The AX series uses an oil seal for the shaft seal device for oil.
This is a contact oil seal so it has a limited life span. Check the oil seal at the following intervals depending on the operating condition, and if an oil leak is found, please contact us.

1. In normal operating condition
   Check at an interval of one or two years.
2. In harsh operating condition
   Check at an interval of one year.
3. Use with a food machine, etc.
   If the product is used, in particular, with equipment susceptible to oil, provide a protective cover and grease tray or something similar, or please consult with us in advance.

Harsh condition examples

- * The ambient temperature exceeds 35℃ .
- * The daily operating time exceeds 12 hours.
- * The on-off operation or normal-reverse operation are performed frequently.
- * There is a lot of dust.
- * Corrosive gases, chemical vapors, etc. are present in the atmosphere.

Gear Oils for the AX Series Speed Reducers

Ambient temperature / Standards		ISO viscosity grade	JIS
Normal load	− 10 ～ 5℃	VG 150	Gear oil type 2, no. 4
	5 ～ 40℃	VG 320	Gear oil type 2, no. 6
High load	− 10 ～ 5℃	VG 320	Gear oil type 2, no. 6
	5 ～ 40℃	VG 460	Gear oil type 2, no. 7

Oil Amounts for the AX Series Speed Reducers

Motor output [kW]	Speed reducer frame number	Oil amount [ℓ]
0.2	50	0.31
0.4	60	0.44
0.75	70	0.81
1.5	80	0.94

Selection

Selection Procedures

1. Torque value (load)

Check the machine load, and select the speed reducer frame number by estimating the factor based on the rated torque in the catalog.

2. Output shaft rotation speed (speed reduction ratio)

Determine and select the output shaft rotation speed based on the rated rotation speed in the catalog. Selection of the output shaft rotation speed is important for a solid shaft speed reducer.

3. Operating time (hours/day) and start frequency (number of starts/hour)

Check the operating time and start frequency when you select the speed reducer frame number.

4. Ambient temperature

Determine the service factor (K) based on the operating ambient temperature.

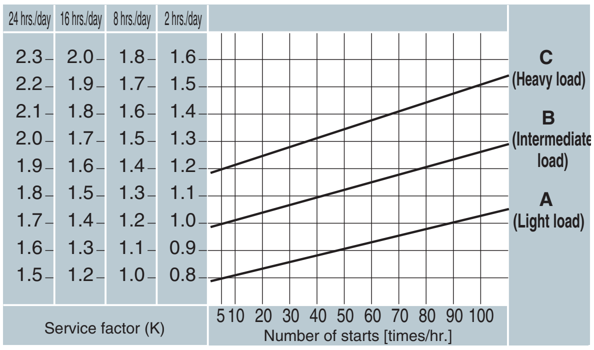
Service Factor (K)

The service factor (K) is an important element for selection. Please give it sufficient consideration when making the selection.

1. Determine the type of machine load, A, B, or C, from the table below.

Operating conditions	Examples	Type of load
Uniform load without impact	Conveyor (uniform load), etc.	A (light load)
Light impact load	Conveyor (variable feed), etc.	B (intermediate load)
Heavy impact load	Press, crushing machine, etc.	C (heavy load)

2. Obtain the service factor (K) from the graph based on the operating time and number of starts.



3. Correct the service factor (K) you obtained based on the table below.

Ambient temperature	Corrected value
− 10 ～ 5 ℃	K × 1.1 ～ 1.2
5 ～ 30 ℃	K × 1.0
30 ～ 40 ℃	K × 1.1 ～ 1.2

BELT-TYPE STEPLESS SPEED CHANGER UNITS

- ANS
- ANW NHN/PMN
- ANW NKN
- ANG GDN
- ACW
- ANB
- PDS
- PDC
- PDG BSN
- AHS
- AHM
- SPEED CHANGER BELTS

Belt-type Stepless Speed Changer Unit

ANS

Standard applied motor output	0.2 kW to 3.7 kW (4-pole)
Speed reduction ratio	1:4

Belt-type Stepless Speed Changer Changing Rotation Speed Freely

Speed Change Pulley Set

One-touch Speed Change

Changing speeds is simple.

Turn handle to right for lower speed, and to left for higher speed.

Easy-to-see Handle Graduations

Handle graduations serve as the main gauge, assisted by the rotating graduation plate on the handle. Optional rotation speed indicator (SD type) also available.

Specifications

Model	Applied motor (4-pole) [kW]	Speed change ratio	Output rotation speed [min $^{-1}$]		Number of handle turns	Speed changer in use			
						Motor side		Machine side	
			50Hz	60Hz		Model	Mass [kg]	Model	Mass [kg]
ANS-02	0.2	1:4	500 ～ 2000	600 ～ 2400	5	AK-90-AN-11	1.5	PE-106-AN-12H	1.7
ANS-04	0.4	1:4	500 ～ 2000	600 ～ 2400	6	AK-106-AN-14N	1.7	PE-125-AN-15H	2.6
ANS-07N	0.75	1:4	500 ～ 2000	600 ～ 2400	7	AK-125-AN-19N	2.8	PE-150N-AN-18H	4.1
ANS-15N	1.5	1:4	500 ～ 2000	600 ～ 2400	8.25	AK-150-AN-24N	3.8	PE-180N-AN-22H	6.4
ANS-22N	2.2	1:4	500 ～ 2000	600 ～ 2400	8.25	AK-160-AN-28N	3.7	PE-190N-AN-25H	6.5
ANS-37N	3.7	1:4	500 ～ 2000	600 ～ 2400	8.75	AK-180-AN-28N	7.0	PE-212N-AN-30H	9.5

* The output rotation speed is that when a 3-phase 4-pole motor is mounted. Also use 1800 min^{-1} or less for the input rotation speed.
* Coil springs are used for 02 and 04 models.

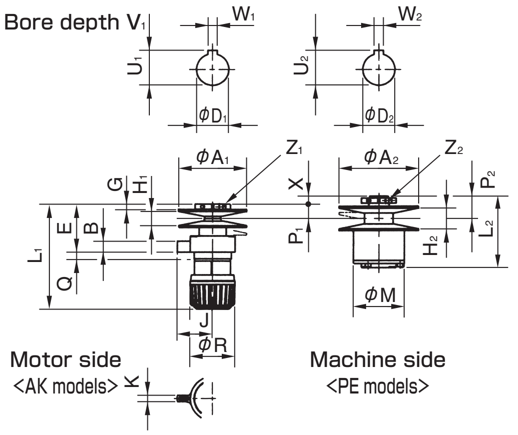
Distance between Shafts and Belt Number

Model	Distance between shafts [mm]	Belt number	Distance between shafts [mm]	Belt number	Distance between shafts [mm]	Belt number	Distance between shafts [mm]	Belt number	Distance between shafts [mm]	Belt number
ANS-02	108	1022V178S	140	1022V196S	163	1022V220S	172	1022V223	198	1022V247S
ANS-04	125	1422V210	140	1422V220	160	1422V236S	200	1422V266S	210	1422V270S
ANS-07N	172	1422V266S	186	1422V270S	209	1422V290	224	1422V300S	263	1422V330S
ANS-15N	185	1922V298S	217	1922V321	239	1922V338S	270	1922V363S	293	1922V381S
ANS-22N	230	2322V341	270	2322V364S	314	2322V396S	344	2322V421S	372	2322V441K
ANS-37N	250	2322V387S	274	2322V396S	304	2322V421S	333	2322V441K	386	2322V481

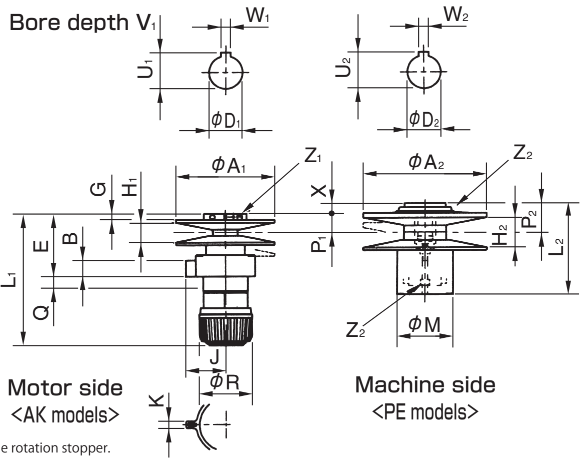
* If you need a distance between shafts other than the above, please consult with us.

Dimensions

ANS-02 and 04



ANS-07N, 15N, 22N and 37N



Dimension K is the width of the rotation stopper.

Unit [mm]

Model	Model for motor-side speed changer	A1	B	E	G	H1	J	K	L1	P1	Q	R	Z1	D1	U1	W1	V1	max.P.D.	min.P.D.
ANS-02	AK-90-AN-11	90	17	66.5	9	16	55	10	153	20	10	70	M5	11	-	-	23	85	34.5
ANS-04	AK-106-AN-14N	106	17	74.5	8.5	22	55	10	163	22.5	12	70	M5	14	16	5	30	101	41
ANS-07N	AK-125-AN-19N	125	24	83.5	8.5	22	60	10	184	22.5	14	80	M6	19	21.5	6	40	120	49.5
ANS-15N	AK-150-AN-24N	150	24	94.5	9.5	30	60	10	198	28.5	16.5	80	M6	24	27	8	50	143	58.5
ANS-22N	AK-160-AN-28N	150	24	105	14	36.5	60	10	208	36	16.5	80	2-M6	28	31	8	60	143	58.5
ANS-37N	AK-180-AN-28N	180	φ 10	102	10	36.5	80	φ 10	240	32	17.5	80	M8	28	31	8	60	171	72.5

Unit [mm]

Model	Model for machine-side speed changer	A2	H2	L2	M	P2	Z2	D2	U2	W2	max.P.D.	min.P.D.	X
ANS-02	PE-106-AN-12H	106	25	90	70	22	M5	12	13.5	4	101	54.5	2
ANS-04	PE-125-AN-15H	125	32	111	80	35	M5	15	17	5	120	66	12.5
ANS-07N	PE-150N-AN-18H	155	34	110	90	36	M8	18	20.5	6	145	81.5	13.5
ANS-15N	PE-180N-AN-22H	185	45	137	100	44	M8	22	24.5	6	175	98	15.5
ANS-22N	PE-190N-AN-25H	185	51.5	150	100	53.5	M8	25	28	8	175	98	17.5
ANS-37N	PE-212N-AN-30H	216	54	161	110	48.5	M8	30	33	8	208	120	17.5

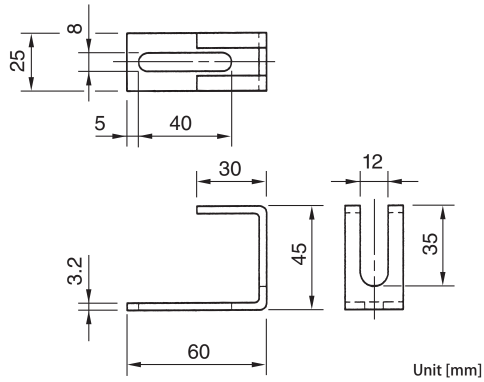
Machine-side speed changer bore diameter

Model	Unit model in use	Max. bore diameter [mm]	Nominal bore diameter	φ D2 [mm]	U2 [mm]	W2 [mm]	Bore depth [mm]
PE-106	ANS-02	15	10H	10	11.2	3	25
			12H＊	12	13.5	4	30
			14H	14	16	5	30
PE-125	ANS-04	18	14H	14	16	5	40
			15H＊	15	17	5	40
			18H	18	20.5	6	40
PE-150N	ANS-07N	22	18H＊	18	20.5	6	40
			20H	20	22.5	6	40
			22H	22	24.5	6	50
PE-180N	ANS-15N	25	18H	18	20.5	6	40
			22H＊	22	24.5	6	50
			25H	25	28	8	50
PE-190N	ANS-22N	25	25H＊	25	28	8	50
PE-212N	ANS-37N	30	25H	25	28	8	50
			30H＊	30	33	8	65

* The ＊ mark indicates the standard bore diameter.
* If you need a bore diameter other than the above, please consult with us.

Rotation Stopper Support

This can be used for the rotation stopper of the handle.



Unit [mm]

How to Place an Order

ANS-02-11-12H-□

Size
Nominal bore diameter for motor-side speed changer AK model
Nominal bore diameter for machine-side speed changer PE model
Options
Blank: Standard
SD: Rotation speed indicator
TH: Equipped with a square hole bushing for adjustments during machine stop

Model and nominal bore diameter for motor-side speed changer

AK-90-AN-11

Size
ANS-use
Nominal bore diameter, bore specifications
Blank: No key
N: Compliant with the new motor standards

Model and nominal bore diameter for machine-side speed changer

PE-106-AN-12H

Size
ANS-use
Nominal bore diameter, bore specifications
H: Compliant with the new JIS standards

* Check the Machine-side speed changer bore diameter if you need non-standard bore diameters.

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
HOLLOW SHAFT / SOLID SHAFT SPEED CHANGERS AND REDUCERS
BELT-TYPE STEPLESS SPEED CHANGER UNITS
STAND-ALONE BELT-TYPE STEPLESS SPEED CHANGERS
ZERO-MAX (STEPLESS SPEED CHANGERS)
DC MOTORS
ROTATION SPEED INDICATORS
MODELS
ANS
ANW NHN/PMN
ANW NKN
ANG GDN
ACW
ANB
PDS
PDC
PDG BSN
AHS
AHM
SPEED CHANGER BELTS

Belt-type Stepless Speed Changer Unit

ANW NHN / PMN

Motor output	0.2 kW to 3.7 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

Model Combining Speed Changer ANS Model with a Motor and Worm Speed Reducer

Integrated Model of a Speed Change Pulley, Motor, and Worm Speed Reducer

Compact Design

This is a model that integrates a speed change pulley, motor, and worm speed reducer.

Variety of Shapes

A variety of shapes facilitates the installation design.

Specifications

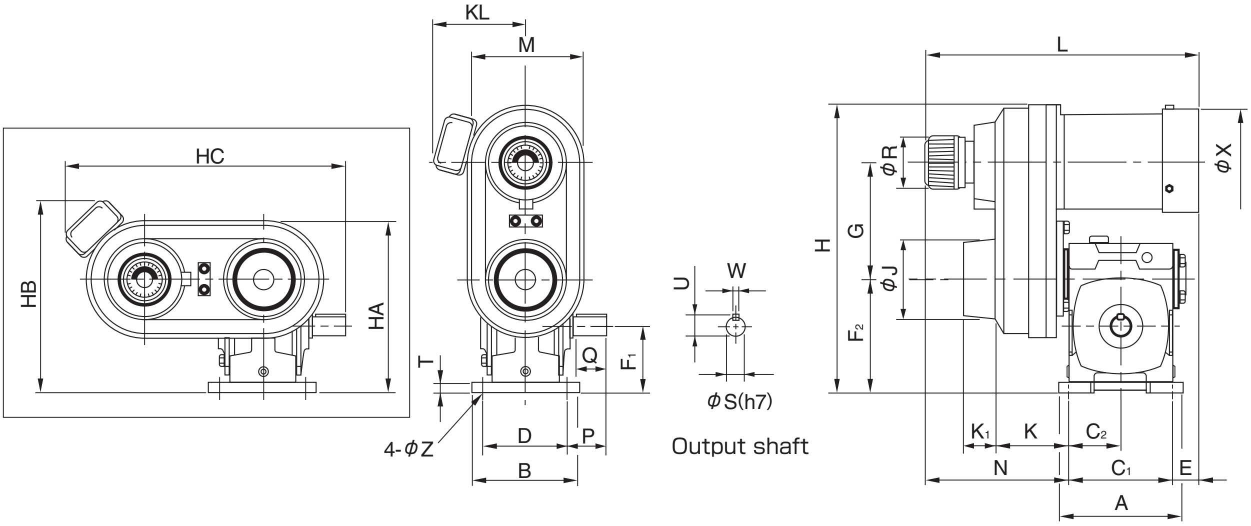
Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed change ratio	Speed changer in use		Model for belt in use	Speed reducer	Mass [kg]
					Model for motor-side speed changer	Model for machine-side speed changer			
ANW-02NHN	0.2	4	Three-phase, 200/50, 200・220/60	1:4	AK-90-AN-11	PE-106-AN-12H	1022V196S	NHN-50	19
ANW-04NHN	0.4	4	Three-phase, 200/50, 200・220/60	1:4	AK-106-AN-14N	PE-125-AN-15H	1422V236S	NHN-60	26
ANW-07NHN	0.75	4	Three-phase, 200/50, 200・220/60	1:4	AK-125-AN-19N	PE-150N-AN-18H	1422V270S	NHN-70	43
ANW-15NHN	1.5	4	Three-phase, 200/50, 200・220/60	1:4	AK-150-AN-24N	PE-180N-AN-22H	1922V338S	NHN-80	62
ANW-22PMN	2.2	4	Three-phase, 200/50, 200・220/60	1:4	AK-160-AN-28N	PE-190N-AN-25H	2322V341	N-PRM-25	80
ANW-37PMN	3.7	4	Three-phase, 200/50, 200・220/60	1:4	AK-180-AN-28N	PE-212N-AN-30H	2322V387S	N-PRM-30	114

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).
* Coil springs are used for 02 and 04 models.

Model	Frequency [Hz]	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m] per speed reduction ratio					
		1/10	1/20	1/30	1/40	1/50	1/60
	50	50 ～ 200	25 ～ 100	17 ～ 68	12.5 ～ 50	10 ～ 40	8.5 ～ 34
	60	60 ～ 240	30 ～ 120	20 ～ 80	15 ～ 60	12 ～ 48	10 ～ 40
ANW-02NHN	50	24.5 ～ 6.4	40.2 ～ 11.3	55.0 ～ 16.2	55.0 ～ 18.8	55.0 ～ 23.3	55.0 ～ 26.1
	60	19.6 ～ 5.1	32.1 ～ 9.1	44.8 ～ 13.0	48.9 ～ 15.0	55.0 ～ 18.6	55.0 ～ 20.9
ANW-04NHN	50	49.4 ～ 12.9	86.3 ～ 23.8	115 ～ 32.9	120 ～ 40.7	107 ～ 46.1	100 ～ 53.3
	60	39.5 ～ 10.3	69.1 ～ 19.0	92.0 ～ 26.3	109 ～ 32.5	103 ～ 36.9	95.3 ～ 42.6
ANW-07NHN	50	92.3 ～ 24.4	167 ～ 45.9	212 ～ 62.5	193 ～ 80.5	151 ～ 87.0	151 ～ 102
	60	73.8 ～ 19.5	134 ～ 36.7	173 ～ 50.0	186 ～ 64.4	145 ～ 69.6	144 ～ 81.7
ANW-15NHN	50	186 ～ 50.7	237 ～ 94.0	303 ～ 131	263 ～ 163	252 ～ 166	215 ～ 143
	60	153 ～ 40.9	224 ～ 75.8	288 ～ 106	251 ～ 131	242 ～ 159	204 ～ 143
ANW-22PMN	50	212 ～ 79.3	394 ～ 151	507 ～ 208	526 ～ 270	467 ～ 308	441 ～ 294
	60	178 ～ 66.1	331 ～ 126	430 ～ 173	502 ～ 225	448 ～ 271	420 ～ 294
ANW-37PMN	50	360 ～ 134	644 ～ 251	870 ～ 353	768 ～ 443	799 ～ 525	716 ～ 468
	60	303 ～ 112	546 ～ 210	742 ～ 294	733 ～ 369	766 ～ 475	676 ～ 468

* The output shaft torque may be limited to the rated value of the speed reducer.

Dimensions



Unit [mm]

Model	ANW-02NHN	ANW-04NHN	ANW-07NHN	ANW-15NHN	ANW-22PMN	ANW-37PMN
A	142	165	190	220	270	320
B	124	143	160	170	190	230
C_1	118	140	160	190	220	260
C_2	59	70	80	95	110	130
D	100	115	130	140	155	180
E	56.5	48	40	44	66.5	75
F_1	80	90	105	112	150	180
F_2	130	150	175	192	250	300
G	140	160	186	239	230	250
H	340	389	456	541	590	677.5
J	98	108	134	155	140	150
K	79	89.5	104	117.5	139	137
K_1	40	44	42	53	57	74
L	345.5	373	417.5	462.5	542	627.5
M	139	158	190	220	220	255
N	171	185	217.5	228.5	255.5	292.5
P	45	52.5	65	70	92.5	100
Q	40	50	60	65	75	85
R	70	70	80	80	80	80
T	12	13	15	18	25	30
S	17	22	28	32	38	45
U	19	24.5	31	35	41	48.5
W	5	6	8	10	10	14
X	131	131	162	187	202	235
Z	10	12	14	14	15	18
KL	109	109	116.5	125	141.5	164.5
HA	200	229	270	302	360	427.5
HB	239	259	291.5	317	391	464.5
HC	344	379	432.5	504	510	568

How to Place an Order

ANW-07NHN-VR-30-IE3-☐

Size

Speed reducer type
NHN: 02, 04, 07, 15
PMN: 22, 37

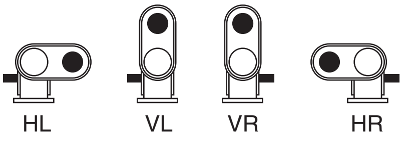
Model

Option

IE code
IE1: 02, 04
IE3: 07 or greater

Nominal speed reduction ratio

Type



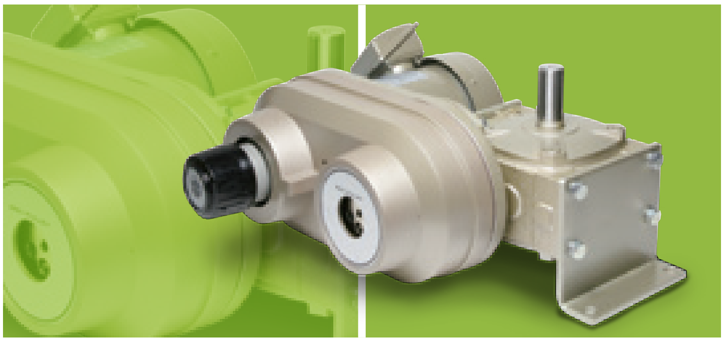
Please determine the type depending on which side of the handle the output shaft is located.

Belt-type Stepless Speed Changer Unit

ANW NKN

Motor output	0.2 kW to 1.5 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

Model Combining Speed Changer ANS Model with a Motor and Worm Speed Reducer



Integrated Model of a Speed Change Pulley, Motor, and Worm Speed Reducer

Compact Design

This is a model that integrates a speed change pulley, motor, and worm speed reducer.

Variety of Shapes

A variety of shapes facilitates the installation design.

Specifications

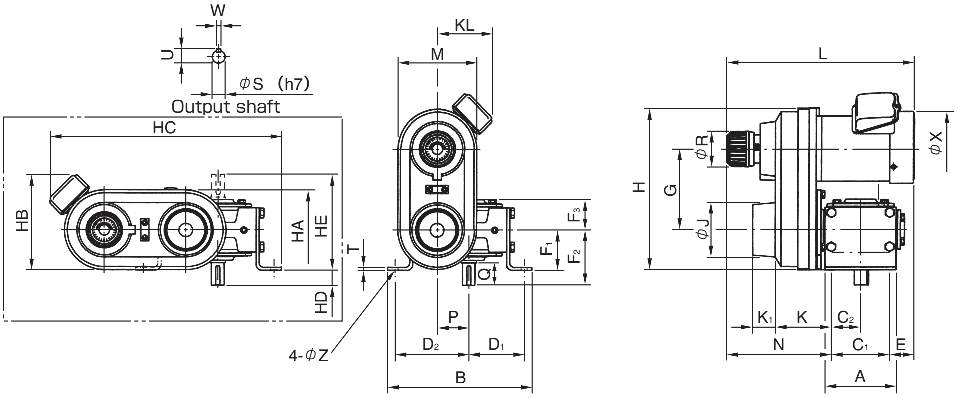
Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed change ratio	Speed changer in use		Model for belt in use	Speed reducer	Mass [kg]
					Model for motor-side speed changer	Model for machine-side speed changer			
ANW-02NKN	0.2	4	Three-phase, 200/50, 200・220/60	1:4	AK-90-AN-11	PE-106-AN-12H	1022V196S	NKN-50	20
ANW-04NKN	0.4	4	Three-phase, 200/50, 200・220/60	1:4	AK-106-AN-14N	PE-125-AN-15H	1422V236S	NKN-60	27
ANW-07NKN	0.75	4	Three-phase, 200/50, 200・220/60	1:4	AK-125-AN-19N	PE-150N-AN-18H	1422V270S	NKN-70	44
ANW-15NKN	1.5	4	Three-phase, 200/50, 200・220/60	1:4	AK-150-AN-24N	PE-180N-AN-22H	1922V338S	NKN-80	64

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).
* Coil springs are used for 02 and 04 models.

Model	Frequency [Hz]	Output shaft rotation speed [min $^{-1}$] and output shaft torque [N・m] per speed reduction ratio					
		1/10	1/20	1/30	1/40	1/50	1/60
	50	50～200	25～100	17～68	12.5～50	10～40	8.5～34
	60	60～240	30～120	20～80	15～60	12～48	10～40
ANW-02NKN	50	24.5～6.4	40.2～11.3	55.0～16.2	55.0～18.8	55.0～23.3	55.0～26.1
	60	19.6～5.1	32.1～9.1	44.8～13.0	48.9～15.0	55.0～18.6	55.0～20.9
ANW-04NKN	50	49.4～12.9	86.3～23.8	115～32.9	120～40.7	107～46.1	100～53.3
	60	39.5～10.3	69.1～19.0	92.0～26.3	109～32.5	103～36.9	95.3～42.6
ANW-07NKN	50	92.3～24.4	167～45.9	212～62.5	193～80.5	151～87.0	151～102
	60	73.8～19.5	134～36.7	173～50.0	186～64.4	145～69.6	144～81.7
ANW-15NKN	50	186～50.7	237～94.0	303～131	263～163	252～166	215～143
	60	153～40.9	224～75.8	288～106	251～131	242～159	204～143

* The output shaft torque may be limited to the rated value of the speed reducer.

Dimensions



Unit [mm]

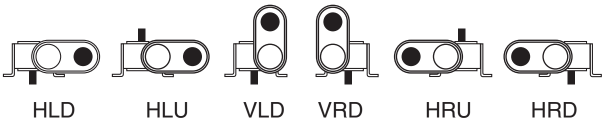
Model	ANW-02NKN	ANW-04NKN	ANW-07NKN	ANW-15NKN
A	120	135	160	175
B	240	277	309	350
C_1	95	115	135	150
C_2	47.5	57.5	67.5	75
D_1	95	110	122	136
D_2	115	137	157	184
E	67.5	60.5	52.5	63.5
F_1	70	80	100	115
F_2	95	110	130	140
F_3	50	55	65	70
G	140	160	186	239
H	279.5	319	381	464
J	98	108	134	155
K	90.5	102	115	137.5
K_1	40	44	42	53
L	345.5	373	417.5	462.5
M	139	158	190	220
N	183	197.5	230	248.5
P	50	60	70	80
Q	40	50	60	65
R	70	70	80	80
T	6	6	9	9
S	17	22	28	32
U	19	24.5	31	35
W	5	6	8	10
X	131	131	162	187
Z	10	12	14	14
KL	109	109	116.5	125
HA	139.5	159	195	225
HB	178.5	188	211.5	235
HC	409	454	509.5	595
HD	25	30	30	25
HE	165	190	230	255

How to Place an Order

ANW-07NKN-VRD-30-IE3-☐

Size
Speed reducer type
Model
Nominal speed reduction ratio
IE code
IE1: 02, 04
IE3: 07 or greater
Option

Type



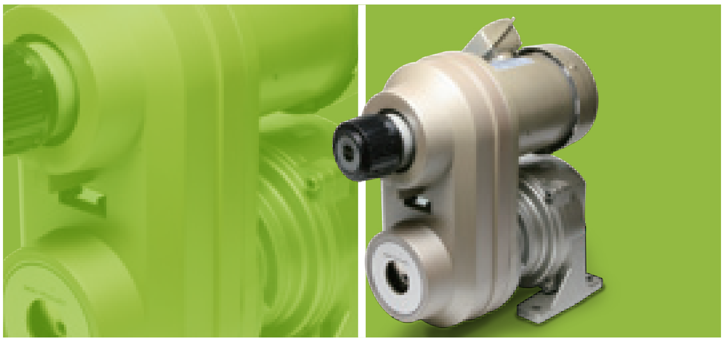
Please determine the type depending on which side of the handle the output shaft is located.

Belt-type Stepless Speed Changer Unit

ANG GDN

Motor output	0.2 kW to 1.5 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	A: 1/5 to 1/25, B: 1/30 to 1/80

Model Combining Speed Changer ANS Model with a Motor and Coaxial Speed Reducer



Integrated Model of a Speed Change Pulley, Motor, and Coaxial Speed Reducer

Compact Design

This is a model that integrates a speed change pulley, motor, and coaxial speed reducer.

Maintenance including Oiling Is Not Required

Routine maintenance is not required because the coaxial speed reducer is oil free. (0.2 to 1.5 kW)

Specifications

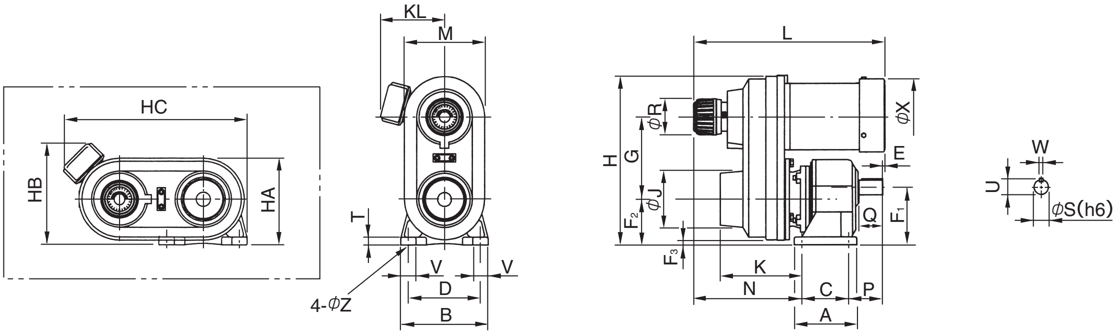
Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed change ratio	Speed changer in use		Model for belt in use	Speed reducer	Mass [kg]	
					Model for motor-side speed changer	Model for machine-side speed changer			Frame A	Frame B
ANG-02GDN	0.2	4	Three-phase, 200/50, 200・220/60	1:4	AK-90-AN-11	PE-106-AN-12H	1022V196S	WL2-02	15	16
ANG-04GDN	0.4	4	Three-phase, 200/50, 200・220/60	1:4	AK-106-AN-14N	PE-125-AN-15H	1422V236S	WL2-04	20	23
ANG-07GDN	0.75	4	Three-phase, 200/50, 200・220/60	1:4	AK-125-AN-19N	PE-150N-AN-20H	1422V270S	WL2-08	36	41
ANG-15GDN	1.5	4	Three-phase, 200/50, 200・220/60	1:4	AK-150-AN-24N	PE-180N-AN-22H	1922V338S	WL2-15	56	71

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).
* Coil springs are used for 02 and 04 models.

Model	Frequency [Hz]	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m] per speed reduction ratio									
		Frame A					Frame B				
		1/5	1/10	1/15	1/20	1/25	1/30	1/40	1/50	1/60	1/80
	50	100～400	50～200	33.5～134	25～100	20～80	17～68	12.5～50	10～40	8.5～34	6.25～25
	60	120～480	60～240	40～160	30～120	24～96	20～80	15～60	12～48	10～40	7.5～30
ANG-02GDN	50	6～3.6	12～7.2	18～10.8	23～14.4	29～18	35～21.6	45～27.5	56～34.4	67～41.2	89～55
	60	6～2.7	12～5.4	18～8.1	23～10.8	29～13.5	35～16.2	45～20.6	56～25.6	67～30.9	89～41.2
ANG-04GDN	50	12～7.2	23～14.4	35～21.6	47～28.8	59～36	70～43.2	89～55	111～68.8	134～82.5	178～110.1
	60	12～6.3	23～11.7	35～17.5	47～23.4	59～29.2	70～35.1	89～44.7	111～55.9	134～67	178～89.4
ANG-07GDN	50	22～13.5	44～27	66～40.5	88～54	110～67.5	132～81	167～103.2	209～129	251～176.4	334～206.4
	60	22～10.8	44～21.6	66～32.4	88～43.2	110～54	132～64.8	167～82.5	209～103.2	251～123.8	334～165.1
ANG-15GDN	50	44～27.9	88～55.8	132～83.7	176～111.6	220～139.5	264～167.4	334～213.2	418～266.6	501～319.9	668～426.5
	60	44～22.5	88～45	132～67.5	176～90	220～112.5	264～135	334～172	418～215	501～258	668～334

* The output shaft torque may be limited to the rated value of the speed reducer.

Dimensions



Unit [mm]

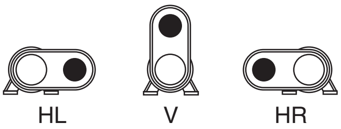
Model	ANG-02GDN		ANG-04GDN		ANG-07GDN		ANG-15GDN	
	-A	-B	-A	-B	-A	-B	-A	-B
A	66	90	90	120	120	164	164	196
B	134	156	156	174	174	204	204	256
C	40	65	65	90	90	130	130	150
D	110	130	130	140	140	170	170	210
E	− 31.5	− 4.5	− 1.5	9.5	22	50	39.5	103.5
F1	85	90	90	110	110	130	130	155
F2	69	70	70	85	85	101	101	120
F3	− 0.5	0.5	− 9	6	− 10	6	− 9	10
G	140	140	160	160	186	186	239	239
H	278.5	280	309	324	366	382	450	469
J	98	98	108	108	134	134	155	155
K	177	169	200	179	216	191	240	250
L	345.5	345.5	373	373	417.5	417.5	462.5	462.5
M	139	139	158	158	190	190	220	220
N	229	221	251.5	230.5	287.5	263.5	298	308
P	45	55	55	62	62	74	74	108
Q	30	40	40	45	45	55	55	82
R	70	70	70	70	80	80	80	80
T	10	12	12	15	15	15	15	20
V	27	28	28	37	37	40	40	50
S	18	22	22	28	28	32	32	42
U	20.5	24.5	24.5	31	31	35	35	45
W	6	6	6	8	8	10	10	12
X	131	131	131	131	162	162	187	187
Z	9	11	11	11	11	13	13	15
KL	109	109	109	109	116.5	116.5	125	125
HA	138.5	139.5	149	164	180	196	211	230
HB	178	179	179	194	201.5	217.5	226	245
HC	316	327	347	356	389.5	404.5	466	492

How to Place an Order

ANG-07GDN-A-V-25-IE3-☐

Size
Speed reducer type
Speed reducer frame type
Option
IE code
IE1: 02, 04
IE3: 07 or greater
Nominal speed reduction ratio
Model

Type



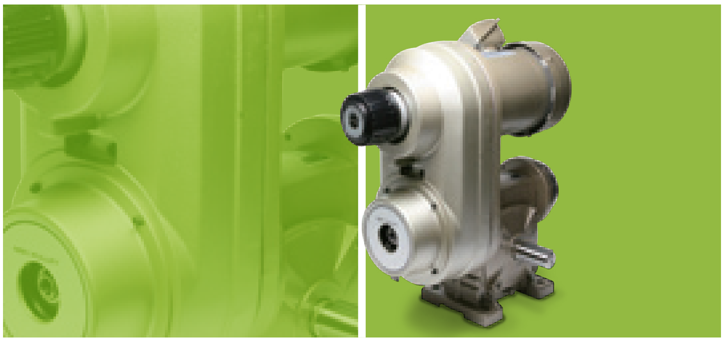
Please determine the type depending on which side of the handle the output shaft is located.

Belt-type Stepless Speed Changer Unit

ACW

Motor output	0.2 kW to 3.7 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

Model Combining Speed Changer ANS Model with an Electromagnetic Clutch and Brake, Motor, and Worm Speed Reducer



Integrated Model of a Speed Change Pulley, Worm Speed Reducer, and Electromagnetic Clutch and Brake, and Motor

Compact Design

This model combines a speed change pulley, worm speed reducer, and electromagnetic brake and motor.

Multi-functional Design

Optimal output rotation speed can be achieved and it is easy to perform start, stop, positioning, inching, and intermittent operations by combining a worm speed reducer and electromagnetic clutch and brake.

Specifications

Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed change ratio	Speed changer in use		Model for belt in use	Speed reducer	Mass [kg]
					Model for motor-side speed changer	Model for machine-side speed changer			
ACW-02PMN	0.2	4	Three-phase, 200/50, 200・220/60	1:4	AK-90-AN-11	PE-106-AC-12H	1022V196S	N-CPM-12	20
ACW-04PMN	0.4	4	Three-phase, 200/50, 200・220/60	1:4	AK-106-AN-14N	PE-125-AC-15H	1422V236S	N-CPM-15	26.5
ACW-07PMN	0.75	4	Three-phase, 200/50, 200・220/60	1:4	AK-125-AN-19N	PE-150-AC-18H	1422V270S	N-CPM-18	46
ACW-15PMN	1.5	4	Three-phase, 200/50, 200・220/60	1:4	AK-150-AN-24N	PE-180-AC-22H	1922V338S	N-CPM-22	66
ACW-22PMN	2.2	4	Three-phase, 200/50, 200・220/60	1:4	AK-180-AN-28N	PE-212-AC-25H	2322V387S	N-CPM-25	94
ACW-37PMN	3.7	4	Three-phase, 200/50, 200・220/60	1:4	AK-180-AN-28N	PE-212-AC-30H	2322V387S	N-CPM-30	124

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher). * Coil springs are used for 02 and 04 models.

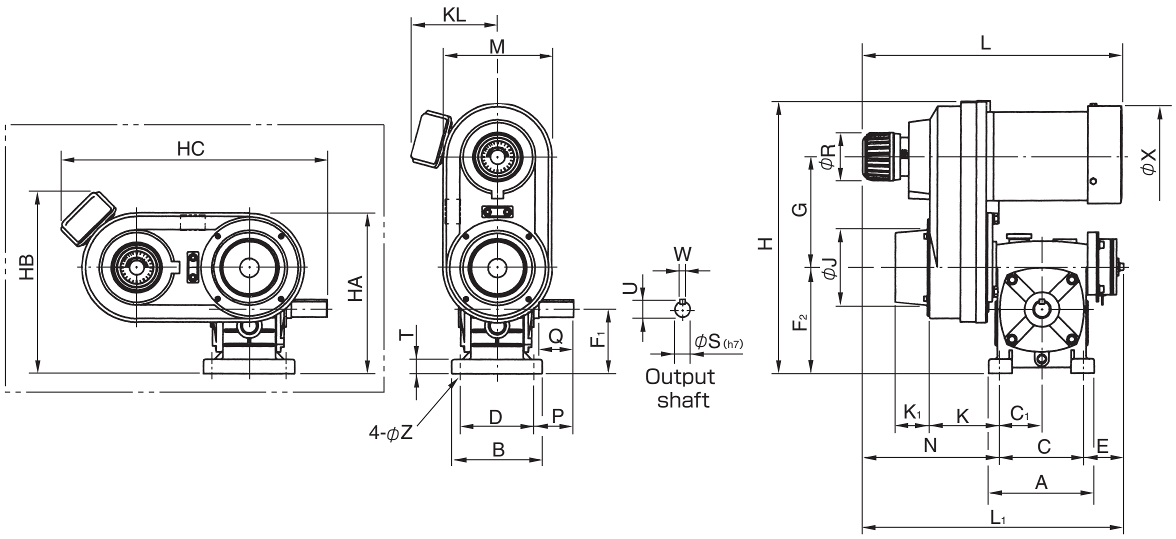
Model	Electromagnetic clutch and brake							
	Size	Dynamic friction torque [N・m]	Static friction torque [N・m]	Exciting voltage [V]	Capacity [W]	Current [A]	Resistance [Ω]	Heat resistance class
ACW-02PMN	06	5	5.5	DC 24	11	0.46	52	B
ACW-04PMN	08	10	11	DC 24	15	0.63	38	B
ACW-07PMN	10	20	22	DC 24	20	0.83	29	B
ACW-15PMN	12	40	45	DC 24	25	1.09	23	B
ACW-22PMN	16	80	90	DC 24	35	1.46	16	B
ACW-37PMN	16	80	90	DC 24	35	1.46	16	B

* If you use the device for a continuous or high-frequency operation, you need to consider how to prevent the temperature from rising. Please consult with us.

Model	Frequency [Hz]	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m] per speed reduction ratio					
		1/10	1/20	1/30	1/40	1/50	1/60
	50	50 ~ 200	25 ~ 100	17 ~ 68	12.5 ~ 50	10 ~ 40	8.5 ~ 34
	60	60 ~ 240	30 ~ 120	20 ~ 80	15 ~ 60	12 ~ 48	10 ~ 40
ACW-02PMN	50	24.5 ~ 6.4	40.2 ~ 11.3	55.0 ~ 16.2	55.0 ~ 18.8	55.0 ~ 23.3	55.0 ~ 26.1
	60	19.6 ~ 5.1	32.1 ~ 9.1	44.8 ~ 13.0	48.9 ~ 15.0	55.0 ~ 18.6	55.0 ~ 20.9
ACW-04PMN	50	49.4 ~ 12.9	86.3 ~ 23.8	115 ~ 32.9	120 ~ 40.7	107 ~ 46.1	100 ~ 53.3
	60	39.5 ~ 10.3	69.1 ~ 19.0	92.0 ~ 26.3	109 ~ 32.5	103 ~ 36.9	95.3 ~ 42.6
ACW-07PMN	50	92.3 ~ 24.4	167 ~ 45.9	212 ~ 62.5	193 ~ 80.5	151 ~ 87.0	151 ~ 102
	60	73.8 ~ 19.5	134 ~ 36.7	173 ~ 50.0	186 ~ 64.4	145 ~ 69.6	144 ~ 81.7
ACW-15PMN	50	186 ~ 50.7	237 ~ 94.0	303 ~ 131	263 ~ 163	252 ~ 166	215 ~ 143
	60	153 ~ 40.9	224 ~ 75.8	288 ~ 106	251 ~ 131	242 ~ 159	204 ~ 143
ACW-22PMN	50	212 ~ 79.3	394 ~ 151	507 ~ 208	526 ~ 270	467 ~ 308	441 ~ 294
	60	178 ~ 66.1	331 ~ 126	430 ~ 173	502 ~ 225	448 ~ 271	420 ~ 294
ACW-37PMN	50	360 ~ 134	644 ~ 251	870 ~ 353	768 ~ 443	799 ~ 525	716 ~ 468
	60	303 ~ 112	546 ~ 210	742 ~ 294	733 ~ 369	766 ~ 475	676 ~ 468

* The output shaft torque may be limited to the rated value of the speed reducer.

Dimensions



Unit [mm]

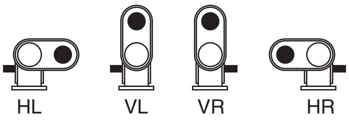
Model	ACW-02PMN	ACW-04PMN	ACW-07PMN	ACW-15PMN	ACW-22PMN	ACW-37PMN
A	140	150	190	220	270	320
B	120	130	150	170	190	230
C	110	120	150	180	220	260
C_1	55	60	75	90	110	130
D	95	105	115	135	155	180
E	52	57	64	62	81	85.5
F_1	80	90	105	120	150	180
F_2	130	150	175	200	250	300
G	140	160	186	239	250	250
H	340	389	456	541	590	678
J	98	108	134	158	190	190
K	83	101	109	123	143	148
K_1	57	49	53	60	105	105
L	345.5	373	417.5	462.5	542	627.5
L_1	337	372	437	476	599	648
M	139	158	190	220	255	255
N	175	195	223	234	298	302.5
P	47.5	57.5	72.5	72.5	92.5	100
Q	40	50	60	65	75	85
R	70	70	80	80	80	80
T	15	20	22	25	25	30
S	17	22	28	32	38	45
U	19	24.5	31	35	41	48.5
W	5	6	8	10	10	14
X	131	131	162	187	202	235
Z	11	11	15	15	15	18
KL	109	109	116.5	125	141.5	164.5
HA	200	229	270	310	378	428
HB	239	259	291.5	325	391.5	464.5
HC	344	379	432.5	504	547.5	567.5

How to Place an Order

ACW-07PMN-VR-30-IE3-□

Size
Speed reducer type
Model
Option
IE code
IE1: 02, 04
IE3: 07 or greater
Nominal speed reduction ratio

Type



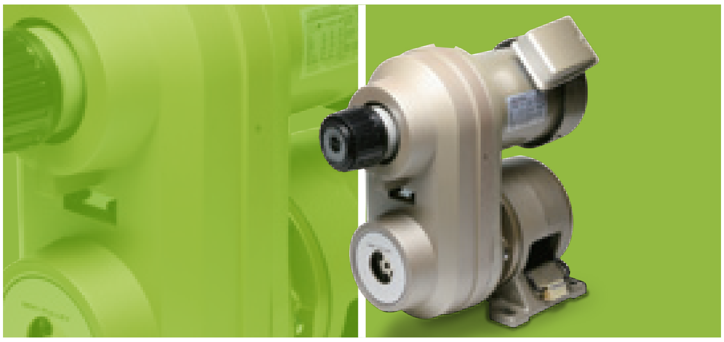
Please determine the type depending on which side of the handle the output shaft is located.

Belt-type Stepless Speed Changer Unit

ANB

Motor output	0.4 kW to 1.5 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz

Model Combining Speed Changer ANS Model with an Electromagnetic Clutch and Brake Unit, and Motor



Integrated Model of an Electromagnetic Clutch and Brake Unit, Motor, and Speed Change Pulley

Compact Design

This model combines an electromagnetic clutch and brake unit, motor, and speed change pulley.

Multi-functional Design

High-frequency start, stop, and inching operations at optimal rotation speed can be performed by incorporating an electromagnetic clutch and brake unit.

Specifications

Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed change ratio	Speed changer in use		Model for belt in use	Speed reducer O.H.L. [N]	Mass [kg]
					Model for motor-side speed changer	Model for machine-side speed changer			
ANB-04N	0.4	4	Three-phase, 200/50, 200・220/60	1:4	AK-106-AN-14N	PE-125-AN-15H	1422V236S	480	21
ANB-07N	0.75	4	Three-phase, 200/50, 200・220/60	1:4	AK-125-AN-19N	PE-150N-AN-18H	1422V270S	700	35.5
ANB-15N	1.5	4	Three-phase, 200/50, 200・220/60	1:4	AK-150-AN-24N	PE-180N-AN-22H	1922V338S	900	53

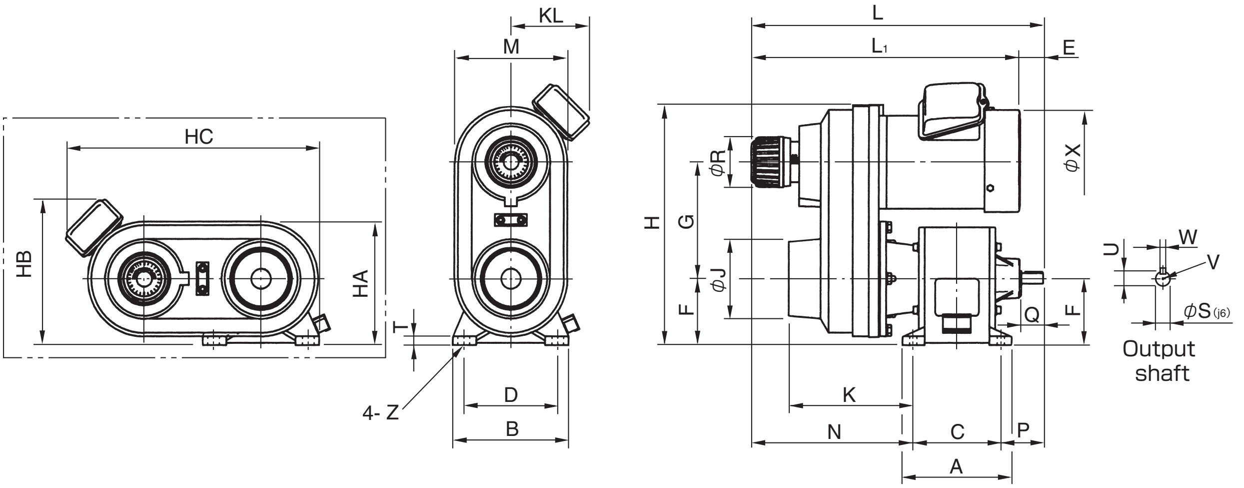
* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).
* Coil springs are used for 02 and 04 models.

Model	Electromagnetic clutch and brake							
	Size	Dynamic friction torque [N・m]	Static friction torque [N・m]	Exciting voltage [V]	Capacity [W]	Current [A]	Resistance [Ω]	Heat resistance class
ANB-04N	08	10	11	DC 24	15	0.63	38	B
ANB-07N	10	20	22	DC 24	20	0.83	29	B
ANB-15N	12	40	45	DC 24	25	1.09	23	B

Model	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m]	
	50Hz	60Hz
	500 ～ 2000	600 ～ 2400
ANB-04N	6.6 ～ 1.6	5.3 ～ 1.3
ANB-07N	12.2 ～ 3	9.8 ～ 2.4
ANB-15N	24.8 ～ 6.2	19.9 ～ 5

* If you use the device for a continuous or high-frequency operation, you need to consider how to prevent the temperature from rising. Please consult with us.

Dimensions



Unit [mm]

Model	ANB-04N	ANB-07N	ANB-15N
A	150	170	210
B	160	195	250
C	120	140	180
D	130	150	200
E	28	45.5	77.5
F	90	110	120
G	160	186	239
H	329	391	469
J	108	134	155
K	172	174	204
L	401	463	540
L_1	373	417.5	462.5
M	158	190	220
N	223	245	261.5
P	58	78	98.5
Q	30	40	50
R	70	80	80
T	12	15	15
S	14	19	24
U	16	21.5	27
W	5	6	8
V	M4 depth 8	M6 depth 11	M6 depth 11
X	131	162	187
Z	9 × 16	11 × 25	12 × 30
KL	109	116.5	125
HA	169	205	230
HB	199	226.5	245
HC	349	400	489

How to Place an Order

ANB-07N-V-IE3-□

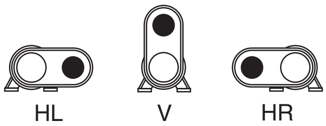
Size

Option

IE code
IE1: 04
IE3: 07 or greater

Model

Type



Please determine the type depending on which side of the handle the output shaft is located.

ANS/ANW/ANG GDN/ACW/ANB Models

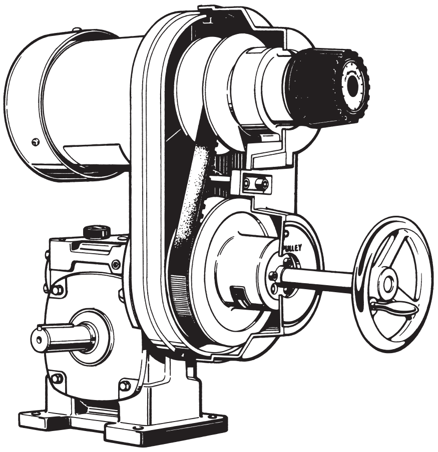
Options

Weight Type Index SD

A rotation speed indicator (SD model) can be built in the standard handle part.

Model	Number of handle turns [rotations]	SD model for AN
AN □ -02-SD	5	SD-53B-B544
AN □ -04-SD	6	SD-53B-B545
AN □ -07-SD	7	SD-53B-B546
AN □ -15-SD	8.25	SD-53B-B547
AN □ -22-SD	8.25	SD-53B-B548
AN □ -37-SD	8.75	SD-53B-B549

* A red zone corresponding to the number of turns of the handle is provided for the SD model for AN.

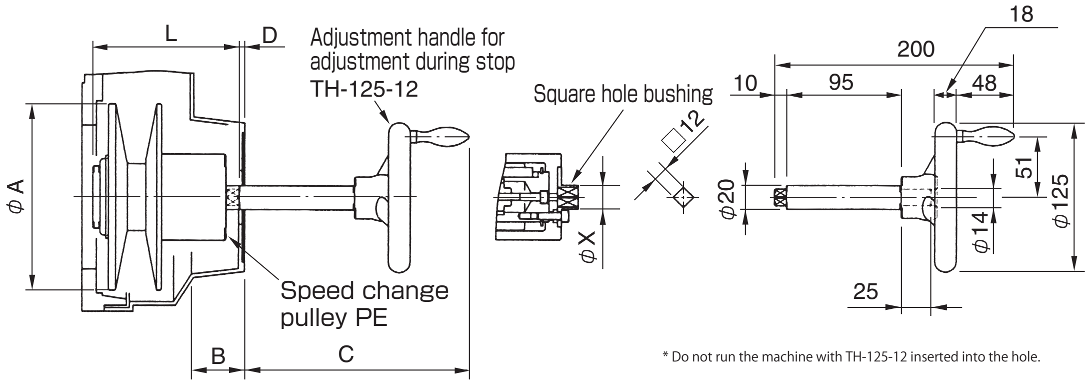


Handle Mounting Square Hole for Adjustment during Stop TH

Fine adjustments and positioning can be performed easily by using the handle inserted to this hole during machine stop.

Mount the adjustment handle for adjustment during stop TH to the square hole bushing of the PE model speed change pulley to perform fine adjustments and positioning.

* Please order an adjustment handle for adjustment during stop (TH-125-12) separately.



* Do not run the machine with TH-125-12 inserted into the hole.

When the AN unit is mounted

Unit [mm]

Model	A	B	C	D	L	X
AN □ -02-TH	106	40	188	2	101	20
AN □ -04-TH	125	44	188	2	122	20
AN □ -07-TH	155	42	188	2	124	20
AN □ -15-TH	185	53	185	5	151	20
AN □ -22-TH	185	57	188	2	164	20
AN □ -37-TH	216	74	189	1	175	20

When the ACW unit is mounted

Unit [mm]

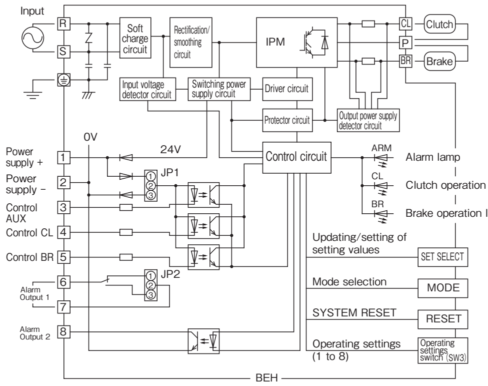
Model	A	B	C	D	L	X
ACW-02PMN-TH	106	57	207	− 17	136.5	20
ACW-04PMN-TH	125	49	198.5	− 8.5	137.5	34
ACW-07PMN-TH	155	53	202	− 12	150	20
ACW-15PMN-TH	185	60	197.5	− 7.5	170.5	20

Electromagnetic Clutch and Brake Power Supply Unit BEH

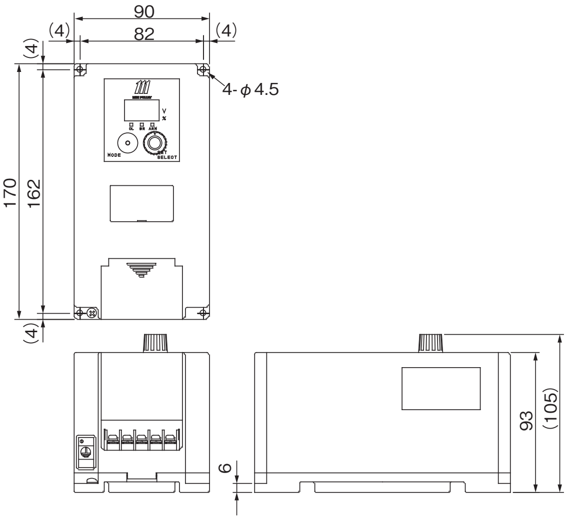
Just connect the device to the AC outlet power supply (100/200 VAC) to receive the 24 VDC excitation power supply necessary for the electromagnetic clutch and brake. In particular, a combination mode to interlock the electromagnetic clutch and the electromagnetic brake enables high-accuracy and high-speed operation. The high-performance power supply also includes an auto-tuning function to automatically detect the connected electromagnetic clutch and brake and set the optimal operating conditions, as well as a variety of protection functions; for example, wiring, connection, and setting errors are indicated by an alarm sound to allow the user to easily remove the cause of the error.

Applied unit	Power supply unit model	Input voltage [V]	Output voltage [V]	Output capacity [W]
ACW / ANB	BEH-10G	AC200 ～ 240	DC24	50
Common to all models	BEH-20G-1	AC100 ～ 120	DC24	100

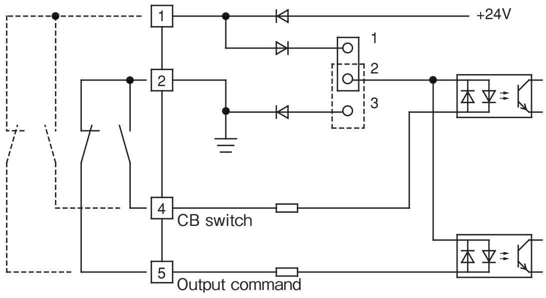
■ Structure



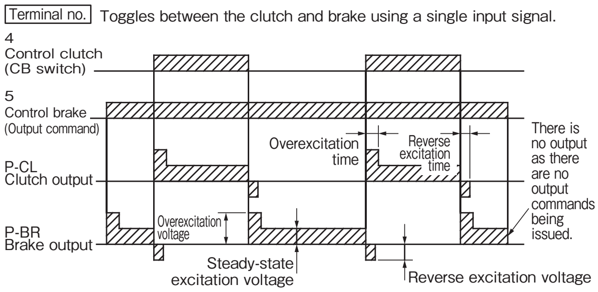
■ Dimensions



■ Wire Connection Method (Interlocked Mode - Operating Settings SW2 OFF)



■ Time Chart

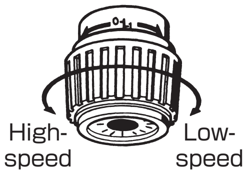


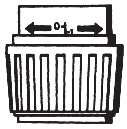
COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
HOLLOW SHAFT / SOLID SHAFT SPEED CHANGERS AND REDUCERS
BELT-TYPE STEPLESS SPEED CHANGER UNITS
STAND-ALONE BELT-TYPE STEPLESS SPEED CHANGERS
ZERO-MAX (STEPLESS SPEED CHANGERS)
DC MOTORS
ROTATION SPEED INDICATORS
MODELS
ANS
ANW NHN/PMN
ANW NKN
ANG GDN
ACW
ANB
PDS
PDC
PDG BSN
AHS
AHM
SPEED CHANGER BELTS

ANS/ANW/ANG GDN/ACW/ANB Models

Items Checked for Design Purposes

1. Avoid a humid place, a place where the ambient temperature is high, a place exposed to water or oil, a place where corrosive and flammable gases are present in the atmosphere, and select a well-ventilated place. Mount the device in a location that provides easy access for inspection.
   The operating ambient temperature range is -10℃ to +40℃ .
2. Turn the handle right (clockwise) to reduce speed and turn it left (counterclockwise) to increase speed.





3. Use the scale seal as a main scale and the scale plate on the handle as a vernier scale.
4. Do not turn the handle when the speed changer is stopped.
5. For the output rotation direction, you can use any direction.
6. Perform a test run and turn the handle to make sure there is no unusual vibration or noise.
7. If you use the device for a machine where normal-reverse operation is performed, or a repeated or impact load is applied, please consult with us.

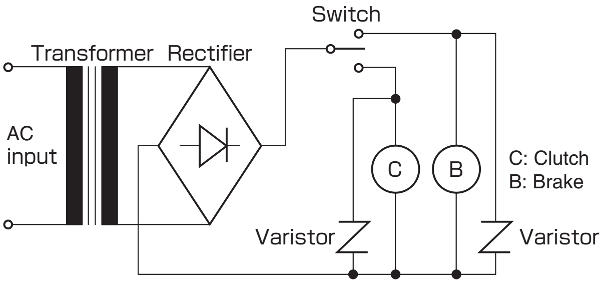
ANS

1. Use the AK model for the motor shaft and the PE model for the driven side.
2. The appropriate input rotation speed is 1500 to 1800 [min^{-1}]. (A 4-pole motor drive is appropriate.)
3. Before using the device, secure the rotation stopper part of the bearing case in the radial direction.
4. When mounting the speed changer, make sure the parallelism and perpendicularity of the travel line of the belt and the two shafts are correct.
5. When mounting the device to the machine, provide the rotating part with a cover.

ANW/ANG GDN/ANB/ACW

1. Mount the device on the floor surface, and select a stable mounting base to make sure it does not vibrate. When you mount the device above the floor level, make sure the base surface is somewhat higher than the floor surface and moisture is not absorbed. The device may vibrate during use if it is not mounted properly. Be sure to mount it securely using mounting bolts of an adequate strength.
2. When mounting the sprocket and gear to the output shaft, make sure the overhang load does not exceed the specified value. When connecting the output shaft directly to the machine, use a flexible coupling and align the shaft center and mount it.
3. Do not hold the handle when moving the device.
4. Remove the air cap attached to the oil fill plug on the worm speed reducer after mounting the device.
5. If you mount the device in an atmosphere where oil, grease, and dust will enter the housing, provide the clutch and brake part with a protective cover. (ACW, ANB)
6. The temperature in the clutch and brake part significantly increases depending on the operating condition. Make sure it is well ventilated. (ACW, ANB)

Wiring the Clutch and Brake

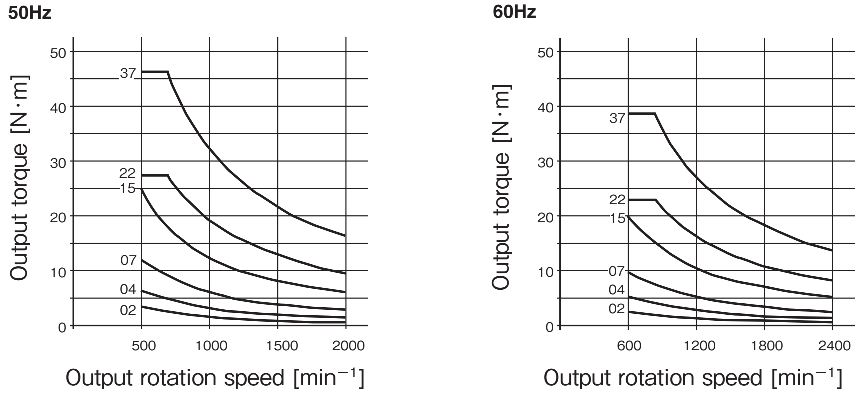


1. When using a clutch and brake, check to make sure the clutch and brake are not activated simultaneously.
2. The power supply for operating the clutch and brake is 24 VDC. A DC or AC power supply is used for the operating power supply by reducing voltage and rectifying current. (We offer a dedicated power supply.) The voltage fluctuation range is within ± 10%. Applying different voltages may deteriorate the performance or cause problems such as coil burnout.
3. The switch is located in the DC circuit. The on-off operation in the AC circuit slows the response time.
4. Connect the included protection elements (varistors) for absorbing surge to each of the clutch and the brake in parallel. However, if you use the power supply BEH model described in Options on the next page, you do not need to connect the varistors.

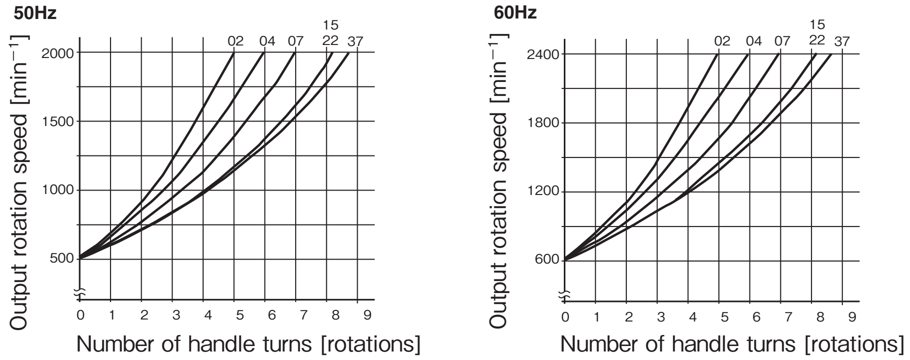
* Before changing between the normal and reverse directions, make sure the speed changer is stopped.
* Break-in is recommended to condition the engaging surfaces of gear teeth of the speed reducer. (Start with a low speed and gradually increase speed.)
* If you have not used the device for a long period of time, check the speed changer, speed changer belt, and speed reducer.
* Check the speed changer belt to make sure there is no unusual wear.
* A strong spring is installed in the speed changer (PE model). Do not disassemble it.

Performance and Characteristics

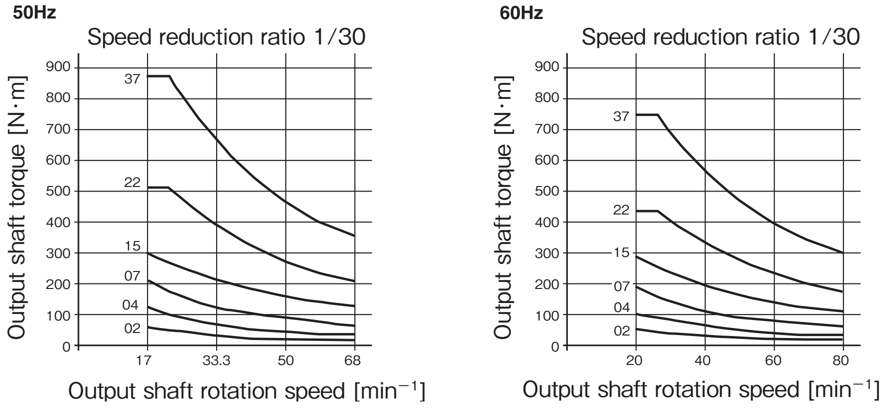
■ ANS: Output torque curve (when a 3-phase 4-pole motor is mounted)



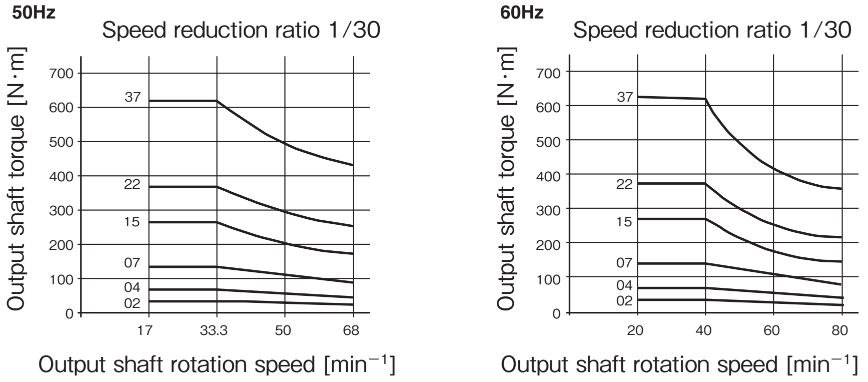
■ ANS: Number of handle turns and output rotation speed (when a 3-phase 4-pole motor is mounted)



■ ANW: Output shaft torque curve



■ ANG GDN: Output shaft torque curve



Belt-type Stepless Speed Changer Unit

PDS

Standard applied motor output	0.2 kW to 3.7 kW (4-pole)
Speed change ratio	Approx. 1:4

Belt-type Stepless Speed Changer Changing Rotation Speed Freely

One Touch Speed Change Operation

Speed change operation is very easy. Turn the handle right to reduce speed and turn it left to increase speed.

Easy-to-Read Handle Scale

Use the needle dial as a main scale and the rotation scale plate on the handle as a vernier scale.

Specifications

Model	Applied motor (4-pole) [kW]	Speed change ratio	Output rotation speed [min^{-1}]		Number of handle turns	Speed changer in use			
						Motor side		Machine side	
			50Hz	60Hz		Model	Mass [kg]	Model	Mass [kg]
PDS-02	0.2	1:4	500 ～ 2000	600 ～ 2400	5	AK-90-MA-11	1.3	PE-106-MA-12H	1.6
PDS-04	0.4	1:3.5	720 ～ 2520	870 ～ 3050	5.5	AK-124-MA-14N	2.4	PE-124-MA-15H	2.2
PDS-07	0.75	1:4	600 ～ 2400	720 ～ 2880	7.5	AK-140-MA-19N	2.8	PE-155-MA-18H	4
PDS-15	1.5	1:4	500 ～ 2000	600 ～ 2400	8.5	AK-155-MA-24N	3.7	PE-185-MA-22H	6
PDS-22	2.2	1:4.5	500 ～ 2250	600 ～ 2700	10.5	AK-185-MA-28N	5.4	PE-216-MA-25H	10
PDS-37	3.7	1:3	780 ～ 2350	940 ～ 2820	8.5	AK-216-MA-28N	6.9	PE-216-MA-30H	10

* The output rotation speed is that when a 3-phase 4-pole motor is mounted. Also use 1800 min^{-1} or less for the input rotation speed.

* For applicable motor greater than 5.5 kW, please consult with us.

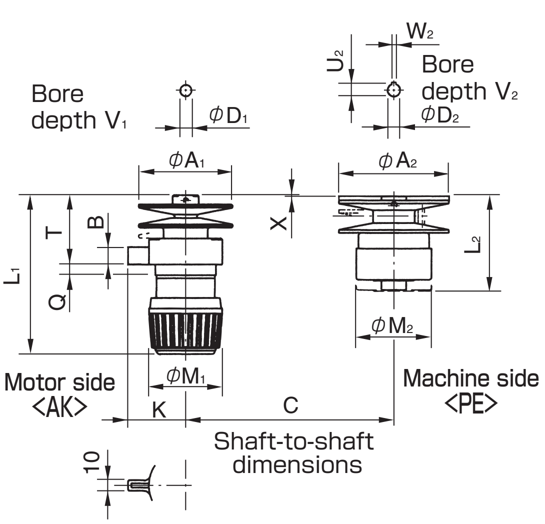
Belt Number and Distance between Shafts

Model	Distance between shafts [mm]	Belt number	Distance between shafts [mm]	Belt number	Distance between shafts [mm]	Belt number
PDS-02	163	1022V220S	172	1022V223	200	1022V247S
PDS-04	200	1422V270S	242	1422V300S	278	1422V330S
PDS-07	172	1422V270S	214	1422V300S	252	1422V330S
PDS-15	182	1922V298S	211	1922V321	235	1922V338S
PDS-22	230	2322V364S	275	2322V396S	306	2322V421S
PDS-37	247	2322V396S	279	2322V421S	304	2322V441K

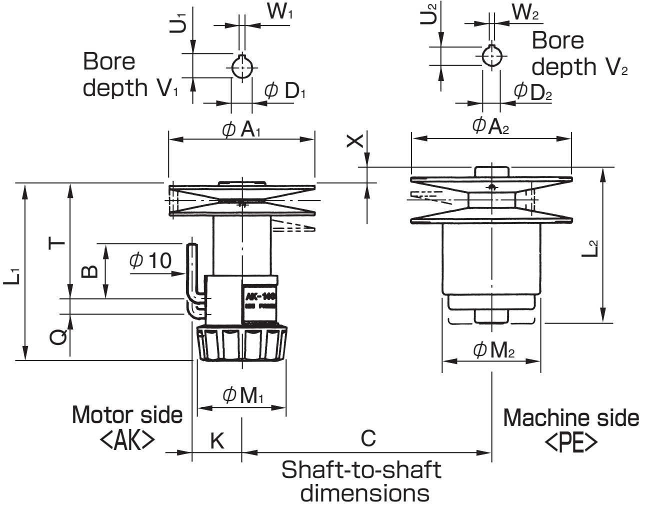
* The distance between shafts is dimension C in the Dimensions on the next page.

Dimensions

PDS-02



PDS-04 to 37



* This is the width of the rotation stopper.

Unit [mm]

Model	Model for motor-side speed changer	A1	M1	L1	B	K	Q	T	D1	U1	W1	V1	max.P.D.	min.P.D.
PDS-02	AK-90-MA-11	90	70	153	17	55	10	67	11	-	-	25	85	34.5
PDS-04	AK-124-MA-14N	124	86	164	53	48	11	107	14	16	5	30	114	58
PDS-07	AK-140-MA-19N	140	86	172	53	48	15	112	19	21.5	6	40	135	58
PDS-15	AK-155-MA-24N	155	86	205	53	48	17	142	24	27	8	50	148	60
PDS-22	AK-185-MA-28N	185	86	231	62	53	21	165	28	31	8	60	178	70
PDS-37	AK-216-MA-28N	216	86	240	74	53	17.5	175	28	31	8	60	200	110

Unit [mm]

Model	Model for machine-side speed changer	A2	M2	L2	D2	U2	W2	V2	max.P.D.	min.P.D.	X
PDS-02	PE-106-MA-12H	106	73	91	12	13.5	4	30	101	54.5	-1
PDS-04	PE-124-MA-15H	124	79	122	15	17	5	40	118	63	12
PDS-07	PE-155-MA-18H	155	94	151	18	20.5	6	45	150	77	14
PDS-15	PE-185-MA-22H	185	104	172	22	24.5	6	55	178	100	16.5
PDS-22	PE-216-MA-25H	216	126	205	25	28	8	50	208	112	17.5
PDS-37	PE-216-MA-30H	216	126	205	30	33	8	65	208	120	17.5

How to Place an Order

PDS-02-11-12H-☐

Size

Nominal bore diameter for motor-side speed changer AK model

Nominal bore diameter for machine-side speed changer PE model

Options Blank: Standard
SD: Rotation speed indicator
TH: Equipped with a square hole bushing for adjustments during machine stop

Model and nominal bore diameter for motor-side speed changer

AK-90-MA-11

Size

Nominal bore diameter, bore specifications
Blank: No key
N: Compliant with the new motor standards

Model and nominal bore diameter for machine-side speed changer

PE-106-MA-12H

Size

Nominal bore diameter, bore specifications
H: Compliant with the new JIS standards

* Please contact Miki Pulley for assistance with non-standard bore diameters.

Belt-type Stepless Speed Changer Unit

PDC

Motor output	0.2 kW to 3.7 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz

Extremely Simple Speed Changer Units

Unit Structure

The stepless speed changer unit combines the speed change pulley, motor and driven shaft with bed.

Large Speed Change Ratio

The combined use of two models of speed change pulleys (AK and PE models) achieves a large speed change ratio.

One Touch Speed Change Operation

Speed change operation is very easy because a rotation stopper is included in the device. Turn the handle right to reduce speed and turn it left to increase speed.

Easy-to-Read Handle Scale

Use the needle dial as a main scale and the rotation scale plate on the handle as a vernier scale.

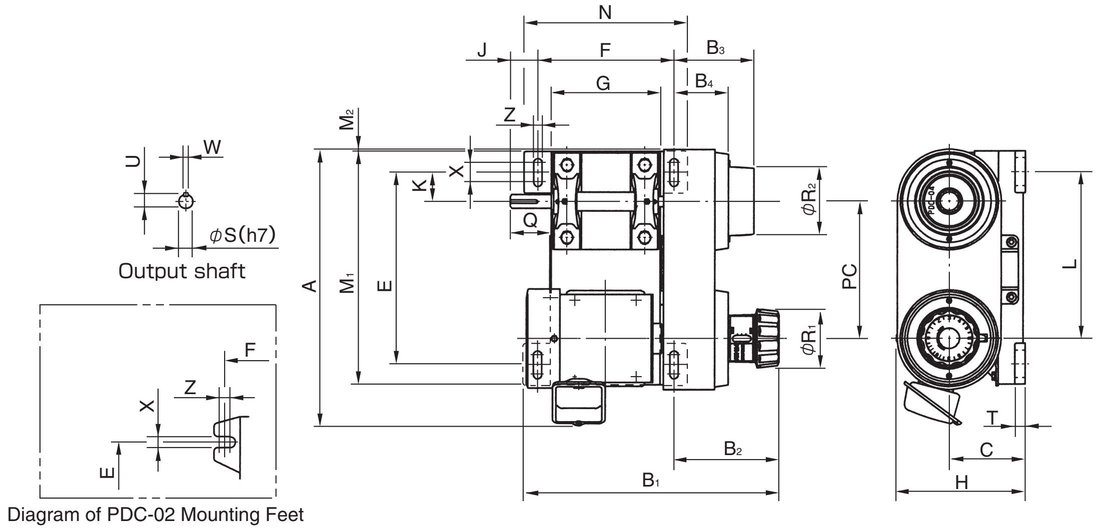
Specifications

Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed change ratio	Speed changer in use		Model for belt in use	Mass [kg]
					Model for motor-side speed changer	Model for machine-side speed changer		
PDC-02N	0.2	4	Three-phase, 200/50, 200・220/60	1:4	AK-90-MA-11	PE-106-MA-12H	1022V220S	20.5
PDC-04N	0.4	4	Three-phase, 200/50, 200・220/60	1:3.5	AK-124-MA-14N	PE-124-MA-15H	1422V270S	30
PDC-07N	0.75	4	Three-phase, 200/50, 200・220/60	1:4	AK-140-MA-19N	PE-155-MA-18H	1422V270S	40
PDC-15N	1.5	4	Three-phase, 200/50, 200・220/60	1:4	AK-155-MA-24N	PE-185-MA-22H	1922V298S	58
PDC-22N	2.2	4	Three-phase, 200/50, 200・220/60	1:4.5	AK-185-MA-28N	PE-216-MA-25H	2322V364S	71.5
PDC-37N	3.7	4	Three-phase, 200/50, 200・220/60	1:3	AK-216-MA-28N	PE-216-MA-30H	2322V396S	88

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

Model	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m]			
	50Hz		60Hz	
	Output shaft rotation speed [min^{-1}]	Output shaft torque [N・m]	Output shaft rotation speed [min^{-1}]	Output shaft torque [N・m]
PDC-02N	500 ～ 2000	3 ～ 0.6	600 ～ 2400	2.4 ～ 0.5
PDC-04N	720 ～ 2520	3.6 ～ 1	870 ～ 3050	2.9 ～ 0.8
PDC-07N	600 ～ 2400	9.2 ～ 2.4	720 ～ 2880	7.5 ～ 2
PDC-15N	500 ～ 2000	19 ～ 5.4	600 ～ 2400	15 ～ 4.3
PDC-22N	500 ～ 2250	28 ～ 8.2	600 ～ 2700	22 ～ 6.6
PDC-37N	780 ～ 2350	40 ～ 11	940 ～ 2820	32 ～ 8.8

Dimensions



Unit [mm]

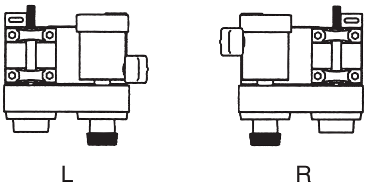
Type	PDC-02N	PDC-04N	PDC-07N	PDC-15N	PDC-22N	PDC-37N
A	322	399	396	433	513	557
B_1	346	374	425	485	570	580
B_2	138	155	165	195	230	240
B_3	90	120	145	165	200	210
B_4	55	85	75	105	130	140
C	95	110	120	130	140	152
E	240	280	290	320	390	390
F	180	200	240	270	320	320
G	150	160	200	230	280	280
H	165	185	210	235	264	276
J	45	40	65	65	80	85
K	35	42	58	67	64	64
L	198	242	230	249	294	309
M_1	300	340	350	380	450	450
M_2	0	3	3	8	31	31
N	200	240	280	310	360	360
PC	163	200	172	182	230	247
Q	60	60	85	85	100	105
R_1	70	86	86	86	86	86
R_2	90	100	110	121	150	150
T	15	15	20	20	20	20
X	11	28	25	25	25	25
Z	10	12	15	15	15	15
S	20	20	25	25	30	30
U	22.5	22.5	28	28	33	33
W	6	6	8	8	8	8

How to Place an Order

PDC-07N-R-IE3-□

Size
Model
Option
IE code
IE1: 02, 04
IE3: 07 or greater

Type



Please determine the type depending on which side of the handle the output shaft is located.

Belt-type Stepless Speed Changer Unit

PDG BSN

Motor output	0.2 kW to 3.7 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
Speed reduction ratio	1/10, 1/20, 1/30, 1/40, 1/50, 1/60

Stepless Speed Changer Combining Speed Changer PDS Model with a Motor and Worm Speed Reducer

Unit Structure

The stepless speed changer combines the speed change pulley, motor and worm speed reducer with bed.

Large Speed Change Ratio

The combined use of two models of speed change pulleys (AK and PE models) achieves a large speed change ratio.

One Touch Speed Change Operation

Speed change operation is very easy because a rotation stopper is included in the device. Turn the handle right to reduce speed and turn it left to increase speed.

Easy-to-Read Handle Scale

Use the needle dial as a main scale and the rotation scale plate on the handle as a vernier scale.

Specifications

Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed change ratio	Speed changer in use		Model for belt in use	Speed reducer	Mass [kg]
					Model for motor-side speed changer	Model for machine-side speed changer			
PDG-02BSN	0.2	4	Three-phase, 200/50, 200・220/60	1:4	AK-90-MA-11	PE-106-MA-12H	1022V220S	N-PA-12	21.5
PDG-04BSN	0.4	4	Three-phase, 200/50, 200・220/60	1:3.5	AK-124-MA-14N	PE-124-MA-15H	1422V270S	N-PA-15	33
PDG-07BSN	0.75	4	Three-phase, 200/50, 200・220/60	1:4	AK-140-MA-19N	PE-155-MA-18H	1422V270S	N-PA-18	51
PDG-15BSN	1.5	4	Three-phase, 200/50, 200・220/60	1:4	AK-155-MA-24N	PE-185-MA-22H	1922V298S	N-PA-22	74
PDG-22BSN	2.2	4	Three-phase, 200/50, 200・220/60	1:4.5	AK-185-MA-28N	PE-216-MA-25H	2322V364S	N-PA-25	103
PDG-37BSN	3.7	4	Three-phase, 200/50, 200・220/60	1:3	AK-216-MA-28N	PE-216-MA-30H	2322V396S	N-PA-30	152.5

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

Model	Frequency [Hz]	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m] per speed reduction ratio											
		1/10		1/20		1/30		1/40		1/50		1/60	
		Output shaft rotation speed [min^{-1}]	Output shaft torque [N・m]	Output shaft rotation speed [min^{-1}]	Output shaft torque [N・m]	Output shaft rotation speed [min^{-1}]	Output shaft torque [N・m]	Output shaft rotation speed [min^{-1}]	Output shaft torque [N・m]	Output shaft rotation speed [min^{-1}]	Output shaft torque [N・m]	Output shaft rotation speed [min^{-1}]	Output shaft torque [N・m]
PDG-02BSN	50	50～200	23～4.8	25～100	41～8.9	17～68	54～12	12.5～50	54～15	10～40	54～18	8.5～34	54～21
	60	60～240	18～4	30～120	33～7.4	20～80	42～9.9	15～60	53～13	12～48	54～15	10～40	54～17
PDG-04BSN	50	72～252	27～8.1	36～126	48～15	24～84	64～20	18～63	76～25	15～52	99～32	12～42	95～35
	60	87～305	22～6.5	44～154	38～12	29～102	51～16	22～77	62～20	17～60	80～26	15～52	91～28
PDG-07BSN	50	60～240	70～20	30～120	130～37	20～80	170～50	15～60	190～63	12～48	200～77	10～40	190～89
	60	72～288	57～16	36～144	110～30	24～96	140～41	18～72	170～53	15～60	200～64	12～48	190～74
PDG-15BSN	50	50～200	150～44	25～100	220～81	17～68	290～110	12.5～50	250～140	10～40	280～170	8.5～34	260～190
	60	60～240	120～35	30～120	200～65	20～80	280～90	15～60	250～110	12～48	280～140	10～40	260～160
PDG-22BSN	50	50～225	220～67	25～113	400～130	17～75	500～180	12.5～56	500～230	10～45	450～280	8.5～37	420～300
	60	60～270	170～54	30～135	320～100	20～90	410～140	15～67	500～180	12～54	450～220	10～45	420～260
PDG-37BSN	50	78～235	320～91	39～118	570～170	26～78	770～240	20～59	730～300	16～47	770～390	13～39	680～430
	60	94～282	250～73	47～141	450～140	32～95	610～190	24～71	730～240	19～56	770～310	16～47	680～340

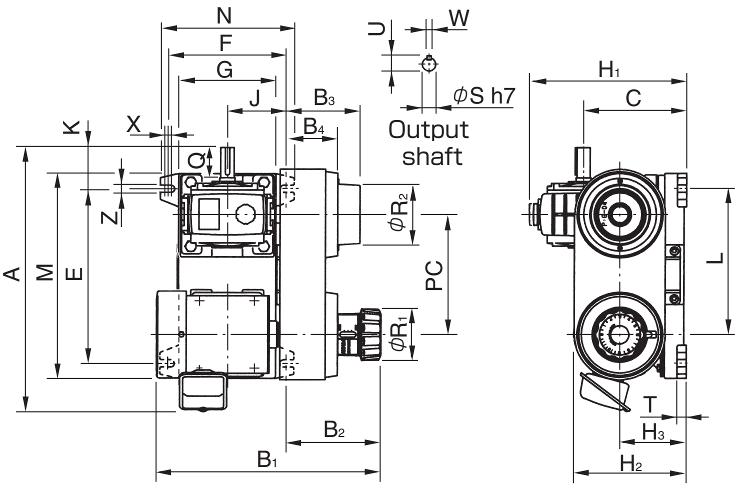
* The output shaft torque may be limited to the rated value of the speed reducer.

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA

SERIES
HOLLOW SHAFT / SOLID SHAFT SPEED CHANGERS AND REDUCERS
BELT-TYPE STEPLESS SPEED CHANGER UNITS
STAND-ALONE BELT-TYPE STEPLESS SPEED CHANGERS
ZERO-MAX (STEPLESS SPEED CHANGERS)
DC MOTORS
ROTATION SPEED INDICATORS

MODELS
ANS
ANW NHN/PMN
ANW NKN
ANG GDN
ACW
ANB
PDS
PDC
PDG BSN
AHS
AHM
SPEED CHANGER BELTS

Dimensions



Unit [mm]

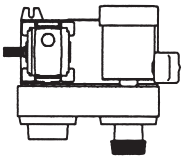
Model	PDG-02BSN	PDG-04BSN	PDG-07BSN	PDG-15BSN	PDG-22BSN	PDG-37BSN
A	347	434	436	468	559	622
B_1	346	374	425	485	570	650
B_2	138	160	165	195	230	230
B_3	90	125	145	165	200	200
B_4	55	85	75	105	130	130
C	145	170	190	210	240	280
E	240	290	290	320	390	410
F	180	195	240	270	320	390
G	150	160	200	230	280	330
H_1	220	255	290	320	375	440
H_2	165	185	210	235	265	285
H_3	95	110	120	130	140	160
J	90	98	120	135	160	195
K	60	68	73	73	93	110
L	198	242	230	249	308	327
M	290	340	350	380	450	490
N	200	220	280	310	360	450
PC	163	200	172	182	230	247
Q	40	50	60	65	75	85
R_1	70	86	86	86	86	86
R_2	90	100	110	121	150	150
T	15	15	20	20	20	20
X	10	10	10	10	10	20
Z	11	12	15	15	15	20
S	17	22	28	32	38	45
U	19	24.5	31	35	41	48.5
W	5	6	8	10	10	14

How to Place an Order

PDG-07BSN-R-30-IE3-□

Size
Model
Nominal speed reduction ratio
Option
IE code
IE1: 02, 04
IE3: 07 or greater

Type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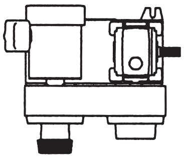

R

Please determine the type depending on which side of the handle the output shaft is located.

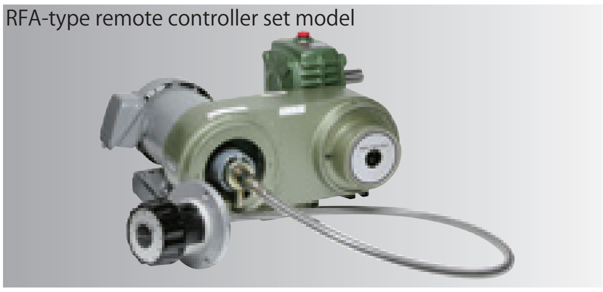
PDS/PDC/PDG BSN Models

Options

Units with Remote Controllers

These are flexible-shaft remote controllers that can be used with belt-type stepless speed changer units to allow remote operation. They are available as RFA type controllers, which have a flexible shaft in the motor shaft axial direction, or as RFB type controllers, where the flexible shaft is perpendicular to the motor shaft.

RFA-type remote controller set model



Applicable speed changers Unit size	No. of handle turns	Standard flexible shaft length [mm]	Applicable model for motor-side speed changer	Remote controller RF model
02 (0.2kW)	5	1000・1600・2500	AK-90-MA-11-RFA	RFA-90-A
04 (0.4kW)	5.5	1000・1600・2500	AK-124-MA-14N-RFA	RFA-124-A
07 (0.75kW)	7.5	1000・1600・2500	AK-140-MA-19N-RFA	RFA-140-A
15 (1.5kW)	8.5	1000・1600・2500	AK-155-MA-24N-RFA	RFA-155-A
22 (2.2kW)	10.5	1000・1600・2500	AK-185-MA-28N-RFA	RFA-185-A
37 (3.7kW)	8.5	1000・1600・2500	AK-216-MA-28N-RFA	RFA-216-A

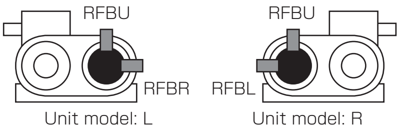
* Contact Miki Pulley for information on models with non-standard flexible shaft lengths.
* Use such that the flexible shaft bend radius is no less than R300.

How to Place an Order

PDG-02BSN-R-10-IE1-RFA-SD-1000

Speed changer unit model
Remote controller Type A
Index handle-equipped option (blank if not required)
Flexible shaft length [mm] 1000/1600/2500

RFB-types allow you to choose the flexible shaft direction.



RFB-type remote controller set model

Applicable speed changers Unit size	No. of handle turns	Standard flexible shaft length [mm]	Applicable model for motor-side speed changer	Remote controller RF model
02 (0.2kW)	10	1000・1600・2500	AK-90-MA-11-RFB	RFB-90-A
04 (0.4kW)	11	1000・1600・2500	AK-124-MA-14N-RFB	RFB-124-A
07 (0.75kW)	15	1000・1600・2500	AK-140-MA-19N-RFB	RFB-140-A
15 (1.5kW)	17	1000・1600・2500	AK-155-MA-24N-RFB	RFB-155-A
22 (2.2kW)	21	1000・1600・2500	AK-185-MA-28N-RFB	RFB-185-A
37 (3.7kW)	17	1000・1600・2500	AK-216-MA-28N-RFB	RFB-216-A

* Contact Miki Pulley for information on models with non-standard flexible shaft lengths.
* Use such that the flexible shaft bend radius is no less than R300.

How to Place an Order

PDG-02BSN-R-10-IE1-RFBU-SD-1000

Speed changer unit model
Remote controller Type B (model)
Index handle-equipped option (blank if not required)
Flexible shaft length [mm] 1000/1600/2500

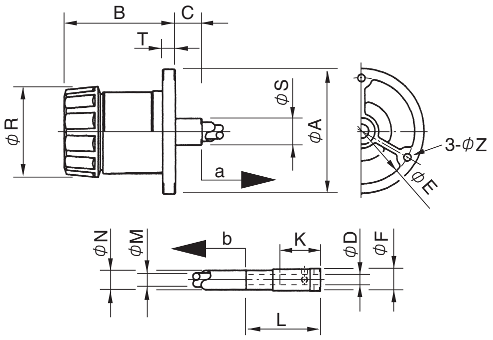
Remote Controller RF

Check the following if you only require the flexible shaft-type remote controller unit.

How to Place an Order

RFA-90-SD-1000

Remote controller Type A/B
Motor-side speed changer AK size
Index handle-equipped option (blank if not required)
Flexible shaft length [mm] 1000/1600/2500



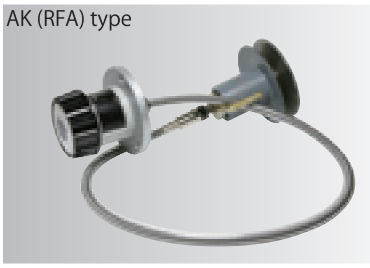
Model	Applicable speed changer Unit size	Dimensions [mm]														No. of handle turns		Standard flexible shaft length [mm]
		A	B	C	D	E	F	K	L	M	N	R	S	T	Z	RFA	RFB	
RFA-90-A / RFB-90-A	02	100	75	25	10	82	20	38	70	10	14	70	25	11	7	5	10	1000・1600・2500
RFA-124-A/RFB-124-A	04	118	94	25	10	100	20	38	70	10	14	86	25	12	7	5.5	11	1000・1600・2500
RFA-140-A/RFB-140-A	07	118	94	25	10	100	20	38	70	10	14	86	25	12	7	7.5	15	1000・1600・2500
RFA-155-A/RFB-155-A	15	118	94	25	10	100	20	38	70	10	14	86	25	12	7	8.5	17	1000・1600・2500
RFA-185-A/RFB-185-A	22	118	104	25	10	100	20	38	70	13	18	86	25	12	7	10.5	21	1000・1600・2500
RFA-216-A/RFB-216-A	37	118	104	25	10	100	20	38	70	13	18	86	25	12	7	8.5	17	1000・1600・2500

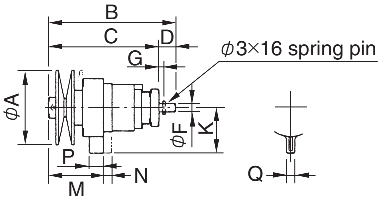
* Models listed in the "Model" column above are handle-only models (without a flexible shaft). To order models with an index handle, add "-A" or "-SD" to the end of the order.
* Contact Miki Pulley for information on models with non-standard flexible shaft lengths.
* Use such that the flexible shaft bend radius is no less than R300.

Motor Side Speed Changer AK (RF) for Remote Controller RF

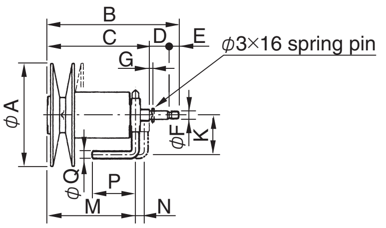
These are dedicated motor side speed changers that allow the speed to be changed with an RF remote controller.

AK (RFA) type





AK-90（RFA）

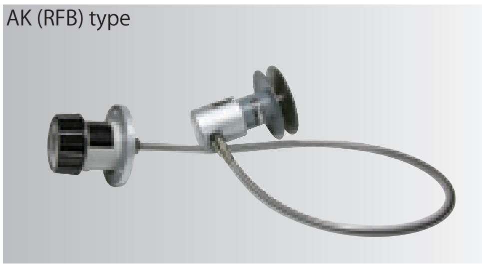


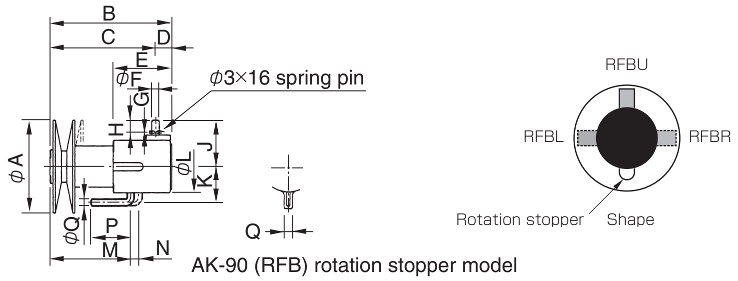
AK-124～216（RFA）

Model	Applicable speed changer Unit size	Dimensions [mm]												No. of handle turns	Standard flexible shaft length [mm]
		A	B	C	D	E	F	G	K	M	N	P	Q		
AK-90-MA-11-RFA	02	90	154	134	20	-	10	6	55	67	10	17	10	5	1000・1600・2500
AK-124-MA-14N-RFA	04	124	160	124	24	12	10	4	48	107	11	53	10	5.5	1000・1600・2500
AK-140-MA-19N-RFA	07	140	169	133	24	12	10	4	48	112	15	53	10	7.5	1000・1600・2500
AK-155-MA-24N-RFA	15	155	201	165	24	12	10	4	48	142	17	53	10	8.5	1000・1600・2500
AK-185-MA-28N-RFA	22	185	228	192	24	12	10	4	53	165	21	62	10	10.5	1000・1600・2500
AK-216-MA-28N-RFA	37	216	236	200	24	12	10	4	53	175	17.5	74	10	8.5	1000・1600・2500

* Models listed in the "Model" column above are speed changer-only models (without a remote controller or flexible shaft).
* Contact Miki Pulley for information on models with non-standard flexible shaft lengths.
* Use such that the flexible shaft bend radius is no less than R300.

AK (RFB) type





AK-90 (RFB) rotation stopper model

Model	Applicable speed changer Unit size	Dimensions [mm]															No. of handle turns	Standard flexible shaft length [mm]
		A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q		
AK-90-MA-11-RFB[ ]	02	90	171	149	22	78	10	4	20	62	55	70	67	10	17	10	10	1000・1600・2500
AK-124-MA-14N-RFB[ ]	04	124	162	140	22	78	10	4	20	62	48	70	107	11	53	10	11	1000・1600・2500
AK-140-MA-19N-RFB[ ]	07	140	171	149	22	78	10	4	20	62	48	70	112	15	53	10	15	1000・1600・2500
AK-155-MA-24N-RFB[ ]	15	155	203	181	22	78	10	4	20	62	48	70	142	17	53	10	17	1000・1600・2500
AK-185-MA-28N-RFB[ ]	22	185	230	208	22	78	10	4	20	62	53	80	165	21	62	10	21	1000・1600・2500
AK-216-MA-28N-RFB[ ]	37	216	238	216	22	78	10	4	20	62	53	80	175	17.5	74	10	17	1000・1600・2500

* Models listed in the "Model" column above are speed changer-only models (without a remote controller or flexible shaft). Check the models in the diagrams above for the flexible shaft direction.
* Contact Miki Pulley for information on models with non-standard flexible shaft lengths.
* Use such that the flexible shaft bend radius is no less than R300.

How to Place an Order

AK-90-MA-11-RFA-SD-1000

Model for motor-side speed changer

Remote controller
RFA: Type A
RFBU: Type B (upward)
RFBL: Type B (left)
RFBR: Type B (right)

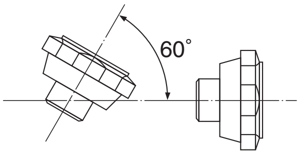
Flexible shaft length [mm]
1000/1600/2500

Index handle-equipped option (blank if not required)

* The flexible shaft direction for RFB types is nominal where the speed changer rotation stopper is at the bottom. Check the models shown in the diagrams above.
* The models above include the remote controller RF.

Index Handle SD for Remote Operation Device RF

Needle moves when handle is rotated. When handle is rotated once, the little hand moves for one gradation. For this reason, it is possible to read the detailed degrees of handle turns. Mount it within the range from parallel to 60 degree, as shown in the diagram below.



Model	Applied index handle
RFA-90-SD	SD-53B-9L
RFA-124-SD	SD-53B-90A-9L
RFA-140-SD	
RFA-155-SD	
RFA-185-SD	SD-53B-90A-12L
RFA-216-SD	
RFB-90-SD	SD-53B-12L
RFB-124-SD	SD-53B-90A-12L
RFB-140-SD	SD-53B-90A-16L
RFB-155-SD	SD-53B-90A-25L
RFB-185-SD	
RFB-216-SD	

* Please note that dimensions of the handle somewhat differ if SD (rotation speed indicator) is mounted.

PDS/PDC/PDG BSN Models

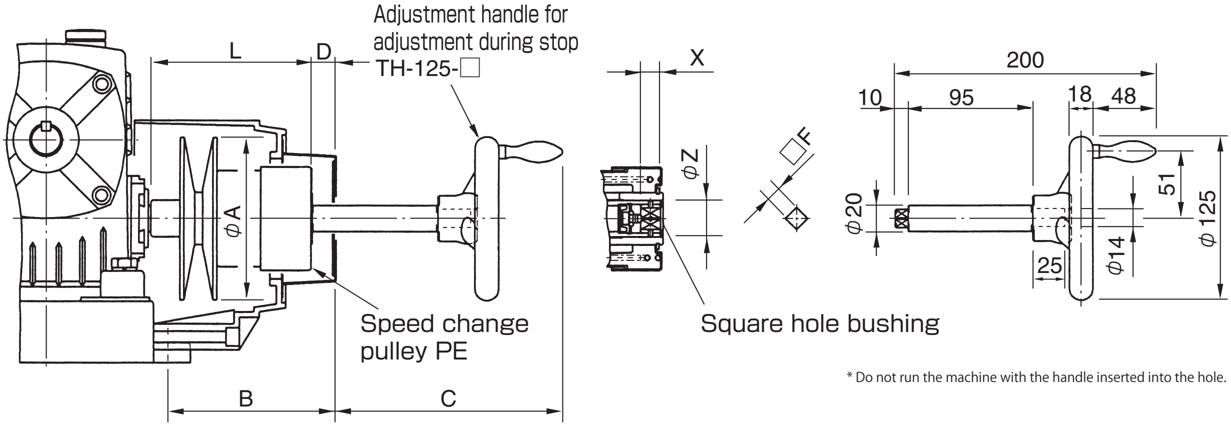
Options

Handle Mounting Square Hole for Adjustment during Stop TH

Fine adjustments and positioning can be performed easily by using the handle inserted to this hole during machine stop.

Mount the adjustment handle for adjustment during stop TH to the square hole bushing of the PE model speed change pulley to perform fine adjustments and positioning.

Please order an adjustment handle for adjustment during stop (TH-125-□) separately.



* Do not run the machine with the handle inserted into the hole.

■ Dimensions When the Handle Is Attached to the PDG-BS Unit

Unit [mm]

Handle model	Applied speed change pulley	A	B	C	D	□F	L	X	Z
TH-125-12	PE-106	106	90	176	14	12	91	15	24
TH-125-12	PE-124	124	125	169	21	12	122	15	28
TH-125-15	PE-155	155	145	176	14	15	151	15	32
TH-125-15	PE-185	185	165	172	18	15	172	20	40
TH-125-15	PE-216	216	200	175	15	15	205	20	50
TH-125-15	PE-216	216	200	165	25	15	205	20	50

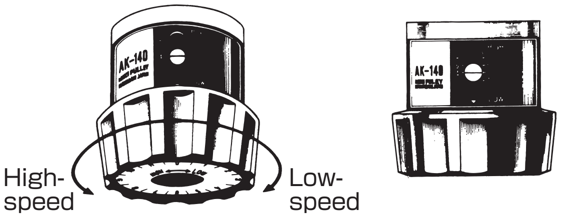
How to Place an Order

TH-125-□

└F dimension

Items Checked for Design Purposes

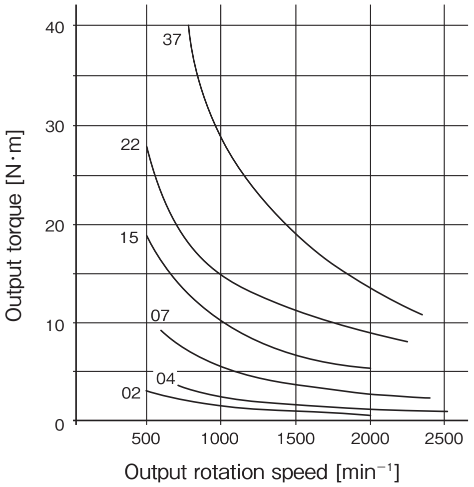
1. Avoid a humid or dusty place, a place where the ambient temperature is high, a place exposed to water or oil, and a place where corrosive and flammable gases are present in the atmosphere, and select a well-ventilated place. Mount the device in a location that provides easy access for inspection. The operating ambient temperature range is -10° C to +40° C.
2. Use the AK model for the motor shaft and the PE model for the driven side.
3. The appropriate input rotation speed range is 1500 to 1800 [min^{-1}]. (The 4-pole motor drive is appropriate.)
4. Before using the device, secure the rotation stopper rod in the radial direction. (PDS model)
5. When mounting the speed changer, make sure the parallelism and perpendicularity of the the travel line of the belt and two shafts are correct.
6. When mounting the device to the machine, provide the rotating part with a cover.
7. Mount the device on the floor surface, and select a stable mounting base to make sure it does not vibrate. When you mount the device above the floor level, make sure the base surface is somewhat higher than the floor surface and moisture is not absorbed. The device may vibrate during use if it is not mounted properly. Be sure to mount it securely using mounting bolts of an adequate strength.
8. When mounting the sprocket and gear to the output shaft, make sure the overhang load does not exceed the specified value. When connecting the output shaft directly to the machine, use a flexible coupling and align the shaft center and mount it.
9. Do not hold the handle when moving the device.
10 Remove the air cap attached to the oil fill plug on the worm speed reducer after mounting the device.
11. If you use the device for a machine where normal-reverse operation is performed, or a repeated or impact load is applied, please consult with us.
12. Turn the handle right (clockwise) to reduce speed and turn it left (counterclockwise) to increase speed.



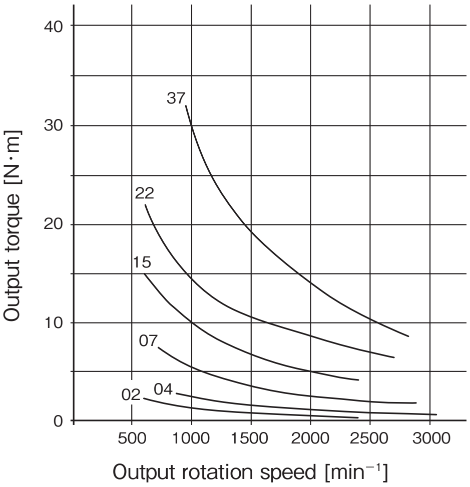
13. Use the needle dial as a main scale and the scale plate on the handle as a vernier scale.
14. Do not turn the handle when the speed changer is stopped.
15. For the output rotation direction, you can use any direction.
16. Perform a test run and turn the handle to make sure there is no unusual vibration or noise.
17. Check the output rotation speed.
18. Before changing between the normal and reverse directions, make sure the speed changer is stopped.
19. Break-in is recommended to condition the engaging surfaces of gear teeth of the speed reducer. (Start with a low speed and gradually increase speed.)
20. If you have not used the device for a long period of time, check the speed changer, speed changer belt, and speed reducer.
21. Check the speed changer belt to make sure there is no unusual wear.
22. A strong spring is installed in the speed changer (PE model). Do not disassemble it as it's so dangerous.

Output Torque Curves (when a 3-phase 4-pole Motor Is Mounted)

50Hz

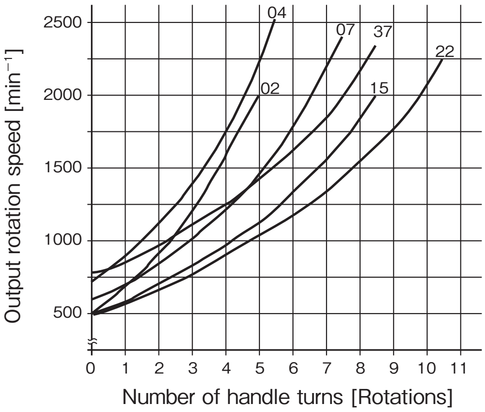


60Hz

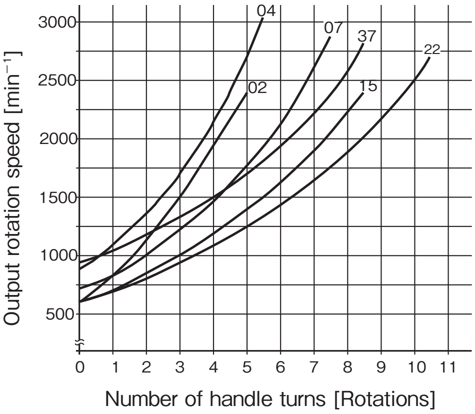


Number of Handle Turns and Output Rotation Speed (with a 3-phase 4-pole Motor Attached)

50Hz



60Hz



Belt-type Stepless Speed Changer Unit

AHS

Standard applied motor output	0.2 kW to 3.7 kW (4-pole)
Speed change ratio	1:4
CB torque	5.5 N・m to 90 N・m

Intermediate-type Speed Changer Unit That Can Be Mounted between Motor and Machine

- Intermediate-type speed changer unit that can be mounted between machines or between motor and machine
- Because the output shaft is through-shaft, operation of two machine is possible at an appropriate proportion.
- The AHS-A model for high-speed input and the AHS-LA model for low-speed input are available.

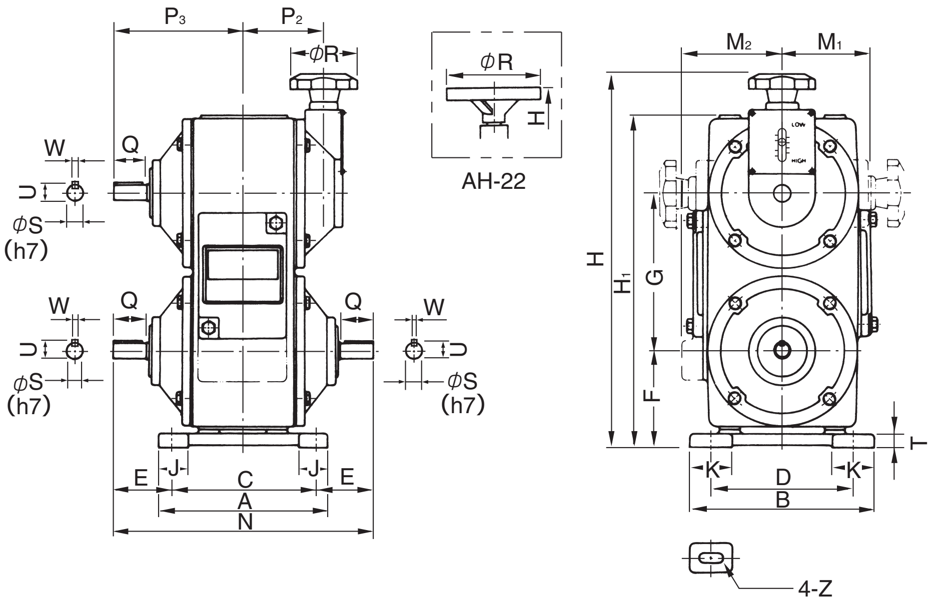
Specifications

Model	Transmission capacity (4-pole motor) [kW]	Standard specification speed changer						Electromagnetic clutch and brake								
		Speed change ratio	Output shaft rotation speed [min $^{-1}$]	Number of handle turns	Model for belt in use	A type Mass [kg]	B type Mass [kg]	Size	Dynamic friction torque [N・m]	Static friction torque [N・m]	Exciting voltage [V]	Capacity [W]	Current [A]	Resistance [Ω]	Heat resistance class
AHS-02-□	0.2	1:4	Input rotation speed × 0.42 ～ 1.68 *Input rotation speed Range：900 ～ 1800	11	1422V240S	17	19	06	5	5.5	DC 24	11	0.46	52	B
AHS-04-□	0.4	1:4		13	1422V270S	23	26	08	10	11	DC 24	15	0.63	38	B
AHS-07-□	0.75	1:4		14	1422V300S	32	36	10	20	22	DC 24	20	0.83	29	B
AHS-15-□	1.5	1:4		15	1922V363S	47	54	12	40	45	DC 24	25	1.09	23	B
AHS-22-□	2.2	1:4		17	2322V421S	97	108	16	80	90	DC 24	35	1.46	16	B
AHS-37-□	3.7	1:4		17	2322V421S	97	108	16	80	90	DC 24	35	1.46	16	B

Model	Transmission capacity (4-pole motor) [kW]	Standard specification speed changer						Electromagnetic clutch and brake								
		Speed change ratio	Output shaft rotation speed [min $^{-1}$]	Number of handle turns	Model for belt in use	A type Mass [kg]	B type Mass [kg]	Size	Dynamic friction torque [N・m]	Static friction torque [N・m]	Exciting voltage [V]	Capacity [W]	Current [A]	Resistance [Ω]	Heat resistance class
AHS-02L-□	0.2	1:4(1:3)	Input rotation speed × 0.5 ～ 2.0 (× 0.5 ～ 1.5) *Input rotation speed Range：500 ～ 900	11	1422V240S	17	19	06	5	5.5	DC 24	11	0.46	52	B
AHS-04L-□	0.4	1:4(1:3)		13	1422DV278	23	26	08	10	11	DC 24	15	0.63	38	B
AHS-07L-□	0.75	1:4(1:3)		14	1422DV314	32	36	10	20	22	DC 24	20	0.83	29	B
AHS-15L-□	1.5	1:4(1:3)		15	1922DV381	47	54	12	40	45	DC 24	25	1.09	23	B
AHS-22L-□	2.2	1:4(1:3)		17	2322DV454	97	108	16	80	90	DC 24	35	1.46	16	B
AHS-37L-□	3.7	1:4(1:3)		17	2322DV454	97	108	16	80	90	DC 24	35	1.46	16	B

* Specification in ( ) indicates AHS-□L-B low-speed input specification with clutch and brake.

Dimensions



Unit [mm]

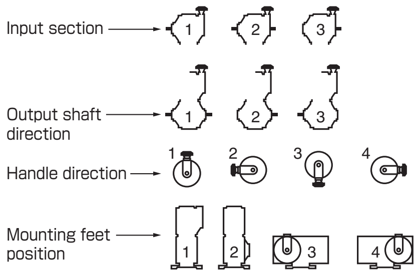
Model		AHS-02	AHS-04	AHS-07	AHS-15	AHS-22
A		190	200	230	260	320
B		200	220	250	280	320
C		160	170	200	230	260
D		160	170	200	230	260
E		52.5	70	80	80	100
F		105	115	135	155	185
G		170	188	213	255	300
H		409	447	502	584	705
H_1		360	397	453	534	635
J		30	35	45	50	60
K		40	50	50	50	60
M_1		97	106	117	138	170
M_2	A type	97	106	117	138	170
	B type	110	120	130	150	175
N		265	310	360	390	460
P_2		80	92	106	121	133
P_3		132.5	155	180	195	230
R		80	80	80	80	160
Q		30	40	50	50	60
S		14	19	24	24	28
U		16	21	27	27	31
W		5	5	7	7	7
T		12	17	20	25	25
Z		10 × 20	12 × 30	12 × 30	12 × 30	14 × 40

How to Place an Order

AHS-07L-B-0001-1111

Size
Output shaft function
Blank: Standard
L: For low-speed input
Driven-side function
A: Standard
B: With clutch and brake
C: With clutch

Mounting feet positions
Handle direction
Output shaft direction
Input unit
Input-side mechanism
00: Without handle
01: Standard (with handle)
03: BG (with bevel gear)
04: RF (flexible shaft-type remote operation)

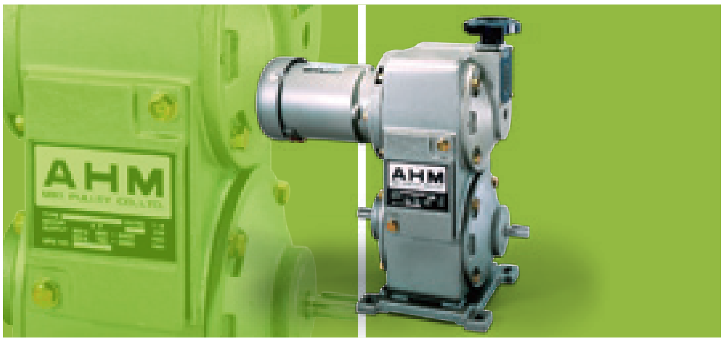


Belt-type Stepless Speed Changer Unit

AHM

Motor output	0.2 kW to 3.7 kW (4-pole)
Power supply voltage	Three-phase, 200 V/50 Hz, 200 or 220 V/60 Hz
CB torque	5.5 N・m to 90 N・m

Model with Motor and Speed Changer Integrated



Unit with motor and speed changer integrated. The standard type (A type) and the type with electromagnetic clutch and brake (B type) are available.

Specifications

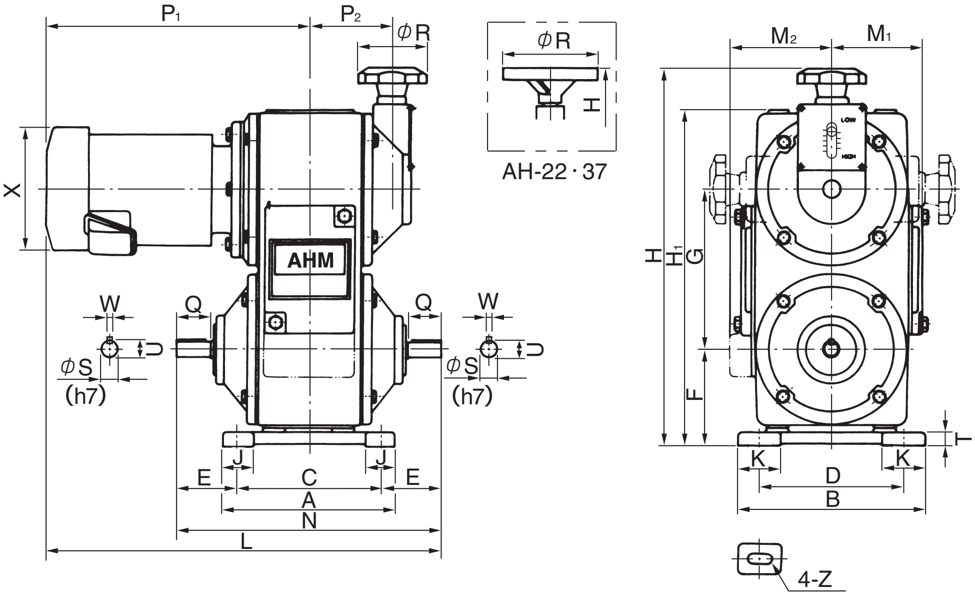
Model	Motor output [kW]	No. of poles	Power supply voltage [V], frequency [Hz]	Speed change ratio	Number of handle turns	Model for belt in use	A type Mass [kg]	B type Mass [kg]
AHM-02	0.2	4	Three-phase, 200/50, 200・220/60	1:4	11	1422V240S	24	26
AHM-04	0.4	4	Three-phase, 200/50, 200・220/60	1:4	13	1422V270S	33	36
AHM-07	0.75	4	Three-phase, 200/50, 200・220/60	1:4	14	1422V300S	48	52
AHM-15	1.5	4	Three-phase, 200/50, 200・220/60	1:4	15	1922V363S	70	77
AHM-22	2.2	4	Three-phase, 200/50, 200・220/60	1:4	17	2322V421S	130	141
AHM-37	3.7	4	Three-phase, 200/50, 200・220/60	1:4	17	2322V421S	141	152

* The induction motors are fully sealed external fan motors that conform to the JIS C4210 standard (for 0.2 kW and 0.4 kW models) or the JIS C 4213 standard (for 0.75 kW models or higher).

Model	Electromagnetic clutch and brake							
	Size	Dynamic friction torque [N・m]	Static friction torque [N・m]	Exciting voltage [V]	Capacity [W]	Current [A]	Resistance [Ω]	Heat resistance class
AHM-02-B	06	5	5.5	DC24	11	0.46	52	B
AHM-04-B	08	10	11	DC 24	15	0.63	38	B
AHM-07-B	10	20	22	DC 24	20	0.83	29	B
AHM-15-B	12	40	45	DC 24	25	1.09	23	B
AHM-22-B	16	80	90	DC 24	35	1.46	16	B
AHM-37-B	16	80	90	DC 24	35	1.46	16	B

Model	Output shaft rotation speed [min^{-1}] and output shaft torque [N・m]	
	50Hz	60Hz
	600 ～ 2400	720 ～ 2880
AHM-02	2.5 ～ 0.5	2.0 ～ 0.4
AHM-04	5.0 ～ 1.3	4.0 ～ 1.0
AHM-07	10 ～ 2.5	8.0 ～ 2.0
AHM-15	20 ～ 5.0	16 ～ 4.0
AHM-22	30 ～ 7.0	24 ～ 5.6
AHM-37	43 ～ 12	34 ～ 9.6

Dimensions



Unit [mm]

Model		AHM-02	AHM-04	AHM-07	AHM-15	AHM-22	AHM-37
A		190	200	230	260	320	320
B		200	220	250	280	320	320
C		160	170	200	230	260	260
D		160	170	200	230	260	260
E		52.5	70	80	80	100	100
F		105	115	135	155	185	185
G		170	188	213	255	300	300
H		409	447	502	584	705	705
H_1		360	397	453	534	635	635
J		30	35	45	50	60	60
K		40	50	50	50	60	60
L		414	467	493	593.5	661.5	691.5
M_1		97	106	117	138	170	170
M_2	A type	97	106	117	138	170	170
	B type	110	120	130	150	175	175
N		265	310	360	390	460	460
P_1		281	312	313	398.5	431.5	461.5
P_2		80	92	106	121	133	133
R		80	80	80	80	160	160
Q		30	40	50	50	60	60
S		14	19	24	24	28	28
U		16	21	27	27	31	31
W		5	5	7	7	7	7
X		φ130	φ145	φ163	196	211	238
T		12	17	20	25	25	25
Z		10 × 20	12 × 30	12 × 30	12 × 30	14 × 40	14 × 40

* Dimension F is same for horizontal type. Dimensions L, P_1, and X differ depending on the motor manufacturer.

How to Place an Order

AHM-07-B-0001-1111-IE3

Size

Driven-side function
A: Standard
B: With clutch and brake
C: With clutch

IE code
IE1: 02, 04
IE3: 07 or greater

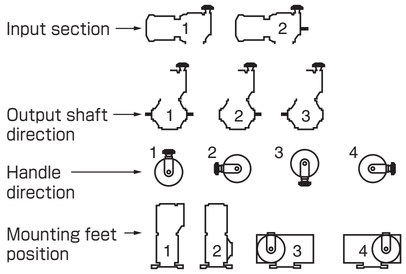
Mounting feet positions

Handle direction

Output shaft direction

Input unit

Operation mechanism
00: Without handle
01: Standard (with handle)
03: BG (with bevel gear)
04: RF (flexible shaft-type remote operation)



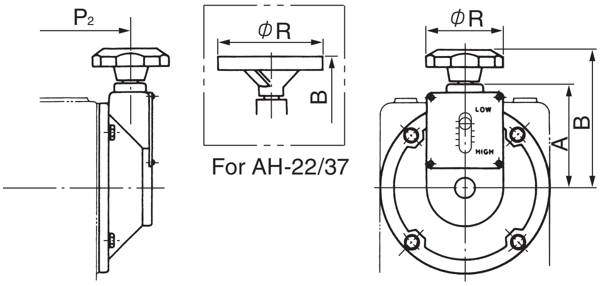
AHS/AHM Models

Options

Operation Function 01 (Standard Handle)

For the handle direction, you can select any direction (vertical and horizontal).
In addition to the standard handle, an optional SD handle with a rotation speed indicator is also available. (It can only be used for the horizontal handle.)

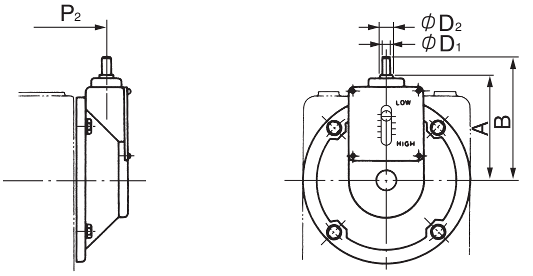
Model	A	B	P₂	R	Number of handle turns
AH-02	100	134	80	80	11
AH-04	110	144	92	80	13
AH-07	120	154	106	80	14
AH-15	140	174	121	80	15
AH-22	170	220	133	160	17
AH-37	170	220	133	160	17



Operation Function 00 (with No Handle)

If you want to remove the standard handle and mount your desired handle, or if you want to perform remote operation using a sprocket and universal joint, specify this suffix code 00.

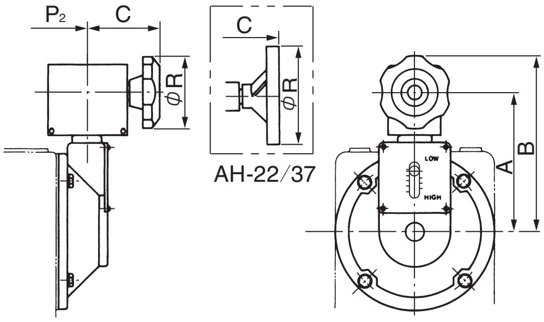
Model	A	B	D₁	D₂	P₂	Number of handle turns
AH-02	101	121	10	15	80	11
AH-04	111	131	10	15	92	13
AH-07	121	141	10	15	106	14
AH-15	141	161	10	16	121	15
AH-22	171	191	10	16	133	17
AH-37	171	191	10	16	133	17



Operation Function 03 (Right Angle Handle)

This is a right angle handle with a bevel gear mounted to the handle part. In addition to the standard handle, an SD handle (with a rotation speed indicator) is also available.

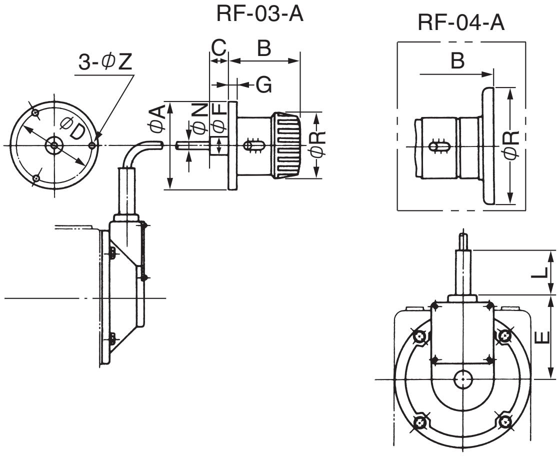
Model	A	B	P₂	C	R	Number of handle turns
AH-02	150	190	80	80	80	11
AH-04	160	200	92	80	80	13
AH-07	170	210	106	80	80	14
AH-15	190	230	121	80	80	15
AH-22	220	300	133	100	160	17
AH-37	220	300	133	100	160	17



Operation Function 04 (Flexible-shaft Type Remote Operation)

Remote control is available at low cost.
The standard flexible shaft lengths are 1000 mm, 1600 mm, and 2500 mm.
Use the device with a bend radius of R300 or more.

Model	A	B	C	D	E	F	G	L	N	R	Z	Number of handle turns	RF model
AH-02	118	93	25	100	100	25	12	70	14	86	7	11	RF-03-A
AH-04					110							13	
AH-07		121			120				18	160		14	RF-04-A
AH-15					140							15	
AH-22					170							17	
AH-37													



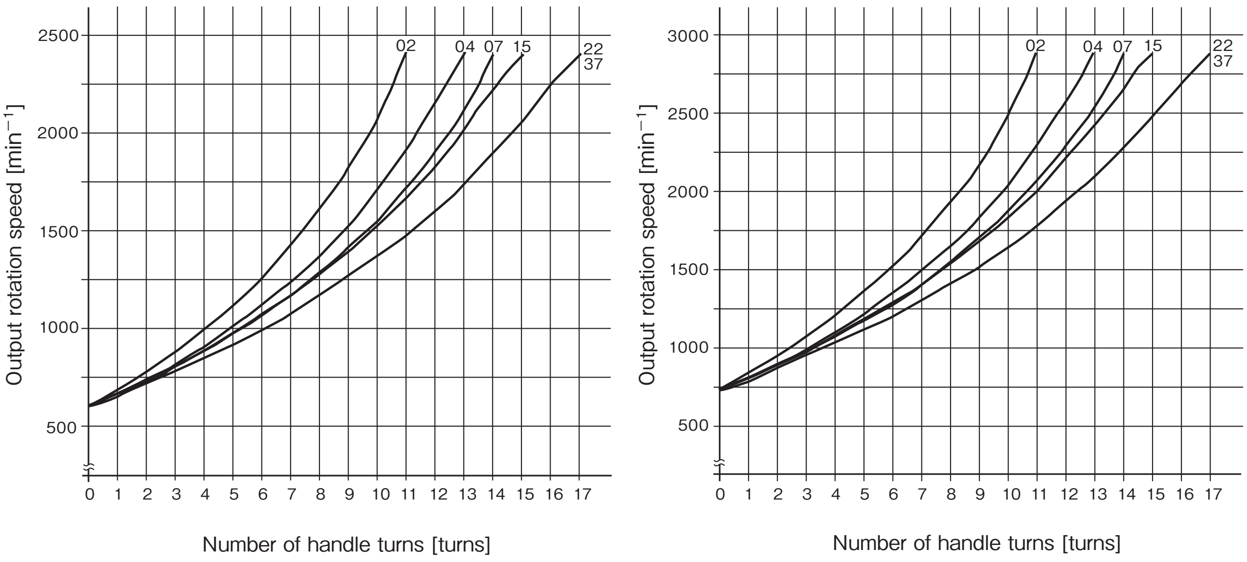
Items Checked for Design Purposes

1. Avoid a humid or dusty place, a place where the ambient temperature is high, a place exposed to water or oil, and a place where corrosive and flammable gases are present in the atmosphere, and select a well-ventilated place. Mount the device in a location that provides easy access for inspection. The operating ambient temperature range is -10℃ to 40℃ .
2. Mount the device above the floor level, and select a stable mounting base to make sure it does not vibrate. When you mount the device above the floor level, make sure the base surface is somewhat higher than the floor surface and moisture is not absorbed. The device may vibrate during use if it is not mounted properly. Be sure to mount it securely using mounting bolts of an adequate strength.
3. Be sufficiently careful to avoid the overhang load when mounting the sprocket and gear to the output shaft. When connecting the output shaft directly to the machine, use a flexible coupling and align the shaft center and mount it.
4. The temperature in the clutch and brake part significantly increases depending on the operating condition. Make sure it is well ventilated. (AH-B type)
5. Turn the handle right (clockwise) to reduce speed and turn it left (counterclockwise) to increase speed.
6. Read the scale pointed by the needle in the handle flange part.
7. Do not turn the handle when the speed changer is stopped.
8. For the output rotation direction, you can use any direction.
9. Perform a test run and turn the handle to make sure there is no unusual vibration or noise.
10. Check the output rotation speed.
11. Before changing between the normal and reverse directions, make sure the motor is stopped.
12. Use the power supply unit shown at right for units with an electromagnetic clutch and brake.

Just connect the device to the AC outlet power supply (100/200 VAC) to receive the 24 VDC excitation power supply necessary for the electromagnetic clutch and brake. In particular, a combination mode to interlock the electromagnetic clutch and the electromagnetic brake enables high-accuracy and high-speed operation. The high-performance power supply also includes an auto-tuning function to automatically detect the connected electromagnetic clutch and brake and set the optimal operating conditions, as well as a variety of protection functions; for example, wiring, connection, and setting errors are indicated by an alarm sound to allow the user to easily remove the cause of the error.

Applied unit	Power supply model	Input voltage [V]	Output voltage [V]	Output capacity [W]
Common to all AHS/AHM models	BEH-10G	AC200 ~ 240	DC24	50
	BEH-20G-1	AC100 ~ 120	DC24	100

AHM: Number of Handle Turns and Output Shaft Rotation Speed



50Hz

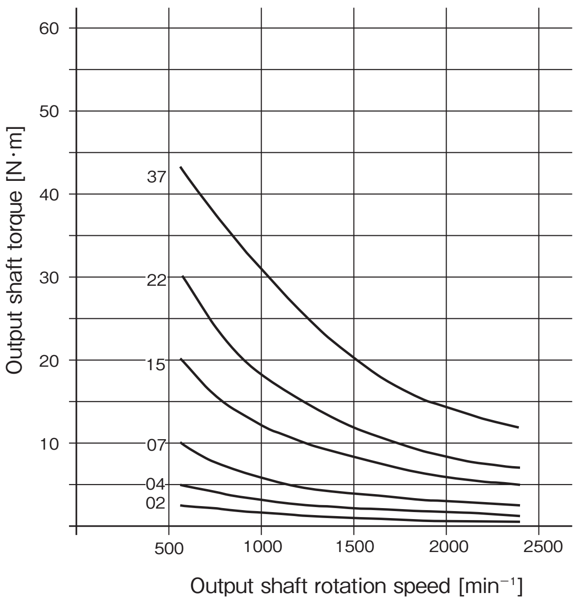
60Hz

AHS/AHM Models

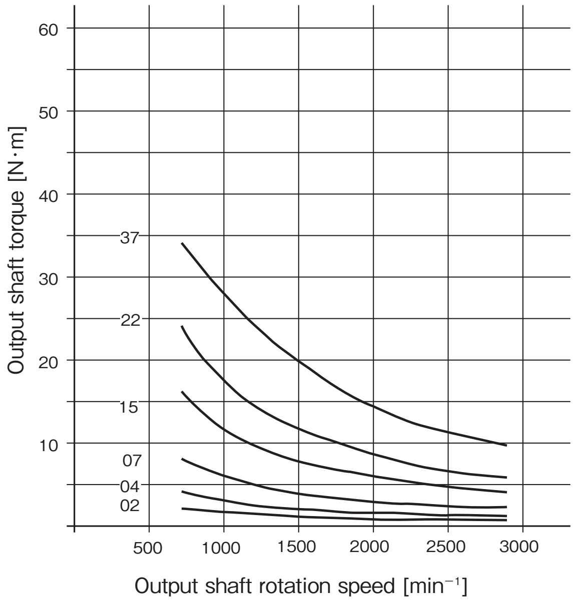
Items Checked for Design Purposes

AHM: Output Shaft Torque Curves

50Hz

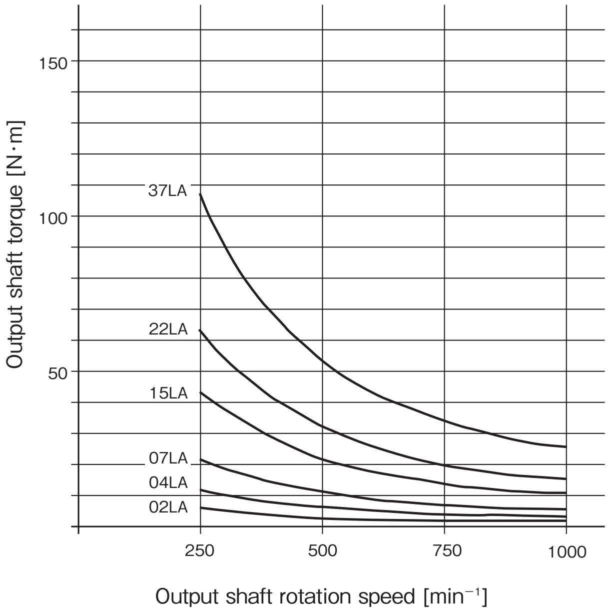


60Hz

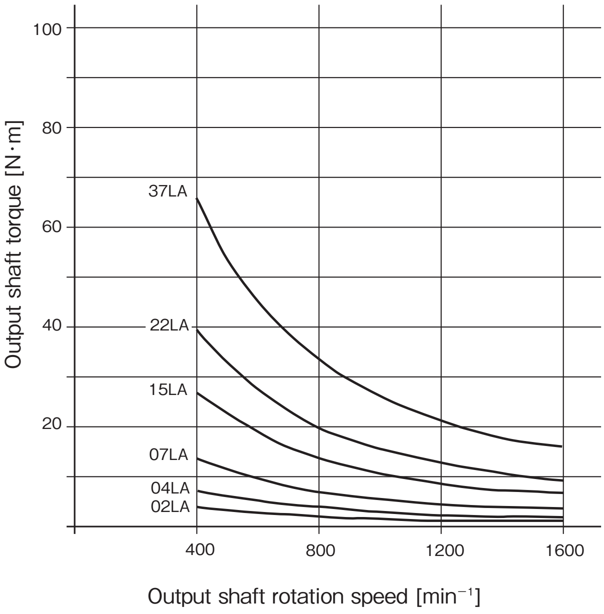


AHS-LA: Output Shaft Torque Curves

500 min⁻¹ at input



800 min⁻¹ at input



Belt-type Stepless Speed Changer Units

SPEED CHANGER BELTS

There are the following three types of belts used for the belt-type units (belt-type stepless speed changers).

Wide Speed Changer Belt

This is a belt specifically designed for changing speed. The inside is cog-shaped to increase flexibility. This belt is designed so that the size of speed changers can be reduced and the speed change ratio can be increased.

Double Cog Belt

This belt is double cog-shaped to increase power transmission capability and flexibility.

Standard V-Belt

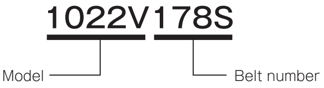
JIS standard M, A, B, C, (D), and (E) belt models

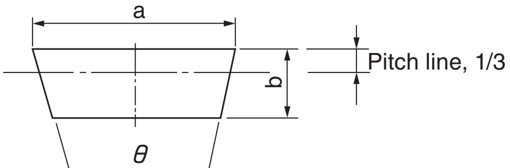
Wide Speed Changer Belts

Model	1022V			1422V			1922V			2322V			2926V			4430V			4836V		
a [mm]	16			22			30			36.5			46			70			76		
b [mm]	6			8			11			12			14			17			22		
θ [°]	22			22			22			22			26			30			38		
	Belt number	Belt's external perimeter [mm]	Pitch perimeter [mm]	Belt number	Belt's external perimeter [mm]	Pitch perimeter [mm]	Belt number	Belt's external perimeter [mm]	Pitch perimeter [mm]	Belt number	Belt's external perimeter [mm]	Pitch perimeter [mm]	Belt number	Belt's external perimeter [mm]	Pitch perimeter [mm]	Belt number	Belt's external perimeter [mm]	Pitch perimeter [mm]	Belt number	Belt's external perimeter [mm]	Pitch perimeter [mm]
	178S	465	448	210	532	515	(256S)	671	649	341	866	841	(471S)	1219	1191	(510S)	1321	1283	(850)	2178	2132
	185	470	457	220	560	543	(277)	716	694	364S	945	920	(491S)	1270	1241	548S	1410	1372	(909)	2328	2282
	192S	484	471	236S	600	584	(282)	737	715	381	972	948	(521S)	1346	1318	(555)	1435	1397			
	196S	513	501	240S	625	608	292	773	750	387S	984	959	(546S)	1410	1382	(578)	1499	1461			
	220S	560	548	255	648	631	298S	785	764	396S	1030	1005	(574)	1481	1453	(610)	1575	1537			
	223	577	564	258	660	643	(317)	805	784	421S	1090	1065	(586)	1511	1483	(630)	1626	1588			
	228	592	579	266S	680	663	321	838	817	441K	1146	1121	(606S)	1562	1534	(660)	1702	1664			
	247S	628	615	270S	700	681	325	827	806	481	1250	1225	(616)	1608	1580	(670)	1727	1689			
	(295)	749	737	290	752	735	338S	880	859	521	1341	1316	(636)	1636	1608	(690)	1778	1740			
				300S	780	764	355	923	902	(541)	1400	1375	(646)	1664	1636	(700)	1803	1765			
				325	840	823	363S	942	921	601S	1554	1529	(666)	1714	1686	(730)	1880	1842			
				330S	855	838	381S	986	964	(621)	1600	1575	(686)	1765	1737	(740S)	1905	1867			
				340	879	863	(386S)	998	976	(661)	1712	1687	(706)	1816	1788	790S	2032	1994			
				(359)	912	895	(403S)	1052	1030	(681)	1748	1732	(726)	1867	1839	(850S)	2184	2146			
				360S	932	916	417S	1080	1058	(721)	1864	1839	(786S)	2019	1991	(910)	2337	2299			
				380	981	964	(426S)	1102	1080	(801)	2068	2043	(856S)	2195	2167	(970S)	2489	2451			
				400S	1036	1020	443S	1145	1124				(906)	2324	2295						
				(420S)	1087	1071	(454S)	1173	1151												
				(466S)	1194	1178	484S	1250	1228												
				(480)	1237	1221	(526S)	1354	1332												
				(540)	1392	1376	544	1400	1378												
				(600)	1542	1526	(604)	1554	1532												
				(720)	1846	1830	(646)	1661	1639												
							(666)	1712	1690												
							(686)	1760	1738												
							(756)	1941	1919												
							(846)	2169	2147												
Unit Mass [kg/m]	0.12			0.23			0.43			0.57			0.84			1.56			2.03		

* Letters S and K at the end of the belt numbers just indicate a difference in the rubber composition and the material of the core. These belts can be used normally.
* The belt numbers in parentheses indicate that these belts are made to order.
* Mass (kg) = unit mass (kg/m) x belt's external perimeter (m)

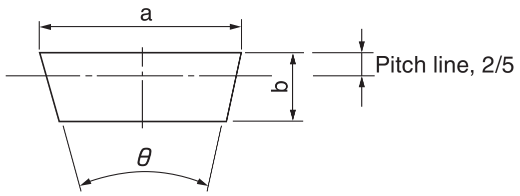
How to Place an Order





Speed Changer Belts

Double Cog Belts



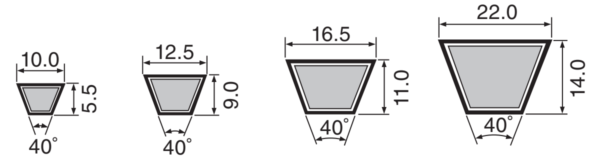
Model	Belt's external perimeter [mm]	Pitch perimeter [mm]	a [mm]	b [mm]	θ° [°]	Unit mass [kg/m]
1422DV278	708	673	24	14	24	0.30
1422DV314	798	763	24	14	24	0.30
1922DV381	968	933	33	14	24	0.46
2322DV454	1155	1110	39	18	24	0.60
2926DV490	1246	1196	46	20	26	0.87
4430DV548S	1433	1378	70	22	32	1.80

* Letter S at the end of the model just indicates a difference in the rubber composition. This belt can be used normally.

* Mass (kg) = unit mass (kg/m) x belt's external perimeter (m)

How to Place an Order

Standard V-Belts



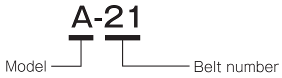
M belt **A belt** **B belt** **C belt**

Model	M	A	B	C
Unit mass (kg/m)	0.07	0.12	0.20	0.37

Nominal number	Belt's external perimeter [mm]	Nominal number	Belt's external perimeter [mm]	Nominal number	Belt's external perimeter [mm]	Nominal number	Belt's external perimeter [mm]	Nominal number	Belt's external perimeter [mm]	Nominal number	Belt's external perimeter [mm]	Nominal number	Belt's external perimeter [mm]	Nominal number	Belt's external perimeter [mm]
21	533	31	787	41	1041	51	1295	61	1549	71	1803	81	2057	91	2311
22	559	32	813	42	1067	52	1321	62	1575	72	1829	82	2083	92	2337
23	584	33	838	43	1092	53	1346	63	1600	73	1854	83	2108	93	2362
24	610	34	864	44	1118	54	1372	64	1626	74	1880	84	2134	94	2388
25	635	35	889	45	1143	55	1397	65	1651	75	1905	85	2159	95	2413
26	660	36	914	46	1168	56	1422	66	1676	76	1930	86	2184	96	2438
27	686	37	940	47	1194	57	1448	67	1702	77	1956	87	2210	97	2464
28	711	38	965	48	1219	58	1473	68	1727	78	1981	88	2235	98	2489
29	737	39	991	49	1245	59	1499	69	1753	79	2007	89	2261	99	2515
30	762	40	1016	50	1270	60	1524	70	1778	80	2032	90	2286	100	2540

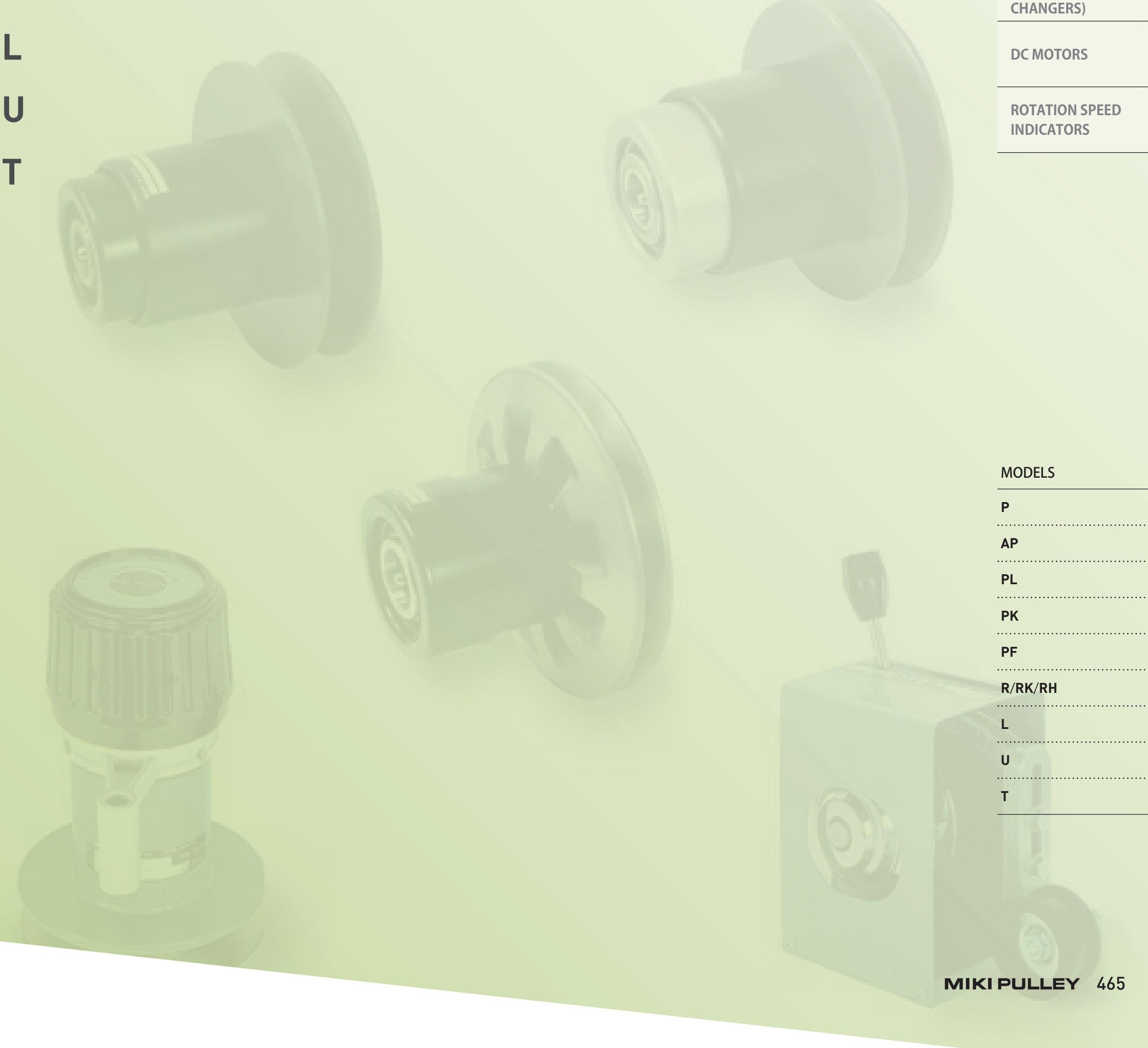
* Mass (kg) = unit mass (kg/m) x belt's external perimeter (m)

How to Place an Order



STAND-ALONE BELT-TYPE STEPLESS SPEED CHANGERS

- P
- AP
- PL
- PK
- PF
- Motor Slide Bases R/RK/RH
- L
- U
- T



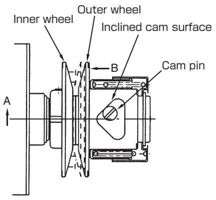
Stand-alone Belt-type Stepless Speed Changer

P

Standard applied motor output	0.2 kW to 3.7 kW (4-pole)
Speed change ratio	Approx. 1:1.5
External pulley diameter	86 mm to 218 mm

A VARI-DIA Pulley Using a Standard V-Belt

- Using a Standard V-Belt
- A Cam Mechanism Prevents Slip
- An Adapter Facilitates Mounting



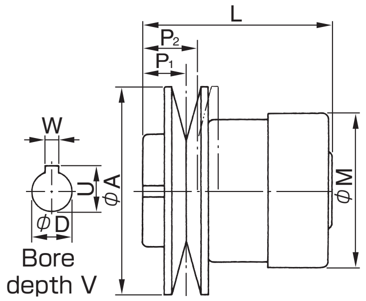
Specifications

Model	Motor in use (4P)	Speed reduction ratio	Belt	Transmission capacity [kW]			Mass [kg]
				High speed	Intermediate speed	Low speed	
P - 86-MA	0.2 ~ 0.4 kW	1:1.5	A	0.7	0.4	0.3	1.1
P - 98-MA	0.4 ~ 0.75 kW	1:1.4	A	1.2	0.7	0.4	1.8
P-106-MA	0.4 ~ 0.75 kW	1:1.6	B	1.3	0.9	0.6	2.0
P-124-MA	0.75 ~ 1.5 kW	1:1.5	B	1.8	1.2	0.8	3.0
P-164-MA	1.5 ~ 2.2 kW	1:1.5	C	3.2	2.2	1.2	6.0
P-218	2.2 ~ 3.7 kW	1:1.4	C	6.2	4.4	3.2	14.0

Types of Adapters

Model	ϕ D [mm]	Bore depth [mm]
P - 86-MA	10 11 12 13 14 15 16	30
P - 98-MA	11 12 13 14 15 16 18 19	40
P-106-MA		40
P-124-MA	14 15 16 18 19 20 22 24 25	50
P-164-MA		50
P-218	22 25 28	60

Dimensions



Unit [mm]

Model	A	P_1	P_2	L	M	D		W		U		V	Max. P.D.	Min. P.D.	Movement distance
P - 86-MA	86	18	21.5	78	63	11	14	—	—	—	—	30	77	51	20
P - 98-MA	98	19	22.5	85	73	14	19	5	6	16	21.5	40	89	62	21
P-106-MA	106	21	26	96	73	14	19	5	6	16	21.5	40	95	58	29
P-124-MA	124	22	27	101	84	19	24	6	8	21.5	27	50	113	75	30
P-164-MA	164	25	32	130	102	24	*28	8		27	31	50	150	96	42
P-218	218	27	34	163	132	28		8		31		60	204	150	42

Movement distance refers to a distance to move the motor that is required to change speed. If a repeated load (brake, motor, etc.) is imposed, specify the key method.
* The bore of the P-164 for a 2.2 kW motor is a straight type.
For details on motor slide bases, refer to the Motor Slide Bases section.

Driven Side Rotation Speed

(Rotation speed by driven pulley diameter when mounted to a 4-pole motor) 50 Hz,1430 min^{-1} 60 Hz,1720 min^{-1}

Unit [min^{-1}]

Model		4 in.	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.
P - 86-MA	50Hz	785 ~ 1180	510 ~ 765	375 ~ 560					
	60Hz	945 ~ 1420	610 ~ 920	450 ~ 675					
P - 98-MA	50Hz	970 ~ 1365	630 ~ 880	460 ~ 650					
	60Hz	1165 ~ 1645	755 ~ 1060	555 ~ 780					
P-106-MA	50Hz		585 ~ 950	425 ~ 690					
	60Hz		705 ~ 1150	510 ~ 830					
P-124-MA	50Hz		760 ~ 1140	560 ~ 840	440 ~ 665				
	60Hz		910 ~ 1370	670 ~ 1010	530 ~ 800				
P-164-MA	50Hz			720 ~ 1120	570 ~ 885	475 ~ 735			
	60Hz			865 ~ 1350	685 ~ 1065	570 ~ 885			
P-218	50Hz				890 ~ 1205	740 ~ 1000	625 ~ 850	545 ~ 740	485 ~ 660
	60Hz				1070 ~ 1445	890 ~ 1205	750 ~ 1020	655 ~ 890	585 ~ 790

How to Place an Order

P-86-MA-11

Size

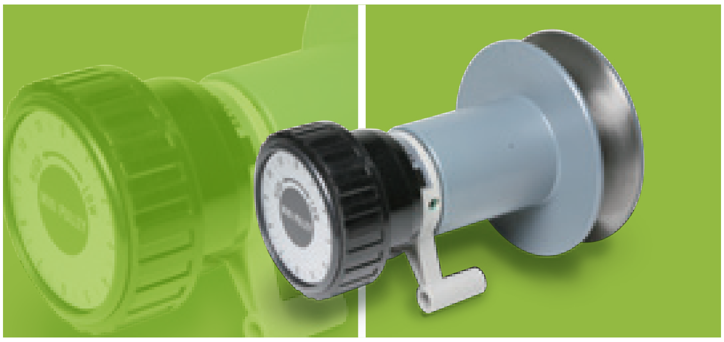
Bore diameter

Stand-alone Belt-type Stepless Speed Changer

AP

Standard applied motor output	0.2 kW to 3.7 kW (4-pole)
Speed change ratio	Approx. 1:1.5
External pulley diameter	86 mm to 218 mm

Speed Change without Changing the Distance between Shafts



- Using a Standard V-Belt
- An Adapter Facilitates Mounting
- Speed Can Be Changed without Changing the Distance between Shafts
- AP Is Used in Combination with P

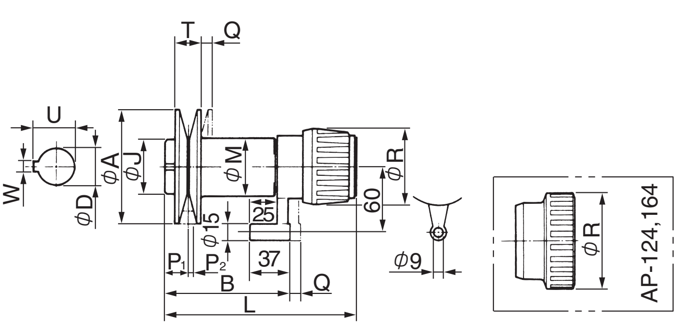
Types of Adapters

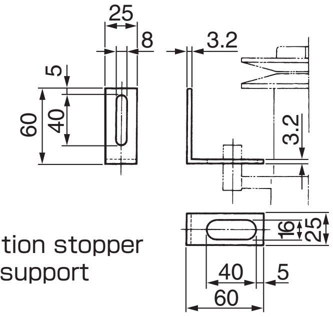
Model	ϕ D [mm]	Bore depth [mm]
AP - 86-MA	10 11 12 13 14 15 16	30
AP - 98-MA	11 12 13 14 15 16 18 19	40
AP-124-MA	14 15 16 18 19 20 22 24 25	50
AP-164-MA		50

Specifications

Model	Motor in use	Driven side speed changer	Belt	Speed change ratio	50Hz		60Hz	
					Output rotation speed [min^{-1}]	Output torque [N・m]	Output rotation speed [min^{-1}]	Output torque [N・m]
AP - 86-MA	0.2 kW4P	P-86-MA	A	1:2.2	950 ～ 2150	1.6 ～ 0.7	1140 ～ 2590	1.4 ～ 0.6
	0.2 kW4P	P-98-MA	A	1:2	820 ～ 1720	1.9 ～ 0.9	990 ～ 2060	1.6 ～ 0.8
AP - 98-MA	0.4 kW4P	P-98-MA	A	1:2	1000 ～ 2050	3.1 ～ 1.5	1200 ～ 2460	2.6 ～ 1.3
	0.4 kW4P	P-124-MA	A	1:1.9	890 ～ 1710	3.5 ～ 1.8	1070 ～ 2060	2.9 ～ 1.5
AP-124-MA	0.75kW4P	P-124-MA	B	1:2.2	950 ～ 2150	6.1 ～ 2.7	1140 ～ 2590	5.1 ～ 2.3
	0.75kW4P	P-164-MA	B	1:2	810 ～ 1660	7.2 ～ 3.5	970 ～ 2000	6.0 ～ 2.9
AP-164-MA	1.5 kW4P	P-164-MA	C	1:2.4	920 ～ 2230	12.7 ～ 5.2	1110 ～ 2680	10.5 ～ 4.4
	1.5 kW4P	P-218	C	1:2	680 ～ 1360	17.2 ～ 8.6	810 ～ 1640	14.4 ～ 7.1

Dimensions





Rotation stopper support

(4-pole motor, 50 Hz 1430 min^{-1}, 60 Hz 1720 min^{-1})

Unit [mm]

Model	A	B	J	L	M	P$_1$	P$_2$	Q	R	T	D	W	U	max. P.D.	min. P.D.	Mass [kg]
AP - 86-MA	86	93	46	156	54	18	3.5	7	70	18	11	—	—	77	51	1.7
AP - 98-MA	98	103	50	166	54	19	3.5	7	70	20	14	5	16	89	62	1.9
AP-124-MA	124	126	68	196	62	22	5	10	88	24	19	6	21.5	113	75	3.2
AP-164-MA	164	137	68	211	66	25	7	14.5	88	30	24	8	27	150	96	4.8

* Use 1800 min^{-1} or less for the input rotation speed. (The 4-pole motor drive is appropriate)

Belt Number and Distance between Shafts

Model	Driven side speed changer	Belt number	Belt number	Belt number	Belt number	Belt number	Belt number
		Distance between shafts [mm]	Distance between shafts [mm]	Distance between shafts [mm]	Distance between shafts [mm]	Distance between shafts [mm]	Distance between shafts [mm]
AP-86-MA	P-86-MA	A-20	A-21	A-22	A-23	A-24	A-25
		153	165	179	191	204	216
AP-86-MA	P-98-MA	A-20	A-21	A-22	A-23	A-24	A-25
		143	155	169	181	194	206
AP-98-MA	P-98-MA	A-21	A-22	A-23	A-24	A-25	A-26
		147	160	172	186	198	211
AP-98-MA	P-124-MA	A-23	A-24	A-25	A-26	A-27	A-28
		163	177	189	202	215	227
AP-124-MA	P-124-MA	B-25	B-26	B-27	B-28	B-29	B-30
		168	181	194	206	220	232
AP-124-MA	P-164-MA	B-28	B-29	B-30	B-31	B-32	B-33
		190	203	216	228	241	254
AP-164-MA	P-164-MA	C-32	C-33	C-34	C-35	C-36	C-37
		211	224	237	249	262	275
AP-164-MA	P-218	C-38	C-39	C-40	C-41	C-42	C-43
		241	254	267	279	293	305

* For details on the travel line, refer to the following page.

How to Place an Order

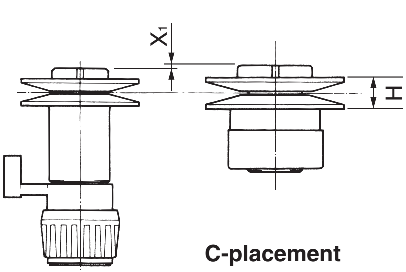
AP-86-MA-11

Size — 86

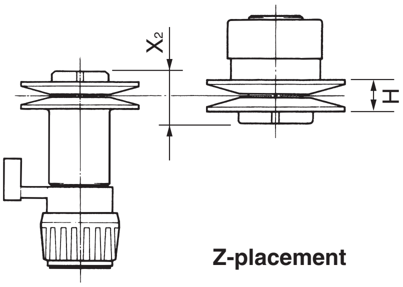
Bore diameter — 11

AP Models

Placement



C-placement



Z-placement

The belt travel lines X are shown as below.

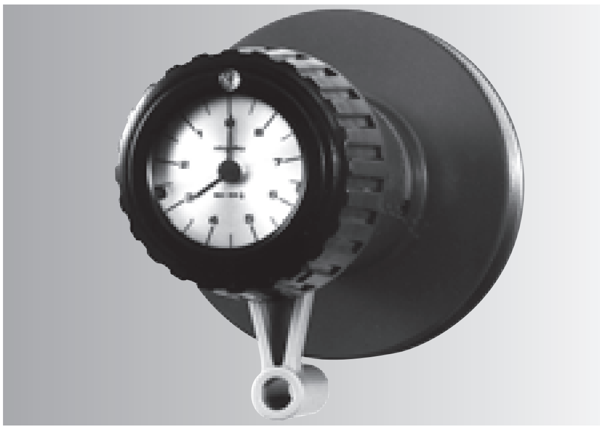
Combination	AP-86-MA P-86-MA	AP-86-MA P-98-MA	AP-98-MA P-98-MA	AP-98-MA P-124-MA	AP-124-MA P-124-MA	AP-124-MA P-164-MA	AP-164-MA P-164-MA	AP-164-MA P-218
H	25	24.5	25	31	34	39.5	44	42.5
C-placement X_1	0	1	0	3	0	3	0	1.5
Z-placement X_2	39.5	40.5	41.5	44.5	49	52	57	58.5

Items Checked for Design Purposes

1. Use the AP model on the drive (motor) side and the P model on the driven side.
2. Use 900 to 1800 min^{-1} for the input rotation speed range.
3. Before mounting the AP model, be sure to lock the rotation stopper rod part of the AP model with the included rotation stopper support.
   If the included rotation stopper support cannot be used, secure the rotation stopper so that it can be slid effortlessly.
4. Avoid a humid or dusty place, a place where the ambient temperature is high, a place exposed to water or oil, and a place where corrosive and flammable gases are present in the atmosphere, and select a well-ventilated place. Mount the device in a location that provides easy access for inspection. The operating ambient temperature range is -10℃ to 40℃ .
5. Securely mount the device to the shaft. When mounting the device to the machine, provide the rotating part with a cover.
6. Do not turn the handle when the speed changer is stopped.
7. If you will use the device for a machine where normal-reverse operation is performed, or a repeated or impact load is imposed, please consult with us.

Options

Handle with Turn Indicator



A rotation speed indicator (SD model) can be mounted in the standard handle part.

Model	Number of handle turns	SD model
AP-86 -MA-□-SD	3.5	SD-53B-5L
AP-98 -MA-□-SD	3.5	
AP-124-MA-□-SD	5	SD-75B-9L
AP-164-MA-□-SD	7	

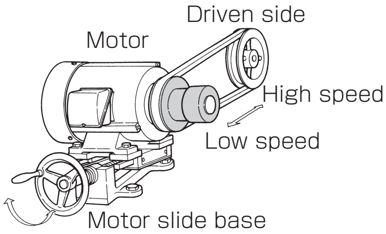
Stand-alone Belt-type Stepless Speed Changer

PL

Standard applied motor output	0.2 kW to 1.5 kW (4-pole)
Speed change ratio	Approx. 1:2
External pulley diameter	116 mm to 212 mm

The Model Designed to Increase the Speed Change Ratio

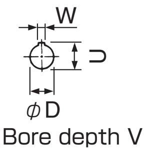
- Using a Standard V-Belt
- Large Speed Change Ratio

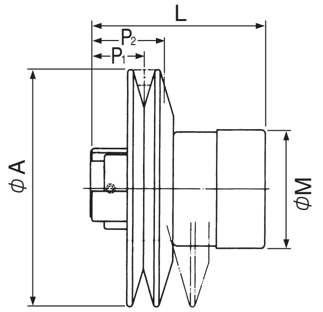


Specifications

Model	Motor in use [kW] (4P)	Speed change ratio	Belt	Transmission capacity [kW]			Mass [kg]
				High speed rotation	Intermediate speed rotation	Low speed rotation	
PL-116-11	0.2	1 : 2.3	M	0.5	0.3	0.2	2.0
PL-140-14N	0.4	1 : 2	A	2.1	1.4	0.6	2.7
PL-170-19N	0.75	1 : 2.1	B	3.6	2.4	1.0	5.5
PL-210-24N	1.5	1 : 2.4	B	5.2	3.1	1.5	7.8

Dimensions





Unit [mm]

Model	A	P₁	P₂	L	M	D	W	U	V	Max. P.D.	Min. P.D.	Movement distance
PL-116-11	116	24	33.5	90	56	11	—	—	40	111	48	49
PL-140-14N	140	28	38	97	84	14	5	16	40	131	65	52
PL-170-19N	170	38.5	52	126	84	19	6	21.5	50	159	74	67
PL-210-24N	212	41	59	148	95	24	8	27	60	201	83	93

* Movement distance refers to a distance to move the motor for changing speed.

How to Place an Order

PL-116-11

Size — 116

Nominal hole diameter — 11

Stand-alone Belt-type Stepless Speed Changer

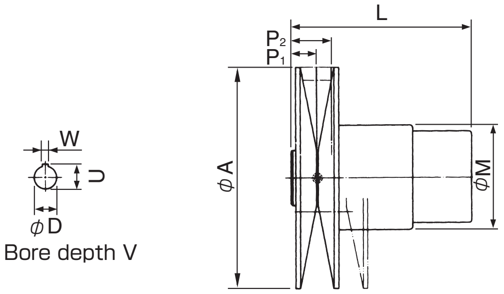
PK

Standard applied motor output	0.2 kW to 11 kW (4-pole) , 11 kW to 18.5 kW (6-pole)
Speed change ratio	Approx. 1:3
External pulley diameter	150 mm to 400 mm

A VARI-DIA Pulley Using a Wide Speed Changer Belt

- Using a Wide Speed Changer Belt
- Large Speed Change Ratio
- Large Transmission Capacity

Dimensions



Unit [mm]

Model	A	P₁	P₂	L	M	D	W	U	V	Max. P.D.	Min. P.D.	Movement distance
PK-150-14N-044	150	19	28.5	120	81	14	5	16	30	144	48	75
PK-200-19N-074	200	23	35.5	160	95	19	6	21.5	40	192	64	101
PK-200-24N-154						24	8	27	50			
PK-250-28N-224	250	31	49.5	210	126	28	8	31	60	240	80	126
PK-250-28N-374												
PK-300-38N-554	305	50	76	300	143	38	10	41	80	290	96	152
PK-300-38N-754												
PK-300-42N-1104						42	12	45	110			
PK-355-42N-1106	355	54	81.5	355	214	42	12	45	110	343	137	162
PK-355-48N-1506						48	14	51.5				
PK-400-55N-1806	400	51	77	355	214	55	16	59	110	388	194	152

* Movement distance refers to a distance to move the motor for changing speed.

Specifications

Model	Applied motor [kW]	Speed change ratio	Belt	Transmission capacity [kW]			Mass [kg]
				High speed rotation	Intermediate speed rotation	Low speed rotation	
PK-150-14N-044	0.4 (4P)	1 : 3	1422V	1.5	1.0	0.4	3.2
PK-200-19N-074	0.75 (4P)	1 : 3	1922V	3.7	2.3	0.5	6.2
PK-200-24N-154	1.5 (4P)						
PK-250-28N-224	2.2 (4P)	1 : 3	2926V	8.0	5.2	1.1	13
PK-250-28N-374	3.7 (4P)						
PK-300-38N-554	5.5 (4P)	1 : 3	4430V	13	12	2.5	24
PK-300-38N-754	7.5 (4P)						
PK-300-42N-1104	11 (4P)						
PK-355-42N-1106	11 (6P)	1 : 2.5	4430V	16	11	5.5	58
PK-355-48N-1506	15 (6P)						
PK-400-55N-1806	18.5 (6P)	1 : 2	4430V	18	15	9.8	66

* If you want to use a slide base for the PK-355/400, please consult with us.

Driven Side Rotation Speed (when 1430 min^{-1} (50 Hz) or 1720 min^{-1} (60 Hz) are input with 4-pole motor)

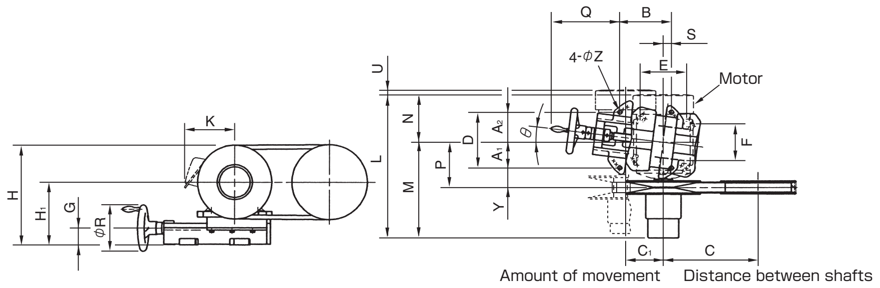
Unit [min^{-1}]

Model	Driven side pulley diameter	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	20 in.	24 in.
PK-150	50Hz	470 ～ 1410	350 ～ 1050	280 ～ 840	230 ～ 690				
	60Hz	565 ～ 1700	420 ～ 1260	335 ～ 1010	275 ～ 830				
PK-200	50Hz	640 ～ 1920	470 ～ 1410	380 ～ 1140	310 ～ 930				
	60Hz	765 ～ 2300	565 ～ 1700	460 ～ 1380	375 ～ 1130				
PK-250	50Hz			470 ～ 1410	390 ～ 1170	330 ～ 990	290 ～ 870		
	60Hz			565 ～ 1700	470 ～ 1410	395 ～ 1190	345 ～ 1040		
PK-300	50Hz			580 ～ 1740	470 ～ 1410	400 ～ 1200	350 ～ 1050		
	60Hz			695 ～ 2090	565 ～ 1700	480 ～ 1440	420 ～ 1260		
PK-355 *	50Hz				440 ～ 1100	380 ～ 950	330 ～ 825	260 ～ 655	
	60Hz				530 ～ 1325	450 ～ 1130	395 ～ 985	310 ～ 780	
PK-400 *	50Hz					530 ～ 1060	470 ～ 940	370 ～ 740	310 ～ 620
	60Hz					635 ～ 1270	565 ～ 1130	445 ～ 890	370 ～ 740

* The values for the model with * mark: When 950 min^{-1} (50 Hz) or 1130 min^{-1} (60 Hz) are input with 6-pole motor.
* For details on the driven side pulley, refer to P475. For the driven side pulley, be sure to use one with the same diameter or larger.

Maintaining a Constant Belt Travel Line

The PK pulley is open at one side. So every time the distance between shafts is increased or decreased to change speed, the belt travel line is moved between P_1 and P_2. However, since this type uses a wide speed changer belt, the travel line must be maintained constant relatively strictly. Therefore, the pulley itself must be moved backward or forward when the distance between shafts is increased or reduced. A motor slide base (RK) is required to do this.
This base can simultaneously increase/decrease the distance between shafts and move the pulley forward/backward. Thus, the belt travel line can always be maintained constant using this base.



Unit [mm]

Model	Applied speed changer	Applied motor	A_1	A_2	B	C_1	D	E	F	G	H	H_1	K	L	M	N	P	Q	R	S	U	Y	Z	θ [°]
RK-05	PK-150-14N-044	0.4kW (4P)	75	85	140	75	160	112	90	20	195	121	127	330	210	116	109	150	125	33	9	34	11	7
RK-20	PK-200-19N-074	0.75kW (4P)	69	81	140	101	150	125	100	45	270	170	135	390	260	130	123	195	125	22	12	54	11	7
	PK-200-24N-154	1.5kW (4P)						140	125		280	180	151	430	279	151	142					73		
RK-50	PK-250-28N-224	2.2kW (4P)	90	110	200	126	200	160	140	50	310	200	162	510	343	167	164	186	140	40	19	74	11	9
	PK-250-28N-374	3.7kW (4P)						190	140		335	212	172	524	350	174	171					81		
RK-100	PK-300-38N-554	5.5kW (4P)	146	174	250	152	320	216	140	60	390	252	206	663	459	204	209	249	200	52	26	63	15	10
	PK-300-38N-754	7.5kW (4P)						216	178		390	252	206	701	478	223	228					82		
RK-200	PK-300-42N-1104	11kW (4P)	146	174	250	152	320	254	210	60	440	280	263	785	513	272	263	249	200	48	27	116	15	10
	PK-355-42N-1106	11kW (6P)						254	254		440	280	263	884	590	294	289					143		

How to Place an Order

PK-150-14N-044

Size — 150
Nominal hole diameter — 14N
Nominally correct motor — 044

Stand-alone Belt-type Stepless Speed Changer

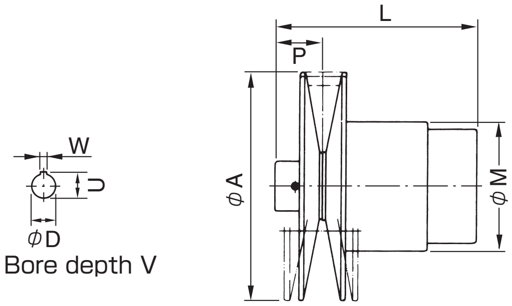
PF

Standard applied motor output	0.4 kW to 3.7 kW (4-pole)
Speed change ratio	1:2.4
External pulley diameter	155 mm to 250 mm

Outstanding Belt Life Span

- Using a Wide Speed Changer Belt
- Open on Both Ends
- Easy Mounting
- The Belt Travel Line Is Always Maintained Constant so the Belt Life Span Is Outstanding.
- Both the Speed Changer and Belt Are Spaciously Designed to Achieve Superior Durability.

Dimensions



Unit [mm]

Model	A	P	L	M	D	U	W	V	Max. P.D.	Min. P.D.	Movement distance
PF-155-14N	155	29	140	94	14	16	5	30	150	62	69
PF-155-19N					19	21.5	6	40			
PF-185-19N	185	38	163	104	19	21.5	6	40	178	74	82
PF-185-24N					24	27	8	50			
PF-216-24N	216	51	203	127	24	27	8	50	208	86	96
PF-216-28N					28	31		60			
PF-250-28N	250	54	252	154	28	31	8	60	241	100	111
PF-250-28N											

* Movement distance refers to a distance to move the motor for changing speed.

Specifications

Model	Applied motor [kW] (4P)	Speed change ratio	Belt	Transmission capacity (kW)			Mass [kg]
				High speed rotation	Intermediate speed rotation	Low speed rotation	
PF-155-14N	0.4	1 : 2.4	1422V	1.6	1.1	0.4	4
PF-155-19N	0.75						
PF-185-19N	0.75	1 : 2.4	1922V	3.6	2.2	0.5	6
PF-185-24N	1.5						
PF-216-24N	1.5	1 : 2.4	2322V	5.2	3.8	1.1	10
PF-216-28N	2.2						
PF-250-28N	2.2	1 : 2.4	2926V	8.0	6.2	2.0	19
PF-250-28N	3.7						

Driven Side Rotation Speed (when 1430 min^{-1} (50 Hz) or 1720 min^{-1} (60 Hz) are input with 4-pole motor), Belt Number and Distance between Shafts

Model	Driven side external pulley diameter	Driven side rotation speed [min^{-1}]	Belt and distance between shafts [mm] (when C = PF model max. P.D.)					
PF-155	6 in.	600 ~ 1440	Belt number	1422V360S	1422V400S	1422V420S	1422V466S	1422V480
		720 ~ 1728	Distance between shafts [mm]	224	276	301	355	376
	8 in.	445 ~ 1060	Belt number	1422V400S	1422V420S	1422V466S	1422V480	1422V540
		535 ~ 1290	Distance between shafts [mm]	234	260	312	334	413
PF-185	8 in.	520 ~ 1285	Belt number	1922V403S	1922V417S	1922V426S	1922V443S	1922V454S
		625 ~ 1545	Distance between shafts [mm]	220	234	245	267	280
	10 in.	415 ~ 1020	Belt number	1922V454S	1922V484S	1922V526S	1922V544	1922V604
		500 ~ 1230	Distance between shafts [mm]	238	277	329	352	430
PF-216	10 in.	495 ~ 1200	Belt number	2322V481	2322V521	2322V541	2322V601S	2322V621
		600 ~ 1440	Distance between shafts [mm]	254	299	329	406	429
	12 in.	415 ~ 1000	Belt number	2322V541	2322V601S	2322V621	2322V661	2322V681
		500 ~ 1205	Distance between shafts [mm]	287	364	387	444	462
PF-250	12 in.	485 ~ 1165	Belt number	2926V574	2926V586	2926V606S	2926V616	2926V636
		580 ~ 1400	Distance between shafts [mm]	303	318	344	366	381
	14 in.	410 ~ 990	Belt number	2926V616	2926V636	2926V646	2926V666	2926V686
		495 ~ 1185	Distance between shafts [mm]	321	336	350	375	401

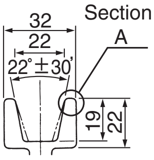
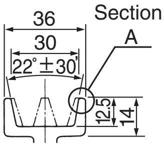
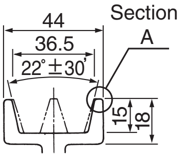
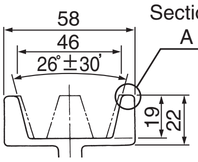
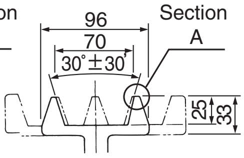
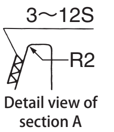
* For the driven side pulley, be sure to use one with the same diameter or larger.

Driven Side Pulley

(V-pulley for a wide speed changer belt)

The cross-sectional shape of the wide speed changer belt is different from that of the standard V-belt. So a commercially available V-pulley cannot be used as is. To use a V-pulley, purchase a JIS standard multi V-pulley and modify it to adjust the V-groove shape to the shape of wide speed changer belt.

Commercially available V-pulleys	Belt size
C type 1 belt	1422V
A type 2 belts	1922V
B type 2 belts	2322V
C type 2 belts	2926V
D type 4 belts	4430V

Belt size	1422V	1922V	2322V	2926V	4430V	
Commercially available V-pulleys	C type 1 belt	A type 2 belts	B type 2 belts	C type 2 belts	D type 4 belts	Surface roughness
Machining drawing						

* For the driven side pulley, purchase a commercially available V-pulley and modify it. The same applies for the driven side pulley of the PK model.

How to Place an Order

PF-155-14N

Size

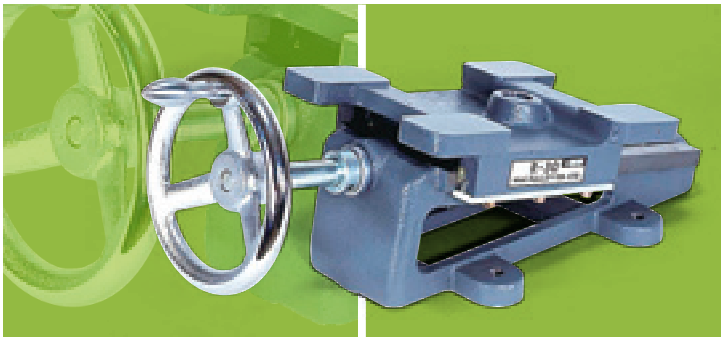
Nominal hole diameter

Motor Slide Bases

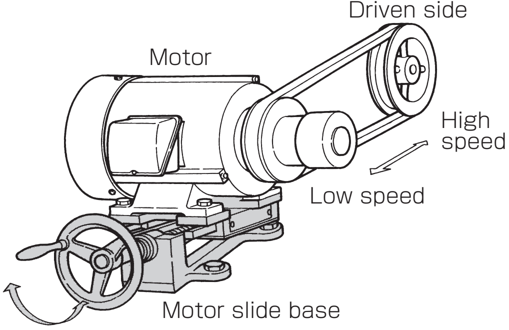
R/RK/RH

Standard applied motor output	0.2 kW to 18.5 kW (4-pole)
Movable distance	0 mm to 200 mm

Motor Slide Base for Easy Speed Change



How to Change Speed



Specifications

Model	Applied motor [kW]	Motor frame number	Movable distance [mm]	Applicable speed changer model				Mass [kg]
				P model	PL model	PK model	PF model	
R-05	0.2 (4-pole)	63	70	P-86	PL-116-11			8.5
	0.4 (4-pole)	71		P-86/P-98/P-106	PL-140-14N		PF-155-14N	
	0.75 (4-pole)	80		P-98/P-106/P-124	PL-170-19N		PF-155-19N/PF-185-19N	
R-20	1.5 (4-pole)	90L	110	P-124/P-164	PL-210-24N		PF-185-24N/PF-216-24N	10.5
R-30	2.2 (4-pole)	100L	140	P-164/P-218			PF-216-28N/PF-250-28N	16
RK-05	0.2 (4-pole)	63	90	P-86	PL-116-11			5.5
	0.4 (4-pole)	71		P-86/P-98/P-106	PL-140-14N	PK-150-14N-044	PF-155-14N	
RK-20	0.75 (4-pole)	80	140	P-98/P-106/P-124	PL-170-19N	PK-200-19N-074	PF-155-19N/PF-185-19N	11
	1.5 (4-pole)	90L		P-124/P-164	PL-210-24N	PK-200-24N-154	PF-185-24N/PF-216-24N	
RK-50	2.2 (4-pole)	100L	160	P-164/P-218		PK-250-28N-224	PF-216-28N/PF-250-28N	18.5
	3.7 (4-pole)	112M		P-218		PK-250-28N-374	PF-250-28N	
RK-100	5.5 (4-pole)	132S	200			PK-300-38N-554		40
	7.5 (4-pole)	132M				PK-300-38N-754		
RK-200	11 (4-pole)	160M	200			PK-300-42N-1104		43
	11 (6-pole)	160L				PK-355-42N-1106		
	15 (4-pole)	160L						
	18.5 (4-pole)*	160L						
RH-50	3.7 (4-pole)	112M	170	P-218			PF-250-28N	25
	5.5 (4-pole)	132S						

* The 18.5-kW (4-pole) motor of the RK-200 is supposed to use a drip proof frame number 160L.

How to Place an Order

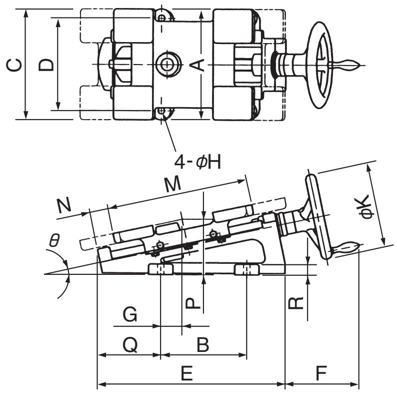
R-05
Model — Size

RK-05
Model — Size

RH-50
Model — Size

Dimensions

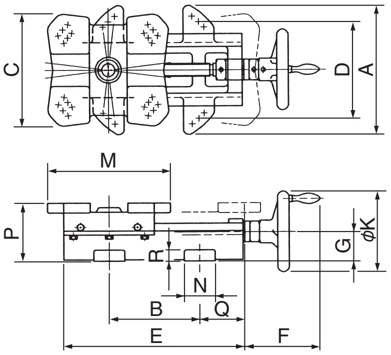
R-☐



Unit [mm]

Model	A	B	C	D	E	F	G	H	K	M	N	P	Q	R	θ [°]
R-05	145	120	130	115	245	100	15	10.5	125	180	27	86	92	16	12
R-20	180	140	180	150	305	120	35	10.5	140	230	30	90	102	17	12
R-30	200	160	190	160	365	200	42	13	160	270	42	114	123	17	12

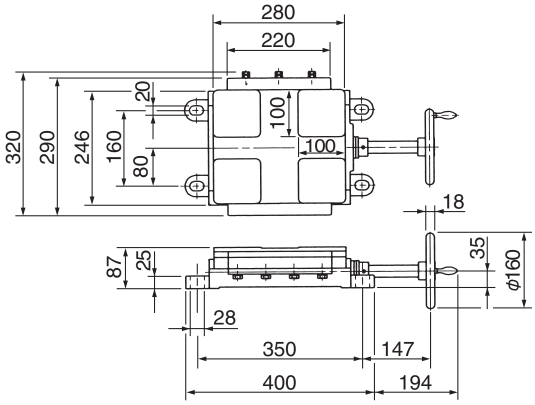
RK-☐



Unit [mm]

Model	A	B	C	D	E	F	G	K	M	N	P	Q	R
RK-05	200	140	131	160	222	110	20	125	153	40	50	42	10
RK-20	200	140	175	150	280	122	45	125	190	48	90	70	17
RK-50	260	200	210	200	320	128	50	140	250	60	100	60	17
RK-100	390	250	252	320	450	150	60	200	283	90	120	100	20
RK-200	390	250	350	320	450	150	60	200	350	90	120	100	20

RH-50



Unit [mm]

How to mount the motor to the slide base

* Determine the position to mount the motor and create tapped (threaded) holes on the slide base.
* Secure the legs of the motor with bolts. Mount the speed changer to the motor shaft.

P/AP/PL/PK/PF/R/RK/RH Models

Items Checked for Design Purposes

Design Capacity

The design capacity can be calculated with the following expression. For the torque constant, however, obtain the capacity for the maximum and minimum rotation of the driven shaft.

$Prd=Pr \times F$ Prd: Design capacity [kW]
F: Correction factor based on load characteristic
Pr: Transmission capacity [kW]

■ Correction factor based on the load characteristic: F

Load characteristic	Operating time per day		
	8 hours	16 hours	24 hours
Light load **(When the load is constant, the rated capacity is not exceeded, and the number of starts and stops is small)**	1.0	1.1	1.2
Medium load **(the maximum load is 125% or less)**	1.2	1.3	1.4
Heavy load **(the maximum load is 150% or less)**	1.3	1.4	1.5

Relational expression for the torque capacity

$$T\,[N \cdot m]=9550 \times \frac{P}{N}$$

T: Transmission torque [N・m]
P: Transmission capacity [kW]
N: Rotation speed [min^{-1}]

Input Shaft Rotation Speed

The speed change pulley is designed to be normally mounted to a 4-pole motor, so make sure at the design phase that the belt's peripheral speed does not exceed 25 m/sec at the maximum rotation speed.
Furthermore, the speed change pulley is designed to use the belt's low speed limit. If it is used at a lower rotation speed than the rated one, the belt's life span may be adversely affected.
In addition, the more the rotation speed decreases, the slower the speed change operation becomes. Therefore, the standard minimum rotation speed is about 500 min^{-1}.

Calculation of the belt's peripheral speed

$$V=\frac{\pi \times D \times N}{60 \times 1000}$$

V: Belt's peripheral speed [m/sec]
D: Pulley's pitch diameter [mm]
N: Rotation speed [min^{-1}]

How to Obtain the Driven Shaft's Rotation Speed

Your desired rotation speed range can be obtained by selecting an appropriate driven pulley for the speed change pulley. The appropriate pitch diameter range that can be selected for the driven pulley is from the same diameter as the maximum pitch diameter (max. P.D) of the speed change pulley to around twice of it. Obtain the rotation speed of the driven shaft with the following expression.

$$N_{max}=\frac{d_{max} \times n}{D} \cdots\cdots\cdots\cdots\cdots \text{maximum rotation speed } [min^{-1}]$$

$$N_{min}=\frac{d_{min} \times n}{D} \text{ or } \frac{N_{max}}{\alpha} \cdots\cdots\cdots\cdots \text{minimum rotation speed } [min^{-1}]$$

n: Speed change pulley's rotation speed [min^{-1}]
d_{max}: Speed change pulley's maximum pitch diameter [mm]
d_{min}: Speed change pulley's minimum pitch diameter [mm]
α: Speed change pulley's speed change ratio
D: Driven pulley's pitch diameter [mm]

Selecting the Belt Size

Selecting the type

Consider the design capacity and the maximum and minimum rotation speed of the driven shaft.
If there are two candidate types, make a design based on the two types, and select the one that matches the design purpose.

Trial calculation of the distance between shafts (guide)

To place a speed change pulley, you must determine the distance between shafts. It varies depending on the diameter of the driven pulley, the length of the available belt, the space of the machine and equipment, etc. A trial calculation must be performed according to these conditions.

The standard distance between shafts can be calculated with the following expression.

$$\text{Shortest distance between shafts } C_{min}=\frac{(D_1+D_2)}{2}+50\,[mm]$$

$$\text{Longest distance between shafts } C_{max}=1.5\,(D_1+D_2)\,[mm]$$

D_1: Speed change pulley's external diameter [mm]
D_2: Driven pulley's external diameter [mm]

How to obtain the belt length

When the driven pulley and guide distance between shafts (C) are calculated, calculate the belt length (L) with the following expression.

$$L=2C+\frac{\pi}{2}(D+d_{min})+\frac{(D-d_{min})^2}{4C}$$

L: Belt's pitch perimeter [mm]
d_{min}: Speed change pulley's minimum pitch diameter [mm]
D: Driven pulley's pitch diameter [mm]

Based on the obtained L, select one with the appropriate length.

■ How to obtain the distance between shafts

Obtain the actual distance between shafts (C) from the selected belt. Calculate it with the following expression.

$$C=\frac{b+\sqrt{b^2-8\,(D\text{-}d_{min})^2}}{8}$$

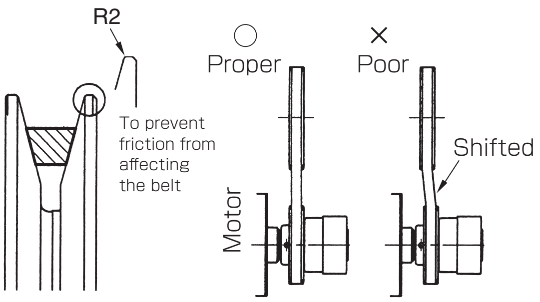
However, $b=2L-\pi\,(D+d_{min})$

d_{min}: Speed change pulley's minimum pitch diameter [mm]
D: Driven pulley's pitch diameter [mm]

Note that this distance between shafts is one when the speed change pulley is farthest away from the driven shaft. When speed is changed, the distance between shafts is decreased accordingly. Take this into consideration when you determine the mounting space.

Other Precautions

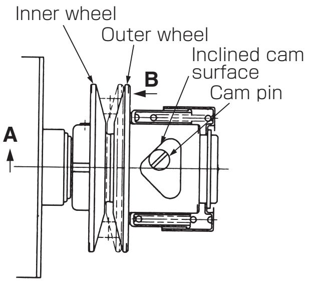
1. Avoid a humid or dusty place, a place where the ambient temperature is high, a place exposed to water or oil, and a place where corrosive and flammable gases are present in the atmosphere, and select a well-ventilated place. Mount the device in a location that provides easy access for inspection. The operating ambient temperature range is -10℃ to 40℃ .
2. When mounting the speed changer, make sure the parallelism and perpendicularity of the travel line of the belt and two shafts are correct.
   Attention needs to be paid, in particular, to a wide speed changer belt.
3. When mounting the device to the machine, provide the rotating part with a cover.
4. Select a stable mounting base to make sure it does not vibrate. The device may vibrate during use if it is not mounted properly. Be sure to mount it securely using mounting bolts of an adequate strength.
5. When using a motor with a slide base, provide a stopper for the slide base to make sure the belt is not detached or does not become too tight.
6. If you will use the device for a machine where normal-reverse operation is performed, or a repeated or impact load is applied, please consult with us.
7. Chamfer the V-groove of the driven pulley about R2 as shown in the figure below to increase the durability of the belt.



Cam mechanism

The outer wheel (moving wheel) of the speed change pulley is pushed by a spring. However, if the load changes, the tension of the V-belt changes, so the spring is pushed back and the belt moves to the inside, resulting in non-uniform rotation. The P model has a cam mechanism to prevent such non-uniform rotation.

As shown in the figure below, when the motor shaft rotates in the direction of arrow A, the cam pin attached to the main body rotates the outer wheel through the inclined surface of the cam. Accordingly, a force indicated by arrow B increases in proportion to an increase in the load applied to the V-belt and pushes the V-belt out as shown by the virtual line and increases the speed. When a load is not applied, the V-belt is loose and does not apply excessive force to the bearing or other parts. When a load is applied, the V-belt becomes moderately tight and the speed is increased to prevent a slip on the V-pulley and compensates for a decrease in the rotation speed of the motor. Thus, the rotation of the driven shaft can be maintained constant.



Key method with no cam mechanism

A key method is available for applications where an impact load is applied, normal-reverse operation is performed repeatedly, or the device is mounted to the brake motor. For this type, the inner and outer wheels are linked with a sliding key instead of a cam pin, and a strong spring appropriate to the belt's transmission capacity is used. Even if an impact load is applied, it is absorbed by the belt and spring, so excessive force is not applied to the machine.

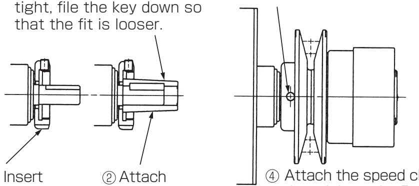
How to Mount to the Motor Shaft

Adapter method

Models using the adapter method (all types of the P and AP model) use a tapered sleeve (adapter) for mounting the device to motors or other shafts in order to avoid a shock to the speed changer main body.

Insert the adapter into the tapered hole of the inner wheel and tighten the nut (P nut) to push the adapter in to secure it to the shaft with a wedge effect.

Follow the following procedure to mount the device to the motor shaft.



③If the key sticks out higher than the adapter, file it down. If the key is too wide and the adapter fitting too tight, file the key down so that the fit is looser.

⑤ Tighten the locking screw of the P nut.

① Insert the P nut.

② Attach the adapter.

④ Attach the speed changer and then tighten the P nut. If the speed changer wiggles, repeat the above steps to center it.

Straight method

All types of the PL, PK, and PF models use a straight method. The mounting holes are straight. The device is connected to the motor or other shafts with a standard key and set screws.

When mounting the device, first place the V-belt to the V-groove of the speed change pulley to protect the pulley in order not to give a shock to the speed changer main body, and then apply the device to the pulley shaft end and gently hammer it in place. Firmly tighten the two set screws at two points, one on the keyway and the other one at a right angle to it.

There is a type where the set screws are not visible from the outside. They can be seen by opening the pulley using the belt.

Operation and Run

1. Do not perform speed changing operation when the speed change pulley is stopped.
2. For the rotation direction, you can use any direction.
3. Before changing between the normal and reverse directions, make sure the speed changer is stopped. (Do not do this with the P and PL models.)
4. For the P, PL, PK, and PF models that change speed by changing the distance between shafts, moving the motor closer to the machine increases the speed and moving it away from the motor decreases the speed.
5. Use a motor slide base (R or RK model) also to change the distance between shafts.
6. Place a stopper to the motor slide base to prevent the belt from becoming too tight or coming out of the pulley at a low or high speed.
7. If have not used the device for a long period of time, check the pulley surface for rust and check the belt.
8. Apply oil to the device at regular intervals (once every 1 to 6 months), and change the speed from high to low several times once a week to prevent the oil film in the sliding portion of the pulley from breaking down.
9. Check the belt to make sure there is no unusual wear.
10. A strong spring is installed in the speed change pulley. Never disassemble it because doing so is dangerous.

Stand-alone Belt-type Stepless Speed Changer

L

Speed Is Changed by Operating the Lever

Transmission capacity	0.2 kW to 2.2 kW
Speed change ratio	1:2 to 1:6
External pulley diameter	103 mm to 260 mm

Speed Changer with Lever

Speed can be changed quickly by changing the lever angle.

How to Place an Order

LA-100

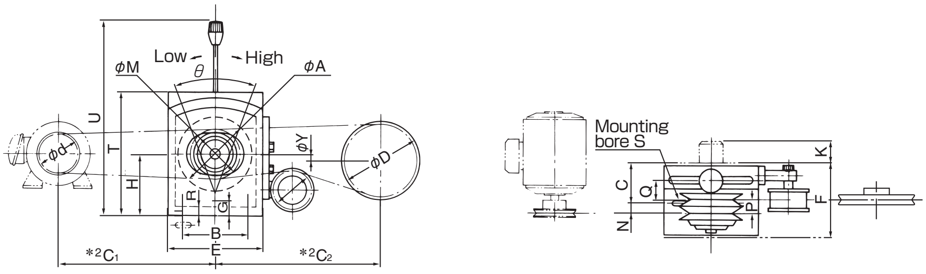
Model — Size

Specifications

Model			LA-100			LB-140			LB-160						LC-210			LC-260					
Belt in use			A belt x1			A belt x1			A belt x1			B belt x1			B belt x1			B belt x1			C belt x1		
Speed change ratio			1 : 2			1 : 4			1:4			1:2			1:4			1 : 4			1 : 2		
Transmission capacity [kW]			0.2			0.2 ～ 0.4			0.4 ～ 0.75						0.75			1.5 ～ 2.2					
Driven shaft rotation speed			Max.	Intermediate	Min.	Max.	Intermediate	Min.	Max.	Intermediate	Min.	Max.	Intermediate	Min.	Max.	Intermediate	Min.	Max.	Intermediate	Min.	Max.	Intermediate	Min.
Transmission capacity [kW]	Motor pulley's external diameter [in.]	2	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18												
		$2\frac{1}{2}$	0.3	0.3	0.26	0.3	0.3	0.18	0.3	0.3	0.18												
		3	0.38	0.38	0.3	0.37	0.37	0.22	0.37	0.37	0.22												
		$3\frac{1}{2}$				0.45	0.67	0.26	0.52	0.67	0.26	0.52	0.52	0.52	0.52	0.52	0.45	0.52	0.52	0.52			
		4				0.52	0.9	0.3	0.6	0.9	0.3	0.9	0.9	0.67	0.67	0.67	0.45	0.67	0.67	0.67			
		$4\frac{1}{2}$				0.6	1.05	0.33	0.67	1.12	0.33	1.05	1.05	0.75	0.97	1.05	0.45	1.05	1.05	0.75			
		5							0.75	1.27	0.37	1.12	1.42	0.75	1.12	1.42	0.52	1.42	1.42	0.82	1.35	1.35	1.35
		$5\frac{1}{2}$							0.82	1.35	0.41	1.27	1.57	0.9	1.2	1.8	0.6	1.8	1.8	0.9			
		6							0.9	1.42	0.45	1.35	1.65	0.9	1.27	2.25	0.67	1.95	2.25	0.97	2.25	2.25	2.25
		$6\frac{1}{2}$													1.35	2.4	0.67	2.1	2.62	1.05			
		7													1.5	2.47	0.75	2.25	3.0	1.12	3.37	3.37	2.4
		8																			3.52	3.52	2.47
Mass [kg]			3.9			7.6			15						21			37					

* The speed change ratio for the LK-110 (mass of 4 kg) with a transmission capacity of 0.1 kw using M belt is 1:5.

Dimensions



Unit [mm]

Model	A	B	C	E	F	G	H	N	P	Q	R	S	T	U	M	K	θ [°]
LK-110	116	105	58	165	125	24	105	29	23	25	18	11 × 30	200	327	80	24	32
LA-100	103	105	58	165	120	24	104	23	19	25	18	11 × 30	200	327	79	—	16
*1LB-140	140	120	75	185	140	27	118	19	25	42	20	11 × 28	235	356	98.5	—	33
*1LB-160	170	140	87	222	153	33	138	25	29	54	21	11 × 40	260	440	116 127	—	35 19
*1LC-210	212	155	104	262	191	42	162	20	37	67	28	14 × 56	290	472	142	—	39
*1LC-260	260	218	121	320	236	42	197	27	43	84	28	19 × 67	380	531	174 188	—	37 21

* Models indicated by *1 include a tension pulley (J= φ 70).

* Calculate C_1 and C_2 indicated by *2 by reference to Items Checked for Design Purposes.

* M: Medium pitch diameter

Stand-alone Belt-type Stepless Speed Changer

U

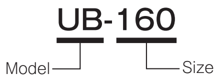
Speed Is Changed by Operating the Handle

Transmission capacity	0.2 kW to 2.2 kW
Speed change ratio	1:2 to 1:6
External pulley diameter	103 mm to 260 mm

Speed Changer with Handle

The speed change ratio is large and the belt travel line is maintained constant.

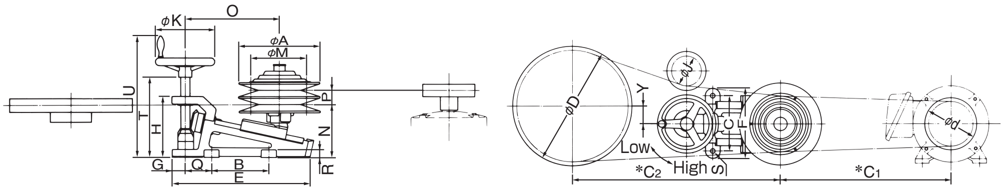
How to Place an Order



Specifications

Model		UB-160						UC-210			UC-260					
Belt in use		A belt x1			B belt x1			B belt x1			B belt x1			C belt x1		
Speed change ratio		1 : 5			1 : 3			1 : 6			1:6			1 : 3		
Transmission capacity [kW]		0.4 ~ 0.75						0.75			1.5 ~ 2.2					
Driven shaft rotation speed		Max.	Intermediate	Min.	Max.	Intermediate	Min.	Max.	Intermediate	Min.	Max.	Intermediate	Min.	Max.	Intermediate	Min.
Transmission capacity [kW]	Motor pulley's external diameter [in.] $3^{1}/_{2}$	0.45	0.67	0.2	0.52	0.52	0.52	0.52	0.52	0.3	0.52	0.52	0.45			
	4	0.52	0.9	0.26	0.67	0.67	0.52	0.67	0.67	0.33	0.67	0.67	0.48			
	$4^{1}/_{2}$	0.6	1.12	0.3	0.9	1.05	0.56	0.82	1.05	0.37	1.05	1.05	0.56			
	5	0.67	1.27	0.33	0.97	1.42	0.6	0.9	1.42	0.41	1.27	1.42	0.63	1.35	1.35	1.35
	$5^{1}/_{2}$	0.75	1.37	0.37	1.05	1.57	0.63	0.97	1.8	0.45	1.42	1.8	0.71			
	6	0.82	1.42	0.37	1.2	1.65	0.67	1.05	2.25	0.52	1.5	2.25	0.75	2.25	3.0	1.35
	$6^{1}/_{2}$							1.2	2.4	0.6	1.6	2.62	0.82			
	7							1.35	2.47	0.67	1.8	3.0	0.9	2.4	3.37	1.42
	8													2.55	4.5	1.5
Mass [kg]		14			14			20			34			34		

Dimensions



Unit [mm]

Model	A	B	C	E	F	G	H	J	K	N	P	Q	R	S	T	U	M	O	Number of handle turns	Movement distance
UB-160	170	120	115	295	145	30	125	70	125	108	29	56	15	11.5	175	270	116 127	190	24 17	75 53
UC-210	212	140	150	350	180	30	140	70	140	118	37	85	16	11.5	202	298	142	225	30	92
UC-260	260	160	160	415	200	30	157	70	160	154	43	107	17	14	246	363	174 188	250	37 29	116 82

* Calculate C_1 and C_2 indicated by * by reference to Items Checked for Design Purposes.
* M: Medium pitch diameter

Stand-alone Belt-type Stepless Speed Changer

T

Transmission capacity	0.2 kW to 2.2 kW
Speed change ratio	1:2 to 1:6
External pulley diameter	103 mm to 260 mm

Speed Can Be Changed Freely

Speed Can Be Changed Freely

This speed changer can be incorporated into a machine and used as part of the equipment.

How to Place an Order

T-100

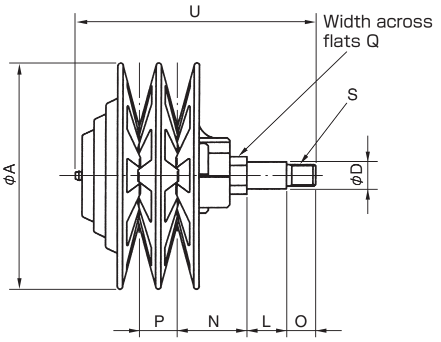
Size

Specifications

Model	Transmission capacity [kW]	Belt	Speed change ratio	Mass [kg]
T-100	0.2	A	1 : 2	1.8
T-140	0.2	A	1 : 4	3.1
T-160	0.4	A	1 : 5	5.2
	0.75	B	1 : 3	
T-210	0.75	B	1 : 6	9.3
T-260	1.5	B	1 : 6	18
	2.2	C	1 : 3	

* The T model is an intermediate wheel pulley to be incorporated into equipment. It is not for the maintenance of the L and U models.
This product requires a moving device. Please contact with us for details.

Dimensions



Unit [mm]

Model	A	P	N	L	O	U	D	S	Q	Min.P.D.	Mid.P.D.	Max.P.D.
T-100	103	19	40	25	15	135	16	M12	19	64	79	94
T-140	140	25	43	25	15	145	16	M12	19	60	98.5	131
T-160	170	29	53	30	22	185	20	M16	24	71 95	116 127	161 159
T-210	212	37	62	40	22	215	26	M20	30	84	142	201
T-260	260	43	85	50	27	275	32	M20	36	99 131	174 188	249 246

L/U/T Models

Items Checked for Design Purposes

Speed Change Ratio

You need to consider various conditions to select the best model, and one of them is the speed change ratio.

That change ratio is expressed as how many times faster the maximum output side rotation speed is relative to the minimum rotation speed.

For example, when the minimum and maximum rotation speeds are 500 and 2,000 min^{-1} respectively, the speed change ratio is 1:4.

The speed change ratio of a speed change pulley can be calculated as: (max. P.D/min. P.D)^2.

How to Calculate the Rotation Speed

You can set various driven-side rotation speeds for a speed change pulley by selecting suitable pitch diameters for the motor pulley and driven-side pulley.

Select a motor pulley with a rated size suited to your operating conditions from the table showing the transmission capacity of each model.

The driven-side rotation speed can be obtained based on the pitch diameter, but a simpler method is given below.

First, select the motor pulley diameter (d) and driven pulley diameter (D) without considering the speed change ratio.

This gives you the center rotation speed.

$$\text{Motor rotation} \times \frac{d}{D} = \text{center rotation speed}$$

If the speed change ratio is i,

the minimum rotation speed is (center rotation speed x 1/ $\sqrt{i}$),

the maximum rotation speed is (center rotation speed x $\sqrt{i}$).

When selecting a V-pulley, you are recommended to use one of a commercially available size. A table for quickly obtaining the center rotation speed is available on the next page. If you need a very low rotation speed, consider placing the speed reducer after the speed change pulley.

Appropriate Distance between Shafts

The speed change pulley must be moved by a large amount between the fixed motor and machine to change the speed, and since the speed change ratio is large, the movement amount is large and the winding angle also changes, so the belt travel line is displaced to a certain degree. Select as large a distance between shafts as possible to reduce the adverse influence on the belt life span. Relational expressions for the appropriate distance between shafts are defined as follow. Calculate the distance between shafts using these relational expressions.

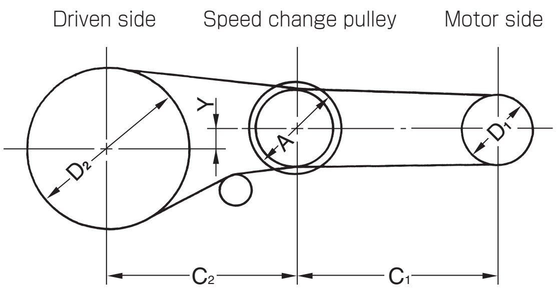
Distance between motor shaft and speed change pulley shaft (C_1)

$C_1 > 2 \times A$, where A indicates the speed change pulley's external diameter.

Distance between speed change pulley shaft and driven shaft (C_2)

$C_2 > A + D_2$, where D_2 indicates the driven pulley's external diameter.

Make sure the centers of the motor shaft, speed change pulley shaft, and driven shaft are aligned on a straight line. If the driven pulley's external diameter is larger than the speed change pulley's external diameter, displace the center of the driven pulley by Y (=1/3x(D_2 - A)).



Belt Length

When the appropriate distance between shafts is determined, calculate the length of the belts with the expressions below using the data you obtained previously: the motor pulley's pitch diameter (D_1), driven pulley's pitch diameter (D_2), and speed change pulley's medium pitch diameter (M in the specifications table = pitch diameter when 2 belts are placed around the same diameter). Select a belt that is slightly longer because heat may be generated if the belt is too tight.

Motor side belt length

$$L_1 = 2C_1 + \frac{\pi}{2}(M + D_1) + \frac{(M - D_1)^2}{4C_1}$$

Driven side belt length

$$L_1 = 2C_2 + \frac{\pi}{2}(M + D_2) + \frac{(M - D_2)^2}{4C_2}$$

In general, when the belt speed is increased with belt transmission systems, in other words, when the external diameter of the motor pulley is increased, the transmission power can be increased accordingly. But you must be aware of the fact that when the rotation speed of machines is increased, the used capacity is also increased accordingly. Pay attention to this fact when you select a speed changer and V-pulley.

How to Increase the Life Span of the Speed Changer

The speed changer needs to be oiled. Apply oil to the speed changer at regular intervals (once every 1 to 6 months), and change the speed from high to low several times once a week to prevent the oil film in the sliding portion of the pulley from breaking down.

Other Check Points

- Select a motor pulley that will result in the rotation speed of the speed changer being within 2000 min^{-1}.
- The speed changer can be mounted in any position, vertically, laterally, and horizontally.
- The tension pulley can be mounted on any side, but in principle, it is mounted on the slack side of the V-belt.
- The speed cannot be changed when the speed changer is stopped.
- Chamfer the V-groove of the V-pulley about R2 to increase the durability of the belt.

L/U/T Models

Items Checked for Design Purposes

Table for Quickly Obtaining Center Rotation Speed

Motor side V-pulley's external diameter (in.) Motor 1720 min⁻¹ (60 Hz)

Driven side V-pulley's external diameter (in.)

2	1430						20	18	16	15	14	13	12	11	10	9	8	7	6½	6	5½	5	4½	4	3½	3	2½	2	
2½	1097	1430					1429	1283	1137	1065	992	937	848	774	702	630	557	483	447	411	375	337	301	265	229	193	157	120	24
3	890	1160	1430				1562	1402	1244	1164	1085	1005	925	846	767	686	607	528	489	449	409	370	330	289	249	210	170	131	22
3½	748	975	1203	1430			1720	1545	1371	1288	1195	1108	1020	931	845	757	669	581	538	494	451	406	363	320	279	232	189	145	20
4	645	842	1038	1234	1430			1720	1526	1428	1330	1233	1135	1037	941	843	745	648	599	554	502	452	404	356	306	258	209	160	18
4½	568	738	912	1085	1257	1430			1720	1610	1500	1390	1280	1170	1061	951	841	731	676	623	566	511	456	401	346	291	240	181	16
5	506	661	814	968	1123	1276	1430			1720	1603	1485	1367	1250	1135	1015	899	781	722	662	604	545	487	428	370	311	256	193	15
5½	458	596	735	874	1012	1153	1291	1430			1720	1594	1467	1342	1216	1091	963	838	774	712	648	585	523	459	397	334	272	208	14
6	416	543	670	797	923	1070	1177	1303	1430			1720	1584	1467	1312	1176	1040	905	836	767	700	632	564	495	428	360	290	224	13
6½	383	499	615	732	848	965	1081	1197	1314	1430			1720	1572	1448	1276	1237	982	908	836	759	686	612	538	464	390	317	243	12
7	355	462	569	676	785	892	1000	1108	1216	1323	1430			1720	1558	1397	1276	1073	992	912	831	750	670	588	507	428	347	267	11
8	308	402	495	588	682	775	869	962	1055	1150	1243	1430			1720	1541	1397	1185	1095	1006	917	829	740	650	561	471	382	294	10
9	272	355	438	521	604	686	768	853	934	1017	1100	1264	1430			1720	1521	1323	1223	1123	1022	924	820	726	626	526	427	327	9
10	245	318	392	466	541	615	689	763	837	911	985	1134	1280	1430			1720	1495	1383	1269	1158	1045	932	820	707	595	483	370	8
11	222	289	356	422	489	556	624	691	758	825	892	1028	1162	1296	1430			1720	1591	1462	1331	1262	1073	944	814	685	556	427	7
12	202	263	325	386	448	509	571	632	693	755	817	940	1061	1184	1307	1430			1720	1581	1440	1300	1161	1020	881	740	600	461	6½
13	186	243	299	356	410	469	525	582	633	695	752	865	978	1091	1204	1317	1430			1720	1570	1416	1263	1120	958	807	660	501	6
14	173	225	277	330	382	435	486	539	592	644	696	801	907	1011	1115	1220	1325	1430			1720	1553	1386	1219	1051	884	724	550	5½
15	160	210	259	308	356	405	458	502	551	601	649	747	844	942	1040	1137	1234	1339	1430			1720	1534	1350	1164	979	795	609	5
16	150	196	242	287	333	379	425	470	516	562	608	699	791	882	972	1064	1155	1247	1339	1430			1720	1512	1306	1097	893	683	4½
18	133	175	215	255	296	336	376	417	461	498	539	619	701	782	862	944	1025	1105	1187	1268	1430			1720	1484	1249	1012	776	4
20	120	156	193	229	266	302	338	375	410	448	483	556	629	702	774	848	921	994	1065	1140	1284	1430			1720	1447	1173	900	3½
22	109	142	175	207	240	275	308	340	373	406	439	505	571	638	704	769	835	901	968	1034	1166	1298				1720	1395	1070	3
24	100	130	160	190	220	250	280	311	342	372	402	463	523	583	644	705	765	825	885	947	1067	1188					1720	1319	2½
	2	2½	3	3½	4	4½	5	5½	6	6½	7	8	9	10	11	12	13	14	15	16	18	20						1720	2

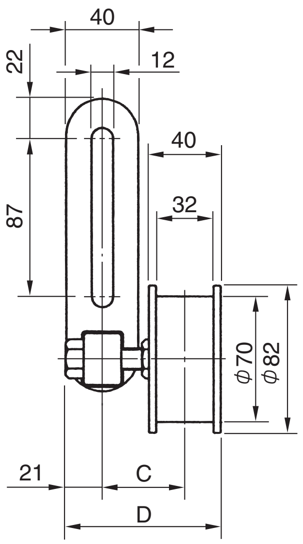
Driven side V-pulley's external diameter (in.)

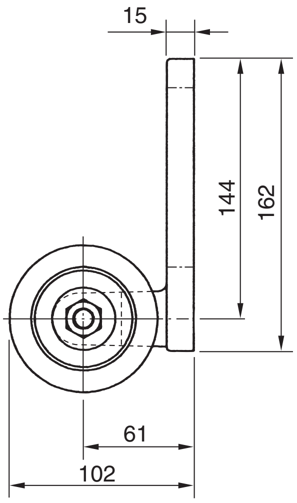
Motor side V-pulley's external diameter (in.) Motor 1430 min⁻¹ (50 Hz)

Calculations on this table are based on the A-type belt. There is an error for the B-type and C-type belts. When using a B-type of 4-inch or more or a C-type belt of 7-inch or more, the error is about 2%, which is tolerable for practical use.

Options

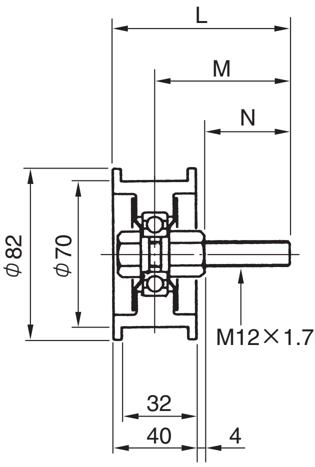
Tension Pulley Set (Tension assembly)





Tension pulley set model	C	D	Applied speed changer model	Used tension pulley part model
Tension assembly L, small	46	87	LB-140,160	TP-1-A
Tension assembly L, large	61	102	LC-210,260	TP-1-B

Tension Pulley Part



Tension pulley part model	L	M	N
TP-1-A	85	65	41
TP-1-B	102	82	58

ZERO-MAX (STEPLESS SPEED CHANGERS)

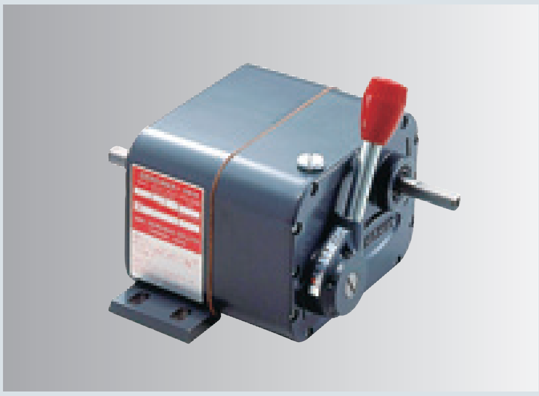
S

MS

S/MS Models

Product Models

Stand-alone Zero-Max



S

Output shaft torque

1.38 to 14.0 N·m

Zero-Max with Motor

MS

Output shaft torque

1.38 to 6.90 N·m

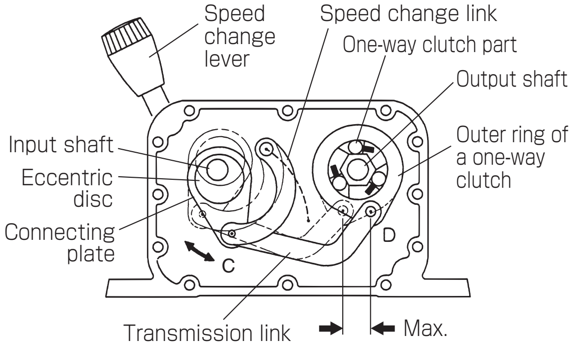
Operating Principles

The structure consists of a link mechanism and one-way clutch as shown in the figure on the right, and these are arranged in four rows in the axial direction. An eccentric disc is attached to the input shaft, and the eccentric discs in the rows are arranged on the circumference at an angle of 90° to each other surrounding the input shaft. Thus, the following mechanism is created: the rotational motion of the input shaft is converted once to the reciprocating motion, which then is converted to the rotational motion by each of the one-way clutches of the output shaft part.

The output rotation speed can be changed steplessly by freely changing the amplitude of this reciprocating motion with a speed change lever.

When Rotating at Maximum Speed

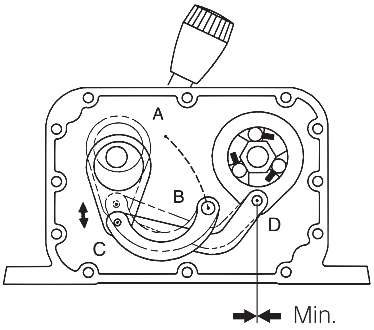
When the input shaft is rotated, the eccentric disc attached to it is rotated around the input shaft. The eccentric disc and connecting plate are fitted together so that they can be rotated freely, thus the oscillating motion is generated around A in the speed change link. The motion in C at this point is transmitted to D by the transmission link, so the oscillating motion is also generated around the outer ring of the one-way clutch. Each of the one-way clutches in the rows converts this oscillating motion to the rotational motion. Thus, the output shaft generates continuous rotational motion.



<When rotating at maximum speed>

When Rotating at Minimum Speed

The center of oscillation of the speed change link moves to B in the figure by moving the speed change lever to the zero position. Thus, the direction of the oscillating motion of the speed change link is changed and C moves up and down as shown in the figure. As a result, only a small amount of motion is transmitted to D, so almost no rotational motion is generated around the output shaft.



<When rotating at minimum speed>

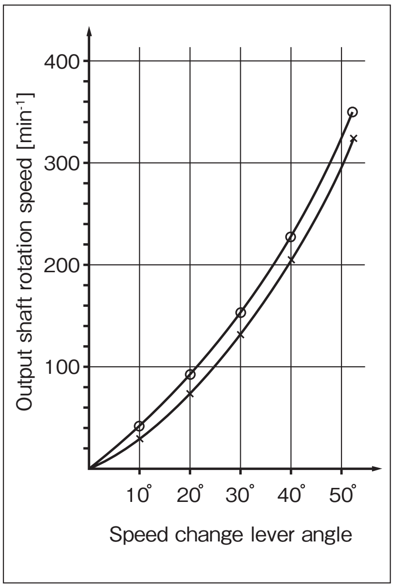
Load Characteristics

The output shaft rotation speed of the Zero-Max changes as shown in the figures below depending on the load torque value. (Input: 1500 min⁻¹, constant)

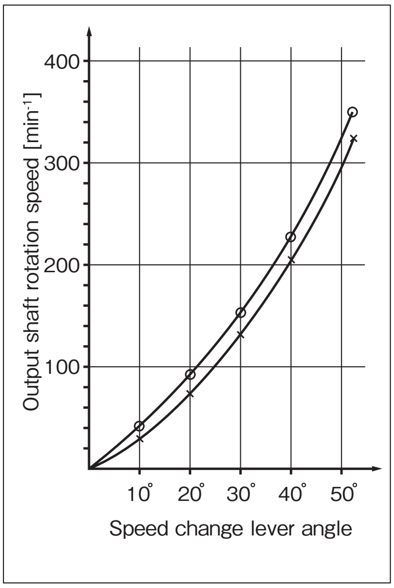
○ : No load　　× : Rated load

* Rated load means the rated output shaft torque load.
* Values in the figures below are typical characteristic values.

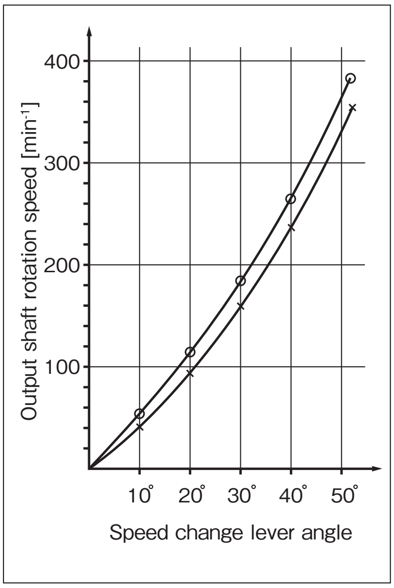
🟩 E1/E2



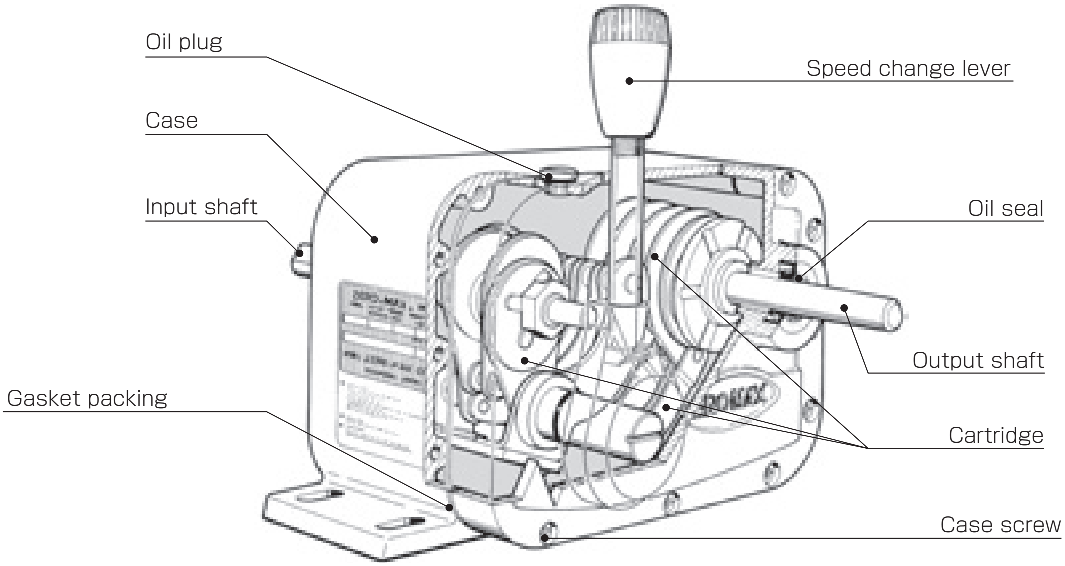
🟩 JK1/JK2



🟩 Y1/Y2



Structure



This speed changer is filled with lubricating oil.

Zero-Max (Stepless Speed Changer)

S

Standard applied motor output	0.2 kW to 0.4 kW (4-pole)
Rated output shaft torque	1.38 N・m to 6.90 N・m
Output shaft rotation speed	0 to 300, 315 min^{-1}/50 Hz, 0 to 360, 380 min^{-1}/60 Hz

Speed Can Be Changed Instantaneously from Zero to Maximum Rotation

Easy Speed Changing

The lever can be operated with one hand, and speed can be changed quickly. In addition, speed can be changed, regardless of whether the machine is running or stopped.

Wide Speed Change Range

The speed change ratio for continuous operation is 1:12, and an almost unlimited speed change range can be used for other operations.

Mechanical Auto Control Is Available

A special lever allows you to perform auto control, such as constant tension feed.

Compact Design

It is easy to handle the device because it is very small and light.

Easy Maintenance

Routine maintenance is easy.

Stepless Speed Change

Specifications

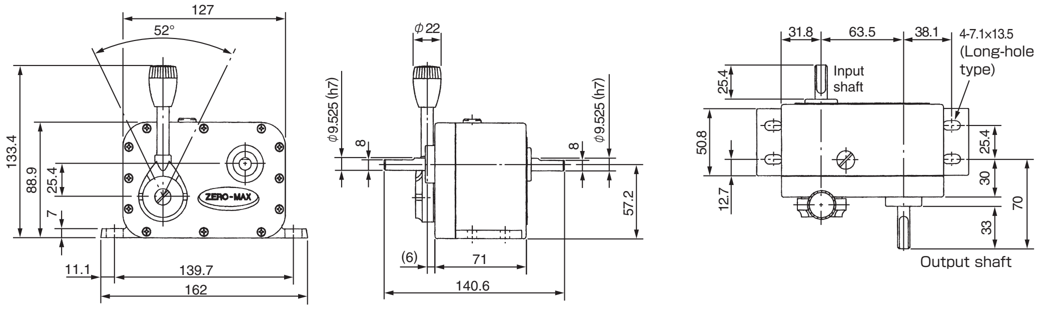
Model		E1	E2	JK1	JK2	Y1	Y2
Output shaft rotation direction *		Counterclockwise	Clockwise	Counterclockwise	Clockwise	Counterclockwise	Clockwise
Rated output shaft torque	[N·m]	1.38	1.38	2.88	2.88	6.90	6.90
Output shaft rotation speed	[min⁻¹]	0 ～ 300 (1430 [min⁻¹] at input)	0 ～ 300 (1430 [min⁻¹] at input)	0 ～ 300 (1430 [min⁻¹] at input)	0 ～ 300 (1430 [min⁻¹] at input)	0 ～ 315 (1430 [min⁻¹] at input)	0 ～ 315 (1430 [min⁻¹] at input)
		0 ～ 360 (1720 [min⁻¹] at input)	0 ～ 360 (1720 [min⁻¹] at input)	0 ～ 360 (1720 [min⁻¹] at input)	0 ～ 360 (1720 [min⁻¹] at input)	0 ～ 380 (1720 [min⁻¹] at input)	0 ～ 380 (1720 [min⁻¹] at input)
Mass	[kg]	1.4	1.4	1.9	1.9	4.8	4.8

* The rated output shaft torque value is constant across the entire speed change range.
* The output shaft rotation speed values are based on the rated load.
* The * mark indicates the rotation direction viewed from the output shaft end.

* A rated output shaft torque 11.5 N·m (QX model) is also available. Please consult with us.

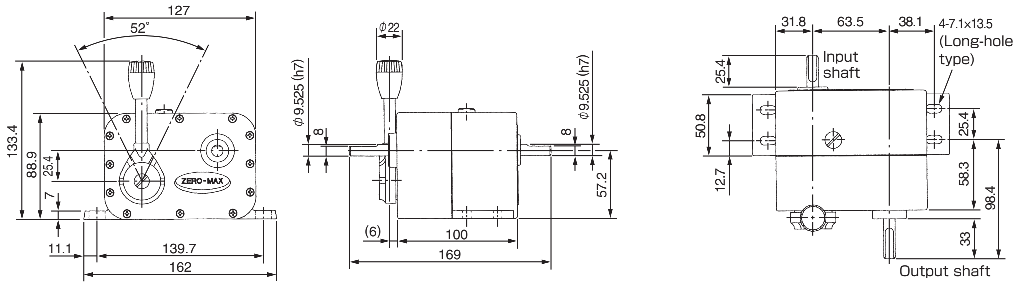
Dimensions

E1/E2



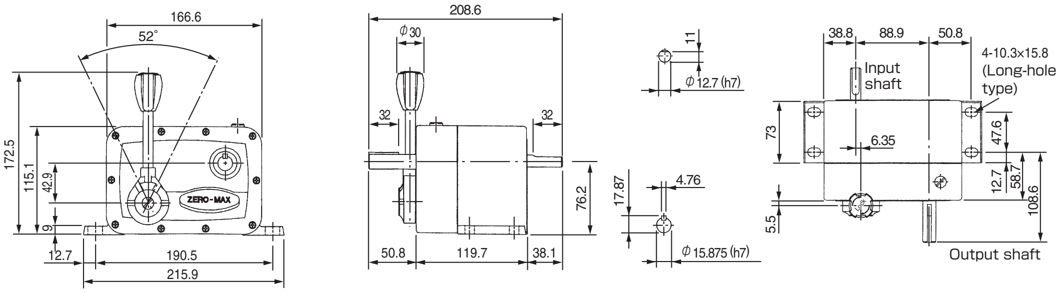
Unit [mm]

JK1/JK2



Unit [mm]

Y1/Y2



Unit [mm]

How to Place an Order

E 1

Size — Output shaft rotation direction

Zero-Max (Stepless Speed Changer)

MS

Motor output	0.2 kW to 0.4 kW (4-pole)
Rated output shaft torque	1.38 N・m to 6.90 N・m
Output shaft rotation speed	0 to 300, 330 min^{-1}/50 Hz, 0 to 360, 400 min^{-1}/60 Hz

A Motor Is Integrated into an Easy-to-Operate Speed Changer

Easy Speed Changing

The lever can be operated with one hand, and speed can be changed quickly. In addition, speed can be changed, regardless of whether the machine is running or stopped.

Wide Speed Change Range

The speed change ratio for continuous operation is 1:12, and an almost unlimited speed change range can be used for other operations.

Mechanical Auto Control Is Available

A special lever allows you to perform auto control, such as constant tension feed.

Compact Design

The device is very small, even including the motor, and easy to handle.

Easy Maintenance

Routine maintenance is easy.

Stepless Speed Change

COUPLINGS
ETP BUSHINGS
ELECTROMAGNETIC CLUTCHES & BRAKES
SPEED CHANGERS & REDUCERS
INVERTERS
LINEAR SHAFT DRIVES
TORQUE LIMITERS
ROSTA
SERIES
HOLLOW SHAFT / SOLID SHAFT SPEED CHANGERS AND REDUCERS
BELT-TYPE STEPLESS SPEED CHANGER UNITS
STAND-ALONE BELT-TYPE STEPLESS SPEED CHANGERS
ZERO-MAX (STEPLESS SPEED CHANGERS)
DC MOTORS
ROTATION SPEED INDICATORS
MODELS
S
MS

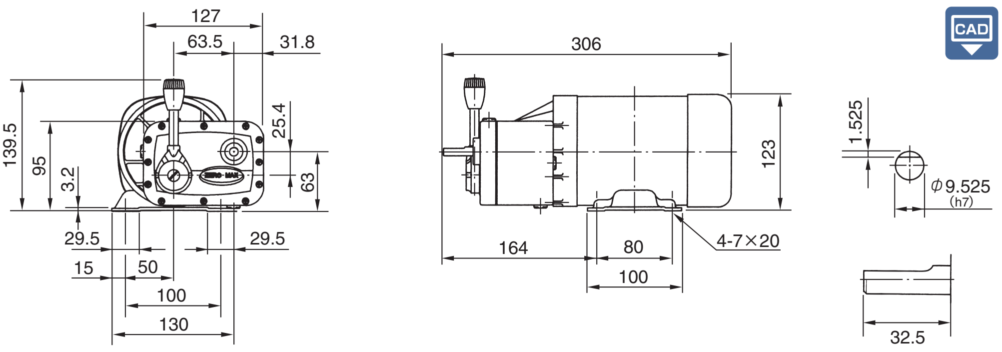
Specifications

Model		M3-E1	M3-E2	M3-JK1	M3-JK2	M3-Y1	M3-Y2
Output shaft rotation direction *		Counterclockwise	Clockwise	Counterclockwise	Clockwise	Counterclockwise	Clockwise
Rated output shaft torque [N·m]		1.38	1.38	2.88	2.88	6.90	6.90
Output shaft rotation speed [min⁻¹]	50Hz	0 ~ 300	0 ~ 300	0 ~ 300	0 ~ 300	0 ~ 330	0 ~ 330
	60Hz	0 ~ 360	0 ~ 360	0 ~ 360	0 ~ 360	0 ~ 400	0 ~ 400
Motor specifications [kW] (4P)		0.2	0.2	0.2	0.2	0.4	0.4
Mass [kg]		7.5	7.5	8.3	8.3	14.3	14.3

* The rated output shaft torque value is constant across the entire speed change range.
* A single-phase motor type (M2-☐) is also available. Please consult with us.
* The output shaft rotation speed values are based on the rated load.
* The * mark indicates the rotation direction viewed from the output shaft end.

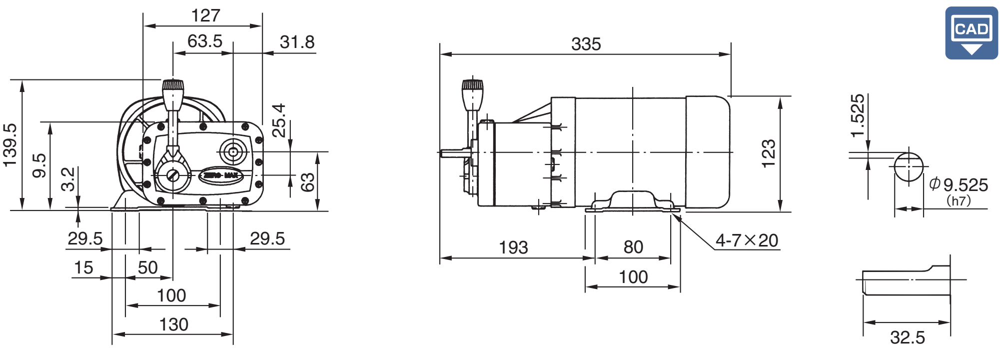
Dimensions

M3-E1/M3-E2



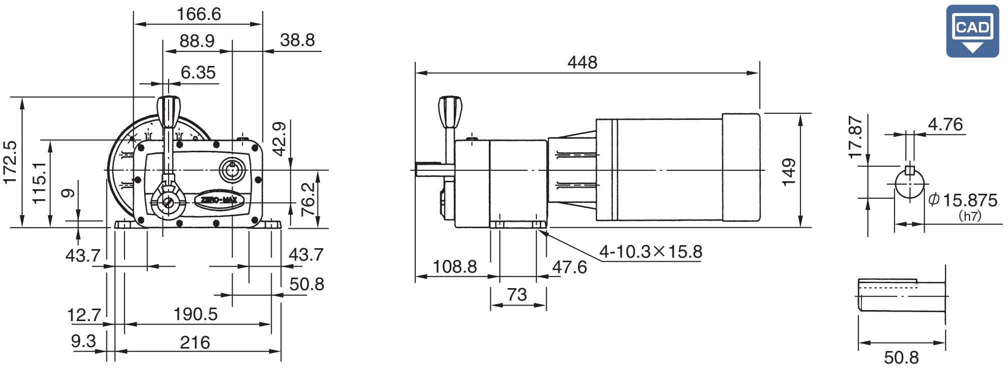
Unit [mm]

M3-JK1/M3-JK2



Unit [mm]

M3-Y1/M3-Y2



Unit [mm]

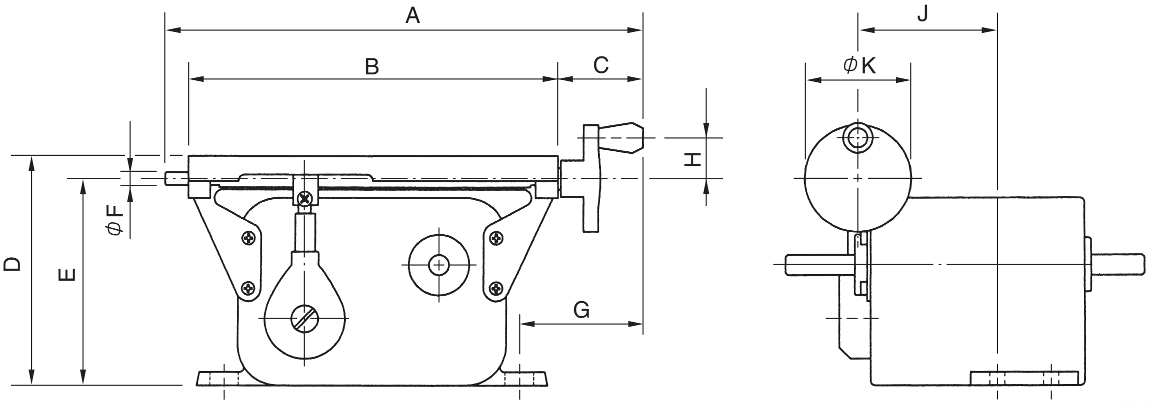
How to Place an Order

S/MS Models

Options

Screw Controller

If you need to make fine-tuning when changing speed, use the Zero-Max with a screw controller. The screw controller can be attached to both the S and MS models. A model with standard lever also can be modified to attach the screw controller (option). When placing an order, specify the screw controller after the Zero-Max model.



Unit [mm]

Model	A	B	C	D	E	F	G	H	J	K
E	226.5	175.5	40	108	98	6	58	19	38	50
JK	226.5	175.5	40	108	98	6	58	19	67	50
Y	225	173	40	133	126	6	32	10	65	50

* If you want to mount the handle in the reverse direction or if you want a handle that turns in the reverse direction, please consult with us.

Items Checked for Design Purposes

Overload Protection

A torque limiter is included in the E1, E2, JK1, and JK2 models to protect the main body against a large impact load. When the torque limiter is activated, a sound occurs. When you hear it, immediately stop the machine and remove the cause of the overload.
A torque limiter is not included in the Y1 and Y2 models. If an overload is applied, use overload protection equipment (torque tender).

Used Oil

The Zero-Max is filled with diesel engine oil.

* SAE viscosity: 40
* API service category: CC grade

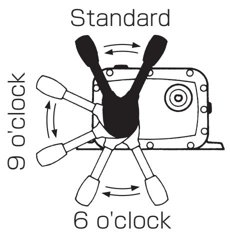
When replacing oil, be sure to use the above oil. Use of inappropriate oil may cause a failure. The fill amount is as follows.

E1/E2:	0.35ℓ	M3-E1/E2:	0.40ℓ
JK1/JK2:	0.55ℓ	M3-JK1/JK2:	0.60ℓ
Y1/Y2:	1.20ℓ	M3-Y1/Y2:	1.20ℓ

Ventilation Plug

For the E1, E2, JK1, and JK2 models of the MS model, replace the sealed oil plug with the included ventilation plug before using the device. For other models, replacement is not required.

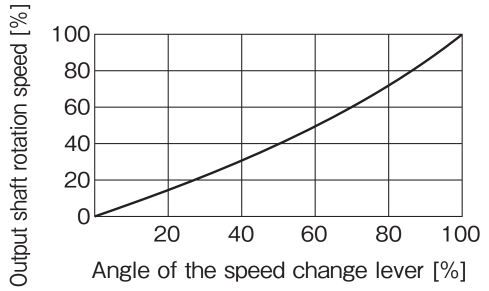
Operating Angle of the Speed Change Lever



Model	Operating angle
E1, E2, JK1, JK2, Y1, Y2	52 °

For the E and JK models, the speed change lever can be mounted in the standard, 9 o'clock, or 6 o'clock direction, and for other models, it can be mounted in any position between the standard and 6 o'clock directions.

Speed Change Lever Angle and Output Shaft Rotation Speed



The speed change lever angle is not proportional to the output shaft rotation speed. For details, refer to the item of Load Characteristics described above.

Maximum Allowable Overhang Load and Thrust Load

Model	Overhang load [N]		Thrust load [N]
	Input shaft	Output shaft	Input and output shafts
E/JK	120	120	120
Y	180	150	350

The overhang load is a value at the middle point of the entire shaft length.

If a pulley and sprocket are used in a winding manner and impact and variable loads are applied, it is recommended to make a design with the allowable overhang load value of about 70% or less.

Mount a V-pulley, etc. to the root of the output shaft and if the pulley have a boss, mount it so that the boss comes outside.

Service Factor Based on the Load Characteristics: K

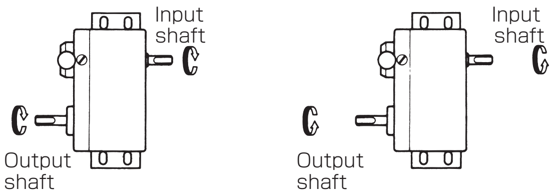
Load condition	Factor
Constant	1.0
Variable	1.5
Impact	2.0

Multiply the load torque by a factor. Select a model that result in the calculated value being less than the rated output shaft torque.

Characteristics for Negative Load

If a large negative load is applied to the Zero-Max, the one-way clutch inside may slip due to its structure, resulting in an overrun of the output shaft. If there is the possibility that a negative load is applied to the Zero-Max in the design stage, please consult with us.

Rotation Direction of the Input and Output Shafts



Counterclockwise (CCW)　Clockwise (CW)

The rotation direction of the input and output shafts is structurally limited. The rotation direction of the output shaft for each model is as follows viewed from the output shaft end.

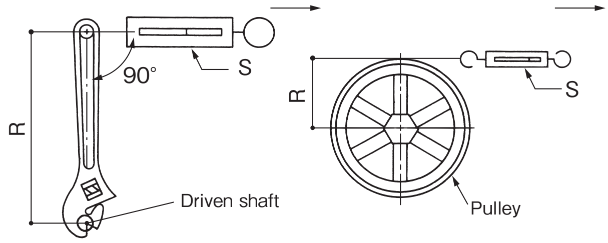
The rotation direction of the input shaft in this case must also be the same direction viewed from the output shaft end. The rotation direction of the output shaft of the Zero-Max is limited by the model and not by the rotation direction of the input shaft. Accordingly, even if the rotation direction of the input shaft is reversed, the rotation direction of the output shaft cannot be changed. If the rotation direction of the input shaft is reversed from the specified direction, the operating state of the link mechanism inside changes and the maximum rotation speed of the output shaft increases, so vibration and noise increase and the oil temperature rises, resulting in a shorter life span.

Rotation Speed of the Input and Output Shafts

The maximum rotation speed of the input shaft is 1800 min^{-1}. The minimum rotation speed cannot be specified, but a too low rotation speed is not desirable if the rotation accuracy of the output shaft is required. (600 min^{-1} or more is recommended.) The speed change range of the output shaft slightly varies depending on the model. Speed can be changed freely within this range with the speed change lever, but 8 to 100% of the maximum rotation speed of the output shaft is recommended for the continuous operating range. If less than 8% of the maximum rotation seed is used continuously, the set rotation speed may become unstable due to a change in the load torque, so there is the possibility that durability will decrease slightly.

Selection

Select the appropriate Zero-Max model based on the rated output shaft torque. The rated output shaft torque is constant across the entire rotation range of the output shaft. Select a model that will not result in the machine side load torque exceeding this value. If the machine side load torque cannot be calculated, obtain it by measurement. For the measurement, it is useful to use a torque wrench or a spring scale as shown in the figure on the left.



Read the value of S when the motion starts and calculate the torque with the following expression.

$T\,[\mathrm{N \cdot m}] = S\,[\mathrm{N}] \times R\,[\mathrm{m}]$

Multiply the load torque value calculated this way by service factor K. Use this value to select a model.

S/MS Models

Special Types

With Single-Phase Motor

For Normal-Reverse Rotation

Coaxial Direction Input and Output Shaft

DC MOTORS

SCD

SYD

DC Motor

SCD

High-performance Model with Feedback Control Capability

Rated output	0.1 kW to 3.7 kW
Power supply voltage	Single-phase, 100 or 200 V/50 Hz, 100 or 200 V/60 Hz
Speed change range	80 min^{-1} to 2500 min^{-1}

Stepless Speed Change and Stable Rotation

Speed can be changed with stable rotation steplessly across the entire range from a high rated speed of 2500 or 1750 min^{-1} to a low speed of 1/30 of the rated speed.

Safe Protection Function

A current limiting circuit and fuse prevent overload at startup and during operation and protect the motor and control board.

High Rotation Accuracy

A constant voltage circuit, load compensation circuit, and magnetic field temperature compensation circuit are installed on the control board, and the rotation accuracy is as high as ±2% against changes in the load and power supply.

Specifications

Model			SCD-100/100-E	SCD-100/200-E	SCD-200/100-E	SCD-200/200-E	SCD-400-E	SCD-750-E	SCD-1500-E	SCD-2200-E	SCD-3700-E
	Motor		SCD-100/100-E	SCD-100/200-E	SCD-200/100-E	SCD-200/200-E	SCD-400-E	SCD-750-E	SCD-1500-E	SCD-2200-E	SCD-3700-E
	Control board		SCD-100/100-Y	SCD-100/200-Y	SCD-200/100-Y	SCD-200/200-Y	SCD-400-Y	SCD-750-Y	SCD-1500-Y	SCD-2200-Y	SCD-3700-Y
Rated output [kW]			0.1	0.1	0.2	0.2	0.4	0.75	1.5	2.2	3.7
Rated torque [N·m]			0.39	0.39	0.78	0.78	1.56	2.92	8.34	12.20	20.60
Rotation range [min^{-1}]			0 ～ 2500						0 ～ 1750		
Speed change range [min^{-1}]			80 ～ 2500						60 ～ 1750		
Power supply (AC)	Voltage [V]		100	200	100	200	200	200	200	200	200
	Frequency/phase		Single phase, 50/60 Hz								
	Allowable voltage fluctuation range		±10%								
	Current*1 [A]		2.3	1.2	4.5	2.3	4.5	9.0	18	27	40
Output (DC)	Armature voltage [V]		80	160	80	160	160	160	160	160	160
	Armature current [A]		1.7	0.85	3.2	1.6	3.0	6.0	11.5	17.5	26.2
	Magnetic field voltage [V]		90	180	90	180	180	180	180	180	180
	Magnetic field current [A]		0.09	0.17	0.40	0.22	0.28	0.27	0.55	0.58	0.69
Motor type			Fully-closed C flange					Drip-proof C flange			
Rotor moment of inertia [kg·m²]			0.0010	0.0010	0.0016	0.0016	0.004	0.004	0.015	0.026	0.043
Fuse	Armature side*2	FU1 [A]	10	10	10	10	10	16	30	50	100
		FU2 [A]	10	10	10	10	10	16	30	50	100
	Magnetic field side	FU3 [A]	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0
		FU4 [A]	-	-	-	-	0.5	0.5	0.5	0.5	0.5
Control method			Constant speed control by constant voltage, IR compensation, and magnetic field temperature compensation								
Components			DC motor/control board								
Standard operating specifications			Power supply switch/speed setter								
Carbon brush	Model/number of brushes		SCD-100-BL x2				SCD-400-BL x4		SCD-1500-BL x2		
	Dimensions [mm]		6 × 8 × 20 (H × W × L)				8 × 6 × 24 (H × W × L)		10 × 25 × 35 (H × W × L)		
Control board mass [kg]			3.0				4.5		8.4		
Motor mass [kg]			13.2		17.5		23.8	24.0	43	50	63

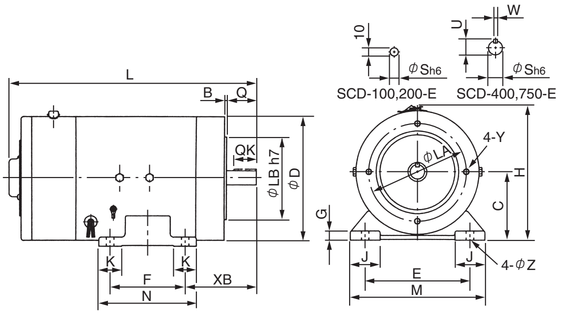
*1: For reference.
*2: Use the specified fast-blow fuse. The FU1 for models with output of 0.1 or 0.2 kW is a power supply fuse. (glass tube)
*For the specifications of motors with brake and terminal box, refer to Options.

Dimensions

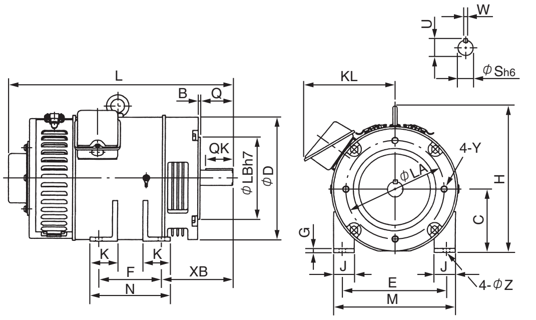
Motors

SCD-100/200/400-E (Fully-Closed Type)

SCD-750-E (Drop-Proof Type)



SCD-1500/2200/3700-E (Drip-Proof Type)

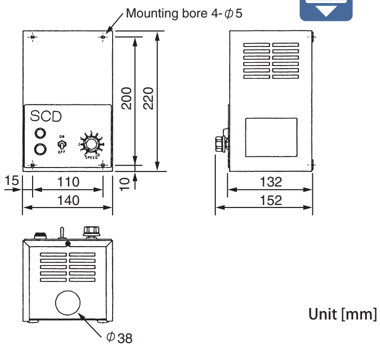


Unit [mm]

Model	SCD- 100/100 100/200 -E	SCD- 200/100 200/200 -E	SCD-400-E	SCD-750-E	SCD-1500-E	SCD-2200-E	SCD-3700-E
C	75	75	90	90	114	114	114
D	135	135	164	164	223	223	223
L	263	303	329	354	409	436	499
XB	75	75	95	95	130	130	140
M	140	140	180	180	222	222	222
N	110	110	130	130	146	210	210
E	112	112	140	140	190	190	190
F	90	90	100	100	114	178	178
J	40	40	40	40	38	38	38
K	20	20	30	30	50	50	50
G	10	10	12	12	7	7	7
H	150	150	179	179	267	267	276
Q	25	25	40	40	60	60	70
QK	20	20	30	30	50	50	50
S	11	11	19	19	28	28	28
W	-	-	5	5	7	7	7
U	-	-	21	21	31	31	31
LA	118	118	130	130	180	180	180
LB	100	100	110	110	150	150	150
Y	M6	M6	M8	M8	M12	M12	M12
KL	-	-	-	-	166	166	166
B	3	3	3	3	4	4	4
Z	7	7	10	10	12	12	12

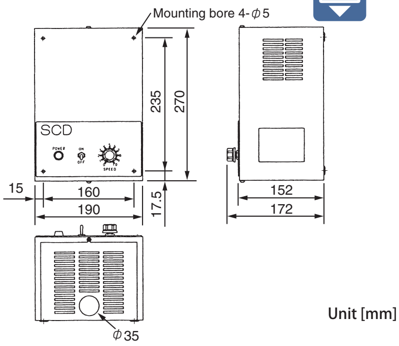
Control Boards

SCD-100/200-Y



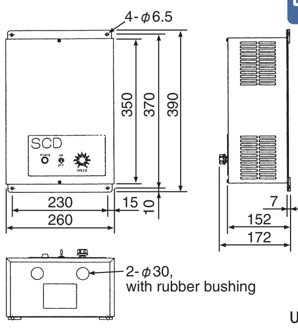
Unit [mm]

SCD-400/750-Y



Unit [mm]

SCD-1500/2200/3700-Y



Unit [mm]

How to Place an Order

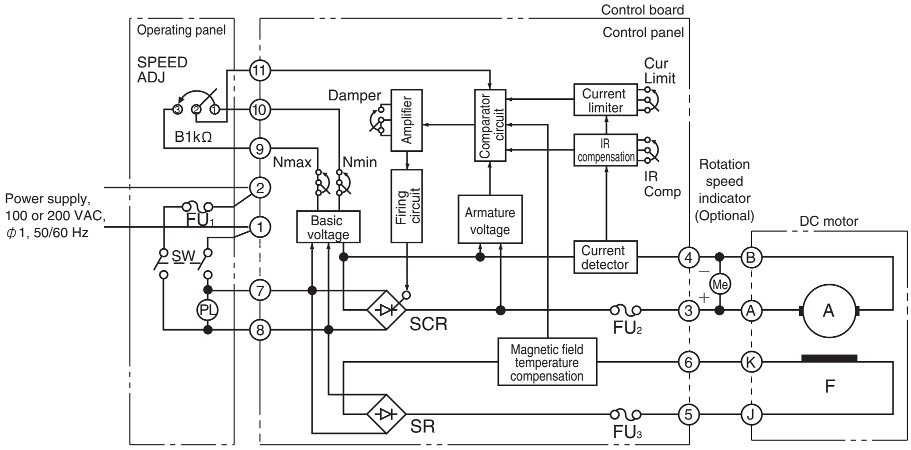
Motor SCD-100/100-E
Rated output
Input voltage

Control board SCD-100/100-Y
Rated output
Input voltage

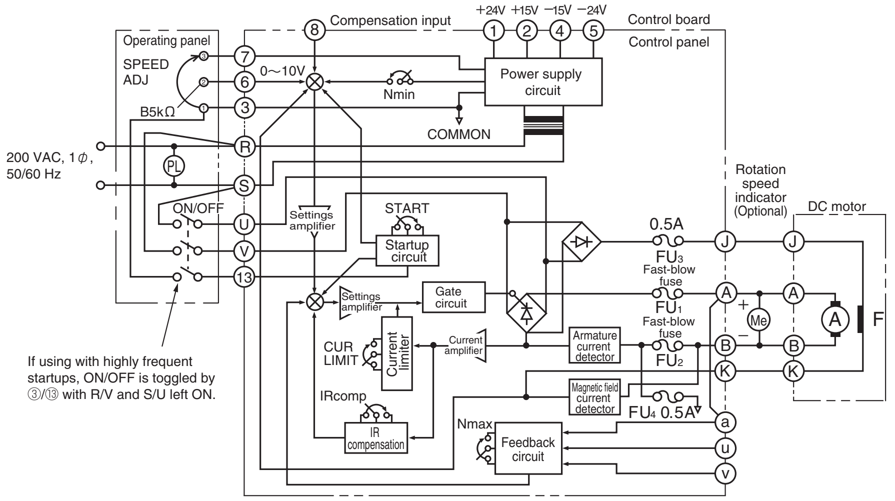
SCD Models

Connection Diagram

■ SCD-100/200-E/Y

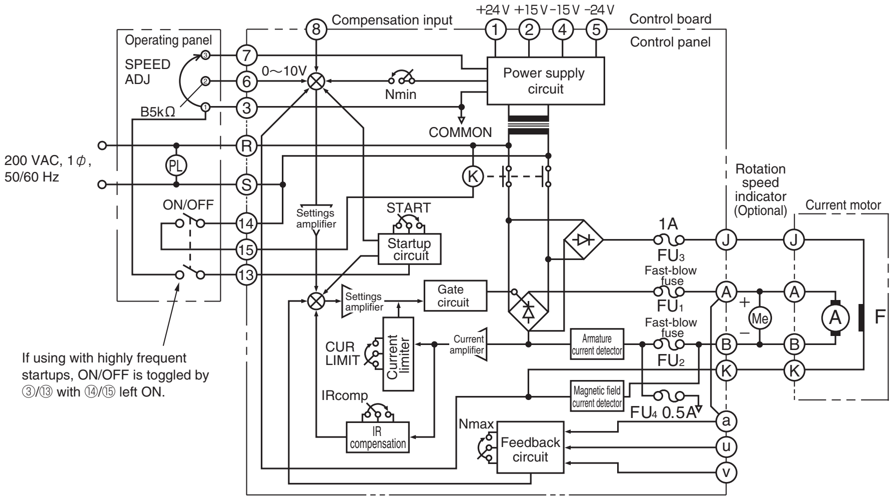


■ SCD-400/750-E/Y



If using with highly frequent startups, ON/OFF is toggled by ③/⑬ with R/V and S/U left ON.

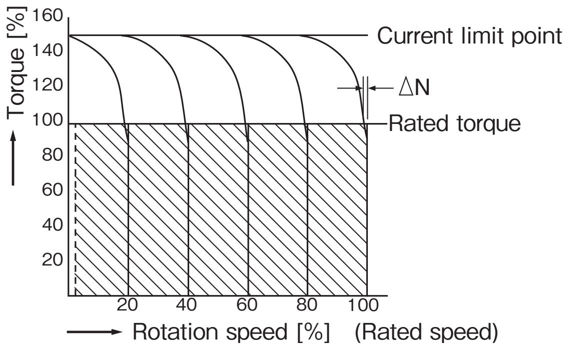
■ SCD-1500/2200/3700-E/Y



If using with highly frequent startups, ON/OFF is toggled by ③/⑬ with ⑭/⑮ left ON.

Characteristics

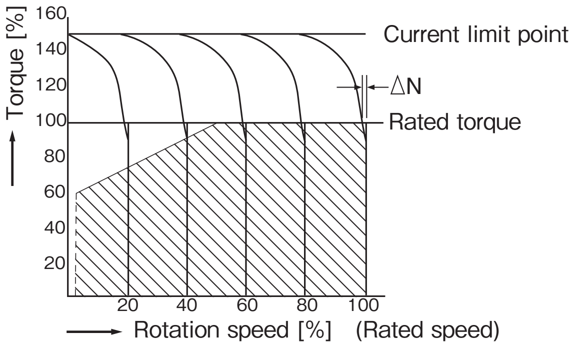
SCD-100/200/400-E/Y (Fully-Closed Type)



* The curve in the graph shows the relationship between the load and rotation speed.
Δ N shows a speed change when the load is changed from 0 to 100%.
The speed under 150% load is 0.

* The shaded area shows the continuous operating range. Continuous operation is possible within the speed change range with 100% torque (rated torque).

SCD-750/1500/2200/3700-E/Y (Drip-Proof Type)



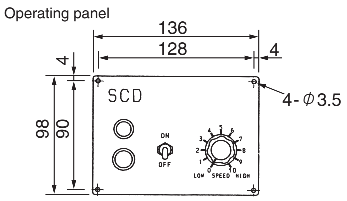
* The curve in the graph shows the relationship between the load and rotation speed.
Δ N shows a speed change when the load is changed from 0 to 100%.
The speed under 150% load is 0.

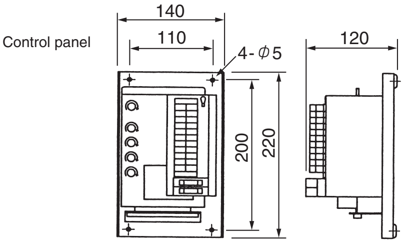
* The shaded area shows the continuous operating range. The torque is limited at low speeds as shown in the figure. However, operation with 100% torque (rated torque) is possible over a short period of time.

Panel Type Control Board

The control board can be used as a panel type by removing its cover.

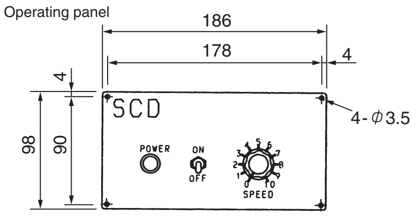
SCD-100/200-Y

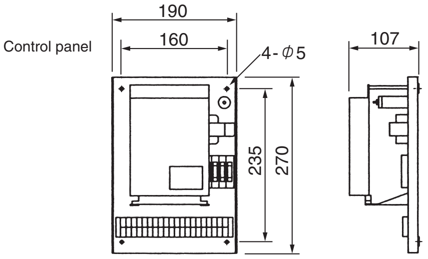




Unit [mm]

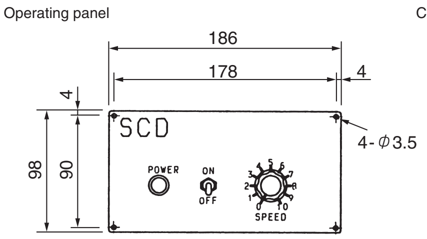
SCD-400/750-Y

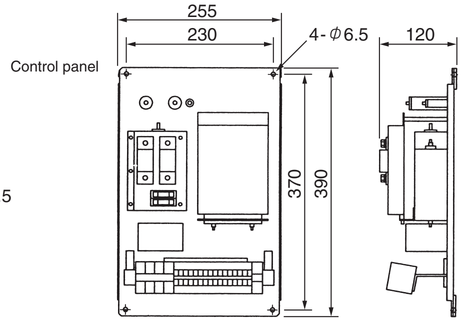




Unit [mm]

SCD-1500/2200/3700-Y





Unit [mm]

DC Motor

SYD

Low-cost Model Limited to the Speed Control Function

Rated output	0.1 kW to 1.5 kW
Power supply voltage	Single-phase, 100 or 200 V/50 Hz, 100 or 200 V/60 Hz
Speed change range	125 min^{-1} to 2500 min^{-1}

Stepless Speed Change and Stable Rotation

Speed can be changed with stable rotation steplessly across the entire range from a high rated speed of 2500 min^{-1} to a low speed of 1/20 of the rated speed.

Safe Protection Function

A current limiting circuit and fuse prevent overload at startup and during operation and protect the motor and control board.

High Rotation Accuracy

A constant voltage circuit, load compensation circuit, and magnetic field temperature compensation circuit are installed on the control board, and the rotation accuracy is as high as ±2% against changes in the load and power supply.

Specifications

Model	Motor	SYD-100/100-E	SYD-100/200-E	SYD-200/100-E	SYD-200/200-E	SYD-400-E	SYD-750-E	SYD-1500-E
	Control board	SYD-100/100-□	SYD-100/200-□	SYD-200/100-□	SYD-200/200-□	SYD-400-□	SYD-750-□	SYD-1500-□
Rated output [kW]		0.1	0.1	0.2	0.2	0.4	0.75	1.5
Rated torque [N·m]		0.39	0.39	0.78	0.78	1.56	2.92	5.84
Rotation range [min^{-1}]		0～2500						
Speed change range [min^{-1}]		125～2500						
Power supply (AC)	Voltage [V]	100	200	100	200	200	200	200
	Frequency/phase	Single phase, 50/60 Hz						
	Allowable voltage fluctuation range	±10%						
	Current*1 [A]	2.3	1.2	4.5	2.3	4.5	9.0	18.0
Output (DC)	Armature voltage [V]	80	160	80	160	160	160	160
	Armature current [A]	1.7	0.85	3.2	1.6	3.0	6.0	11.5
	Magnetic field voltage [V]	85	175	85	175	175	175	175
	Magnetic field current [A]	0.09	0.14	0.09	0.17	0.23	0.27	0.38
Motor type		Fully-closed C flange				Drip-proof C flange		
Rotor moment of inertia [kg·m^2]		0.0010	0.0010	0.0016	0.0016	0.0016	0.004	0.007
Fuse	Armature side*2 FU1 [A]	10					16	20
	Magnetic field side FU2 [A]	0.5 (glass tube)						
Control method		Constant speed control by constant voltage, IR compensation, and magnetic field temperature compensation						
Components		DC motor/control board						
Standard operating specifications		Power supply switch/speed setter						
Carbon brush	Model/number of brushes	SCD-100-BL x2				SYD-400-BL x2	SCD-400-BL x4	
	Dimensions [mm]	6×8×20 (H×W×L)				8×6×24 (H×W×L)	8×6×24 (H×W×L)	
Control board mass [kg]		1.6					1.7	3.8
Motor mass [kg]		10.5		13.2		16.5	24.0	36.0

*1: Reference value.

*2: Use the specified fast-blow fuse.

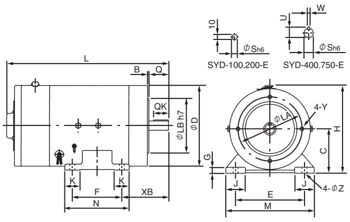
* For the specifications of motors with brake and terminal box, refer to Options.

Dimensions

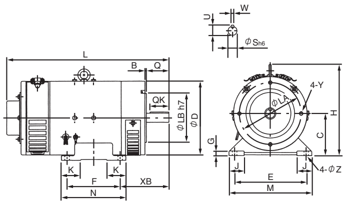
Motors

SYD-100/200-E (Fully-Closed Type)

SYD-400/750-E (Drip-Proof Type)



SYD-1500-E (Drip-Proof Type)

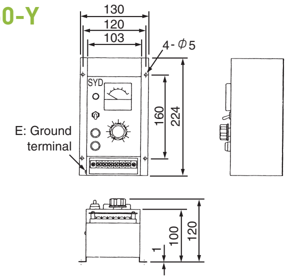


Unit [mm]

Model	SYD- 100/100 100/200 -E	SYD- 200/100 200/200 -E	SYD-400-E	SYD-750-E	SYD-1500-E
C	75	75	75	90	112
D	135	135	135	164	196
L	230	263	303	354	429
XB	60	75	75	95	130
M	140	140	140	180	220
N	110	110	110	130	170
E	112	112	112	140	190
F	90	90	90	100	140
J	30	30	30	40	40
K	20	20	20	30	50
G	10	10	10	12	12
H	150	150	150	179	243
Q	25	25	25	40	60
QK	20	20	20	30	50
S	11	11	14	19	24
W	–	–	5	5	7
U	–	–	16	21	27
LA	118	118	118	130	165
LB	100	100	100	110	130
Y	M6	M6	M6	M8	M10
B	3	3	3	3	4
Z	7	7	7	10	12

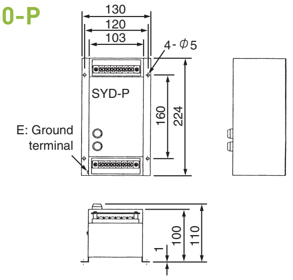
Control Boards

SYD-100 to 750-Y



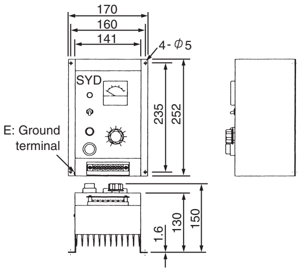
Unit [mm]

SYD-100 to 750-P



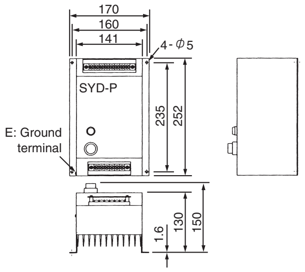
Unit [mm]

SYD-1500-Y



Unit [mm]

SYD-1500-P



Unit [mm]

How to Place an Order

Motor SYD-100/100-E
Rated output
Input voltage

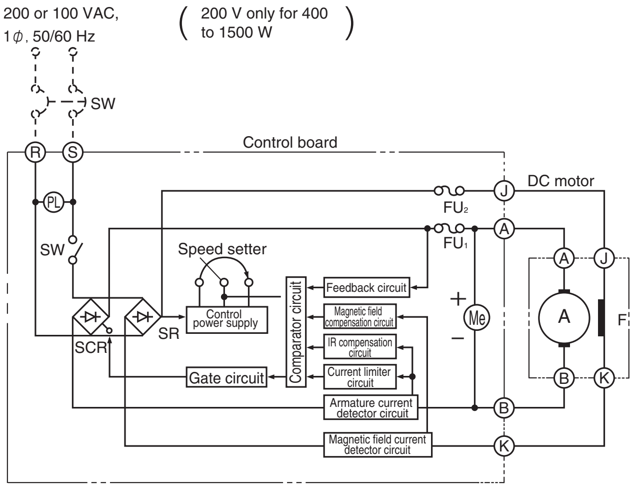
Control board SYD-100/100-Y
Rated output
Type Y-type: Y; P-type: P
Input voltage

SYD Models

Connection Diagram

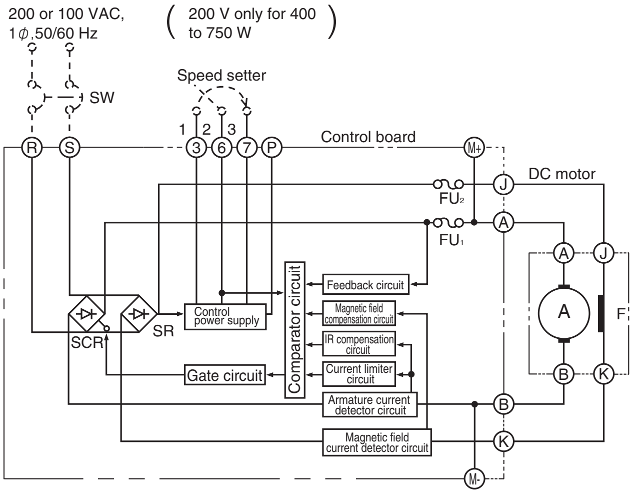
Connection between motor and Y-type control board

SYD-100 to 1500-E/Y

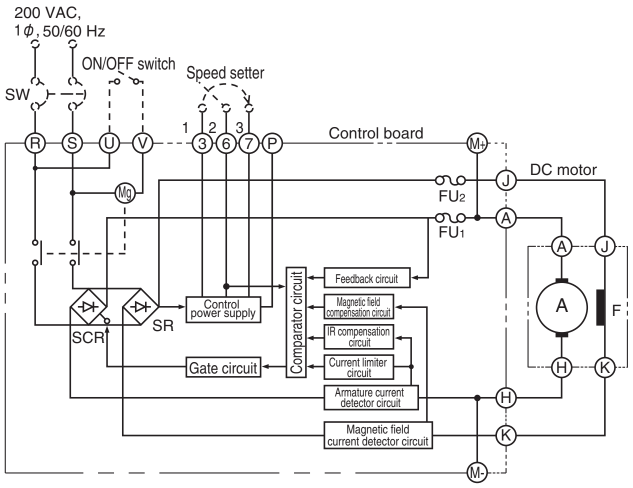


Connection between motor and P-type control board

SYD-100 to 750-E/P



SYD-1500-E/P



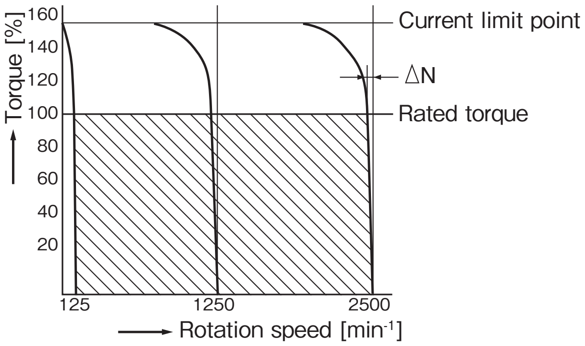
* Use the specified voltage (displayed on the name plate) for the input power supply.

* The rotation direction in the above connection is counterclockwise viewed from the output shaft. If you need the clockwise direction, change A and B (H).

Characteristics

The following figures show the characteristics and continuous operating range of DC motors.

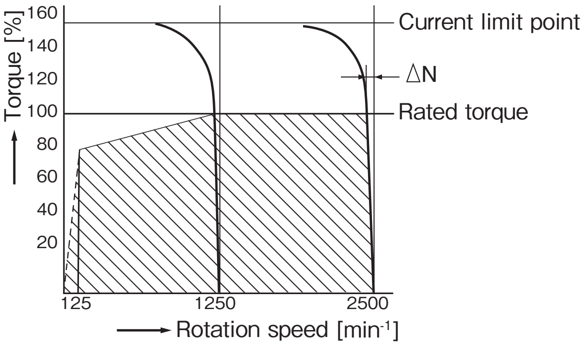
■ SYD-100/200-E/Y (Fully-Closed Type)



* The curve in the graph shows the relationship between the load and rotation speed.
Δ N shows a speed change when the load is changed from 0 to 100%. The speed under 150% load is 0.

* The shaded area shows the continuous operating range. Continuous operation is possible within the speed change range with 100% torque (rated torque).

■ SYD-400/750/1500-E/Y (Drip-Proof Type)



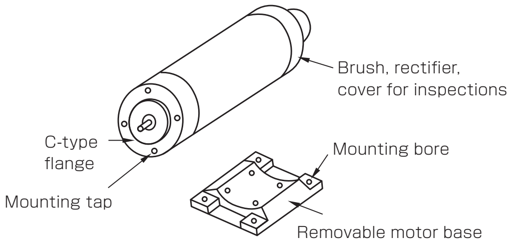
* The curve in the graph shows the relationship between the load and rotation speed.
Δ N shows a speed change when the load is changed from 0 to 100%.
The speed under 150% load is 0.

* The shaded area shows the continuous operating range. The torque is limited at low speeds as shown in the figure. However, operation with 100% torque (rated torque) is possible over a short period of time.

SCD/SYD Models

Items Checked for Design Purposes

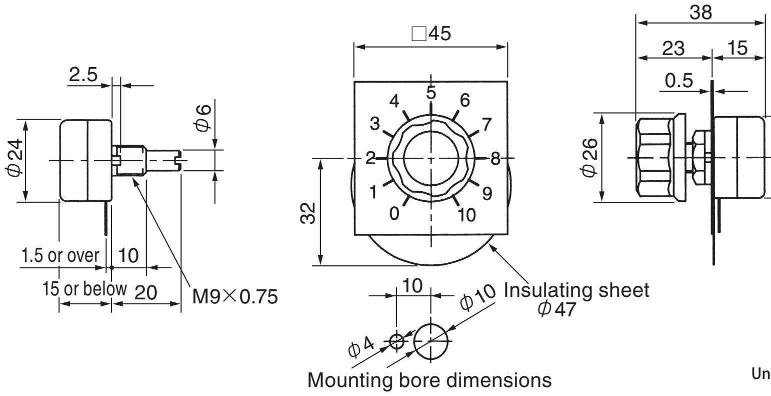
1. Temperature rise: Motors of up to 750 W have Class B insulation and motors of 1.5 kW or more have Class F insulation. Accordingly, the temperature rise limit of the armature winding is 90℃ and 110℃ . If the load is appropriate, the temperature of the outer frame is usually about 15℃ to 25℃ lower than the temperature of the winding. Therefore, it is so hot that you cannot touch it for a long time. However, you may continue operation if the temperature does not exceed the above value.
2. Rotation direction: The rotation can be changed freely in any direction (left or right) by changing the voltage direction of the armature while keeping constant the direction of the magnetic field current.
3. Grounding: Be sure to ground the motor frame and the chassis of the control board. Note that if an isolation transformer is not used on the AC input side, do not ground any part of the AC, DC, and control circuits except for the motor frame and the chassis.
4. Motor mounting direction: The motor can be mounted vertically in any direction (upward and downward). However, excessive thrust may be applied to the bearing depending on the load.
5. Flange mounting: The base of motors of 100 to 750 W is removable. When the base is removed, the motor can be mounted with a C-type flange (defined by the NEMA standards) on the output shaft end face.



Options

<Common to SCD and SYD>

Speed Setter VR Set
(Included in SYD-P)



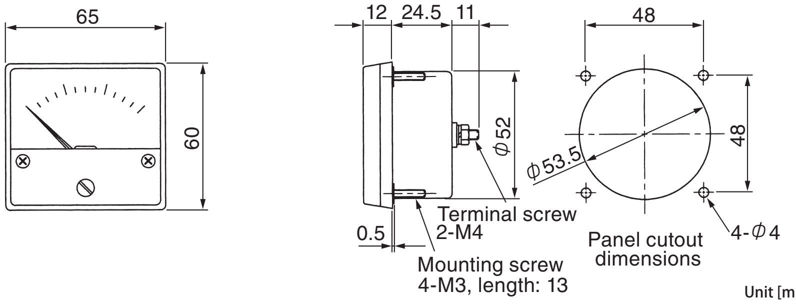
Unit [mm]

Model	For the VR set 24 (B5K-OHM)
Resistance	5 kΩ
Characteristics	B

Model	For the VR set 24 (B1K-OHM)
Resistance	1 kΩ
Characteristics	B

* The resistance for SCD models with 100/200-W output is 1 kΩ .

Rotation Speed Indicator RD-6V

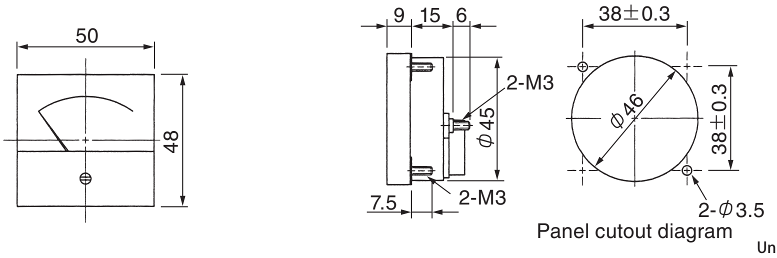


Unit [mm]

Detection voltage		FS voltage
Armature	Power supply 100 V	100 VDC
	Power supply 200 V	200 VDC

1. For the armature, connect the positive side to terminal A and the negative side to terminal B (H). (SCD)
2. For the control board, connect to M+ and M- terminals of the P-type control board. (SYD)

Rotation Speed Indicator KS-5-5
SY series standard rotation speed indicator

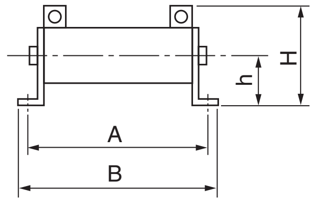


Unit [mm]

Detection voltage		FS voltage
Armature	Power supply 100 V	100 VDC
	Power supply 200 V	200 VDC

1. Connect to M+ and M- terminals of the P-type control board.
2. Not applicable to the EF type.

Vitreous Enamel Resistor for Dynamic Braking



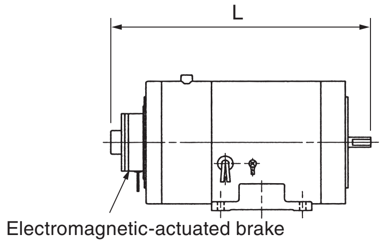
* Braking capacity if the braking current at the rated speed is 150%.

Applied motor	Standard braking		Braking resistor dimensions [mm]			
	Resistance [Ω]	Capacity [W]	A	B	H	h
SCD･SYD-100/100-E	50	50	114	140	51	26
SCD･SYD-100/200-E	50	50	114	140	51	26
SCD･SYD-200/100-E	50	50	114	140	51	26
SCD･SYD-200/200-E	50	50	114	140	51	26
SCD･SYD-400-E	20	100	179	205	54	26
SCD･SYD-750-E	20	100	179	205	54	26
SCD･SYD-1500-E	8	500	347	383	96	50
SCD-2200-E	6	800	387	417	88	38
SCD-3700-E	4	1000	347	383	96	50

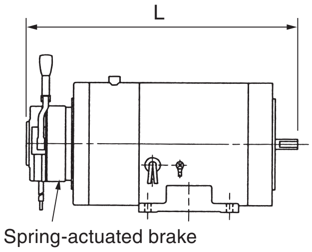
* The values of the SCD-2200-E and 3700-E are combined resistance values. Please contact us for details.

Motors with Electromagnetic Brake, EA/EC

An electromagnetic brake can be mounted on the opposite side of the output shaft. There are two types of brakes: electromagnetic-actuated type (EA type, where the brake is activated when it is energized) and spring-actuated type (EC type, where the brake is released when it is energized).



EA type



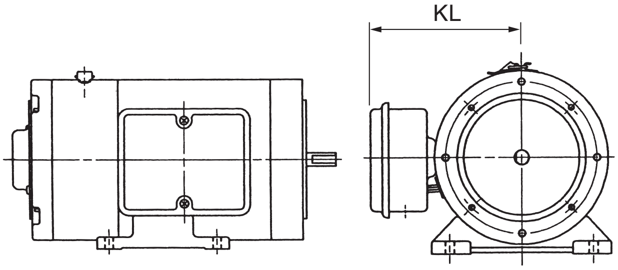
EC type

Motor output [kW]	Electromagnetic-actuated brake model	Exciting voltage [DC.V]	L-dimension extension [mm]	Spring-actuated brake model	Exciting voltage [DC.V]	L-dimension extension [mm]
0.1	111-06-11G 24V 15JIS	24	22	438-06-16 24V 11JIS	24	36
0.2	111-06-11G 24V 15JIS		22	438-06-16 24V 11JIS		36
0.4	111-06-11G 24V 15JIS		22	438-06-16 24V 11JIS		36
0.75	111-06-11G 24V 15JIS		22	458-08-16 24V 11JIS		42
1.5	111-10-12G 24V 20JIS		8	458-10-16 24V 20JIS		25
2.2	111-10-12G 24V 20JIS		8	458-12-16 24V 20JIS		36
3.7	111-12-12G 24V 20JIS		8	458-12-16 24V 20JIS		36

* To modify the standard DC motor to attach a brake, attachments are required in addition to the above brake. Please consult with us for details.

Motor with Terminal Box, EH

A terminal box can be mounted to motors of 0.1 to 1.5 kW.

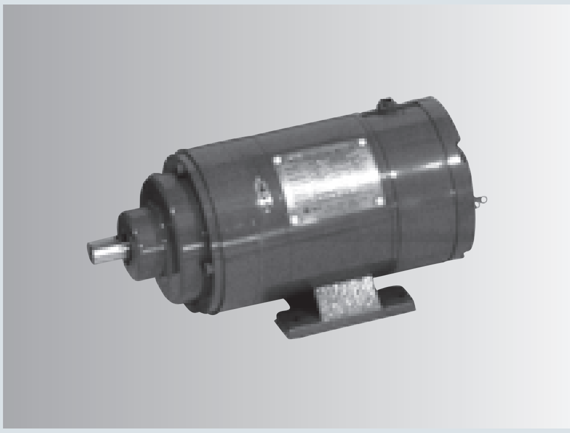


Motor output [kW]	KL dimension [mm]	
	SCD	SYD
0.1	117	117
0.2	117	117
0.4	132	117
0.75	132	132
1.5	–	148

* Comes as standard with SCD models with the output of 1.5 kW or more

DC Motors

Made to Order



SCG/SYG

With Coaxial Speed Reducer (Base Mounting)

SCG	Speed reduction ratio
100/100 100/200	5, 10, 25, 50, 100
200/100 200/200	5, 10, 25, 50
400	5, 10, 20, 30
750	5, 10, 20, 30
1500	10, 20, 30
2200	10, 20, 30
3700	10, 20, 30

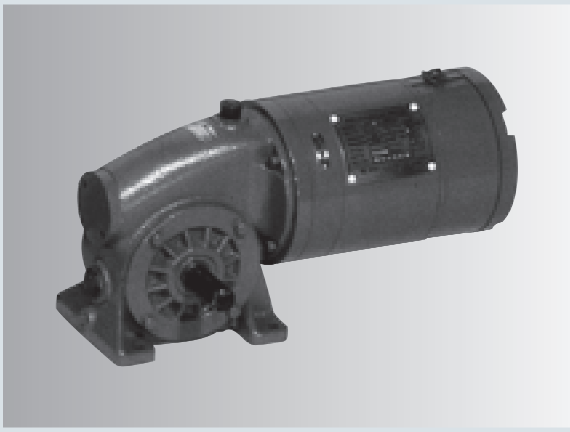
SYG	Speed reduction ratio
100/100 100/200	5, 10, 25, 50, 100
200/100 200/200	5, 10, 25, 50
400	5, 10, 30, 50
750	5, 10, 30, 50

SCE/SYE

With Coaxial Speed Reducer (Flange Mounting)

SCE	Speed reduction ratio
100/100 100/200	5, 10, 25, 50, 100
200/100 200/200	5, 10, 25, 50
400	5, 10, 20, 30
750	5, 10, 20, 30
1500	10, 20, 30
2200	10, 20, 30
3700	10, 20, 30

SYE	Speed reduction ratio
100/100 100/200	5, 10, 25, 50, 100
200/100 200/200	5, 10, 25, 50
400	5, 10, 30, 50
750	5, 10, 30, 50



SCW/SYW

With Worm Speed Reducer (Base Mounting)

SCW	Speed reduction ratio
100/100 100/200	10, 20, 30, 40, 50, 60
200/100 200/200	10, 20, 30, 40, 50, 60
400	10, 20, 30, 40, 50, 60
750	10, 20, 30, 40
1500	10, 20, 30, 40
2200	10, 20, 30, 40
3700	10, 20, 30, 40

SYW	Speed reduction ratio
100/100 100/200	10, 20, 30, 40, 50, 60
200/100 200/200	10, 20, 30, 40, 50, 60
400	10, 20, 30, 40, 50, 60
750	10, 20, 30, 40, 50, 60

* If you have questions about the dimensions and specifications, please consult with us.

ROTATION SPEED INDICATORS

SD

Index Handle

SD

Indication of the Number of Handle Turns

Top Priority Is Given to Readability

An easy-to-read scale is provided to allow the user to read the number of handle turns at a glance.

Weight Type

A bearing is installed to move the needle smoothly.
A wide variety of rotation ratios and handle diameters are available.

Differential Type

Moveable scale dial can be freely mounted in any direction.
The scale can be written freely. (This applies to the type where there is not a scale)

Specifications

Weight Type

Model	Structure	Number of needles	Rotation ratio	Mass [kg]
SD-28A	Weight Type	1	1/4	0.06
SD-28B	Weight Type	2	1/4	0.06
SD-38A	Weight Type	1	1/4, 1/9	0.10
SD-38B	Weight Type	2	1/4, 1/9	0.10
SD-53A	Weight Type	1	1/4, 1/5, 1/6, 1/9, 1/12, 1/16, 1/25	0.075
SD-53B	Weight Type	2	1/4, 1/5, 1/6, 1/9, 1/12, 1/16, 1/25	0.075
SD-75A	Weight Type	1	1/4, 1/5, 1/6, 1/9, 1/12, 1/16, 1/25, 1/36, 1/40, 1/49, 1/64	0.135
SD-75B	Weight Type	2	1/4, 1/5, 1/6, 1/9, 1/12, 1/16, 1/25, 1/36, 1/40, 1/49, 1/64	0.135

* The scale dial is available for all types with clockwise (R type) or counterclockwise (L type) direction.
* Weight type: Turning the handle (case) moves the needle in the same direction as the turning direction of the handle.

How to Place an Order

Weight type

SD-28A-4R

Size
Number of needles
A: 1 needle
B: 2 needles
Rotation ratio
Scale direction
R: Clockwise direction (the scale increments in the clockwise direction)
L: Counterclockwise direction (the scale increments in the counterclockwise direction)

With handle (for SD-53 and SD-75 only)

SD-53A-66-10-4R

Size
Number of needles
A: 1 needle
B: 2 needles
Handle's external diameter
Mounting bore diameter (Dimension D)
Rotation ratio
Scale direction
R: Clockwise direction (the scale increments in the clockwise direction)
L: Counterclockwise direction (the scale increments in the counterclockwise direction)

Handle's External Diameter

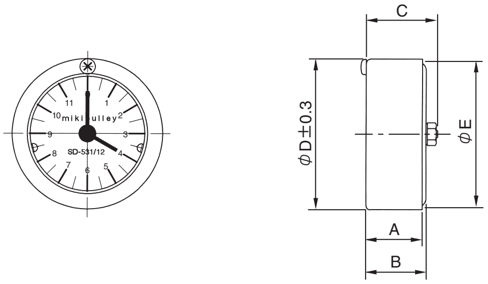
Model	Handle's external diameter
SD-53	66, 80, 140
SD-75	125, 160, 180, 250

Dimensions

Stand-alone Weight Type

SD-53☐-☐☐

SD-75☐-☐☐

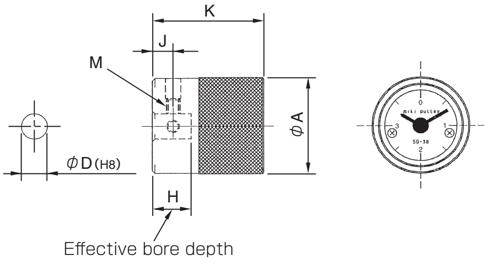


Unit [mm]

Model	A	B	C	D	E	Mass [kg]
SD-53☐-☐☐	20	21.5	25	53.9	52.2	0.075
SD-75☐-☐☐	18	22	25	75.3	73.5	0.135

SD-28☐-☐☐

SD-38☐-☐☐



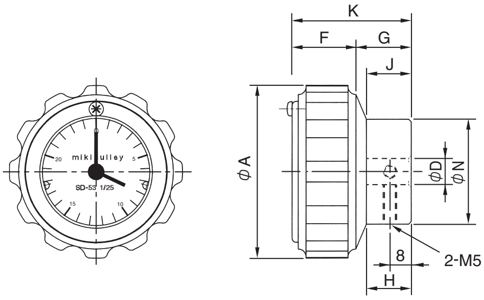
Unit [mm]

Model	A	H	K	J	M	D	Mass [kg]
SD-28☐-☐☐	28	12	40	7	2-M6	10	0.06
SD-38☐-☐☐	38	15	43	8	2-M5	10	0.10

* The knurled pattern is straight for SD-28 and criss-cross for SD-38.

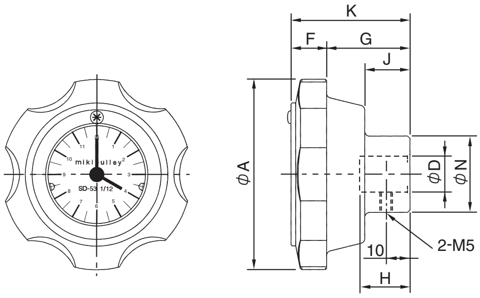
Weight Type in Combination with Handle

SD-53☐-66-☐-☐☐



SD-53☐-80-☐-☐☐

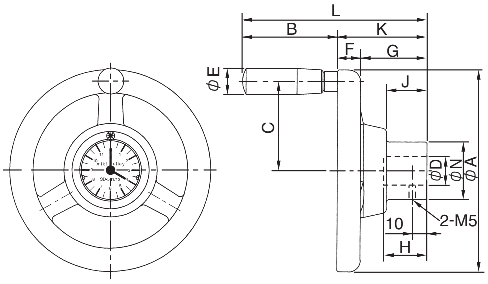
SD-75☐-125-☐-☐☐



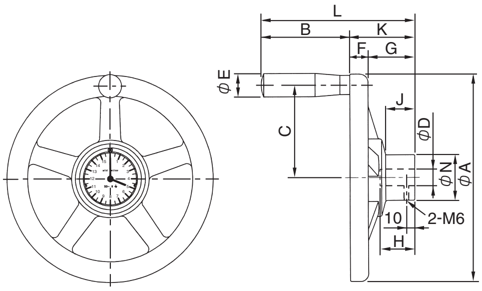
SD-53☐-140-☐-☐☐

SD-75☐-160-☐-☐☐

SD-75☐-180-☐-☐☐



SD-75☐-250-☐-☐☐



* The handle is made of cast aluminum.
* The color of the handle is silver.

Unit [mm]

Model	A	B	C	E	F	G	H	J	K	L	N	D		Mass [kg]
												Std. bore diameter	Max. bore diameter	
SD-53☐- 66 -☐-☐☐	66	–	–	–	24.5	21	17	17	45.5	–	40	10	28	0.22
SD-53☐- 80 -☐-☐☐	80	–	–	–	15	35	21	19	50	–	32	15	20	0.28
SD-53☐-140 -☐-☐☐	140	66	62	18	16	46	30	28	62	128	40	20	28	0.60
SD-75☐-125 -☐-☐☐	125	–	–	–	20	40	30	25	60	–	40	20	28	0.64
SD-75☐-160 -☐-☐☐	160	66	71	18	16	47	30	33	63	129	40	20	28	0.87
SD-75☐-180 -☐-☐☐	180	85	80	22	17	51	35	31	68	153	40	20	28	1.07
SD-75☐-250 -☐-☐☐	250	107	112	28	22	56	42	35	78	185	55	20	35	2.03

* The tolerance for the handle bore diameter is H8.

SD Models

Specifications

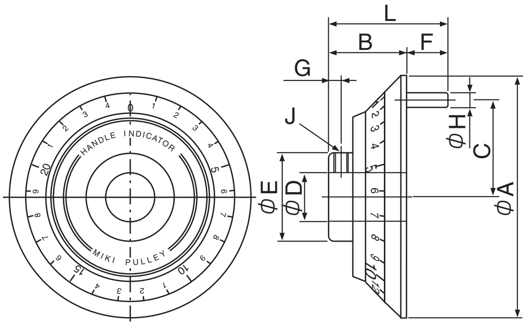
Differential Type

Model	Structure	Number of needles	Rotation ratio	Mass [kg]
SD-50	Differential Type	–	1/20	0.06
SD-100	Differential Type	–	1/25, 1/50	0.27

* There is a type with no scale on the dial (N type) only for SD-50 and SD-100.
* Differential type: Turning the main moving plate (handle) moves the dial in the same direction as the turning direction of the main moving plate.

Dimensions

Differential Type



Unit [mm]

Model	A	B	C	D	E	F	G	H	J	L	Mass [kg]
SD-50-□□	50	23	20	12	22	5	4	5	M4	28	0.06
SD-100-□□	100	32	40	20	36	17	5	6	M6	49	0.27

How to Place an Order

Differential Type

SD-50-20R

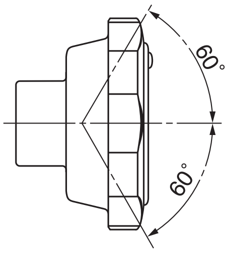
Size
Rotation ratio

Scale direction
R: Clockwise direction (the scale increments in the clockwise direction)
L: Counterclockwise direction (the scale increments in the counterclockwise direction)
N: No scale

Items Checked for Design Purposes

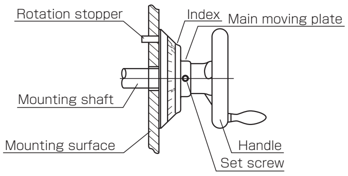
Weight Type (SD-28/38/53/75)

1. Turning the handle (case) turns the needle in the same direction as the turning direction of the handle.
2. The operating temperature range is from -20° C to 60° C. However, the inside surface of the acrylic plate may fog up due to a temperate difference, which makes it difficult to see inside.
3. Do not use the device in a place exposed to water or dust.
4. If you use the device in a place with vibration, the needle and scale may swing depending on the operating condition.
5. If you make a handle for the stand-alone type, please refer to the following recommended bore diameters of the handle.
   SD-53: $\phi 54.3^{+0.10}_{0}$
   SD-75: $\phi 75.7^{+0.10}_{0}$
6. Please note that the mounting angle of the weight type is limited to the range shown in the figure below due to its structure.



Differential Type (SD-50/100)

1. Turning the main moving plate moves the scale dial in the same direction as the turning direction of the main moving plate.
2. The operating ambient temperature range is from -20° C to 60° C.
3. You cannot use the device in a place exposed to boiling water or steam.
4. If you must use the device in a place exposed to water or dust, please consult with us. If you use the device in a place with vibration, the dial may swing depending on the operating condition.
5. If turning of the main moving plate is too fast, noise or other problems may occur.
6. There is no handle holding mechanism.
7. There is no zero-adjustment function. Perform zero adjustment and then fix the zero position when mounting the device.
8. Make sure a load is not applied in the thrust direction when mounting the device. A malfunction may occur.
9. A large swing of the mounting surface against the shaft may cause a malfunction. (For details, refer to the instruction manual)
10. The bore size for the rotation stopper on the mounting surface is such that the rotation stopper moves to some degree.

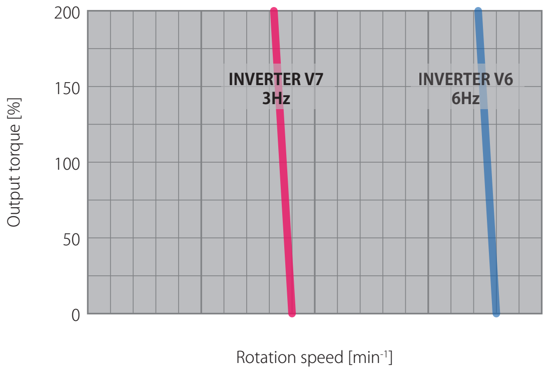


V7 INVERTER

Compact and Powerful

Featuring the one of the fastest available CPUs, the new V7 inverters offer twice the calculating power of the current V6 models, giving them outstanding performance in this class of inverters. Miki Pulley's original dynamic torque vector control system is also used to ensure stable operation at low speeds. These models also retain the ease of use typical of the rest of the series, and are fully compatible with respect to external dimensions, installation dimensions, number and location of terminals, etc. In response to popular demand, they also include an RS-485 communications port. These are compact yet powerful, fully featured inverters.

Dynamic torque vector control


Low frequencies characteristics

Uses dynamic torque vector control

Stable torque at low speeds makes these models ideal for a wide range of conveying machines and other high inertia applications that require a high initial torque.

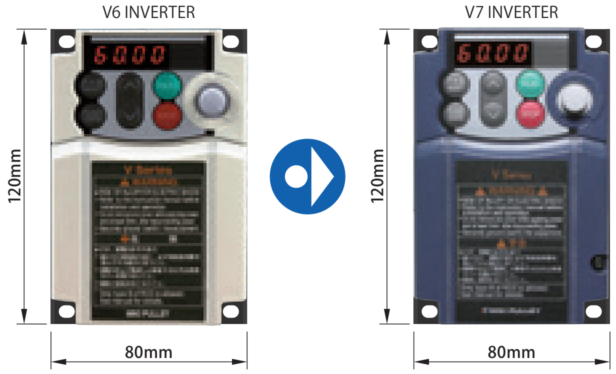
Slip compensation control for short stabilization times

Slip compensation control and voltage tuning provide improved speed control accuracy at low speeds.
The creep speed is also stable for improved stopping precision in applications such as conveying machines.

One of the fastest CPUs in its class

Calculation speeds doubled. Helps to ensure stable control.

Designed to assure backward-compatibility



Size compatibility
Installation compatibility
Terminal number compatibility
Terminal location compatibility
Function code No. compatibility
Common RS-485 communications protocols

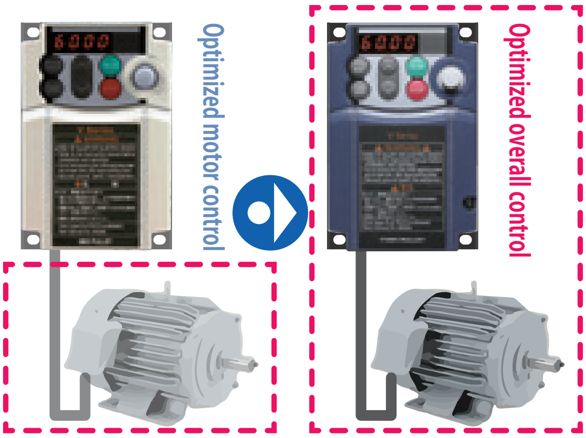
Retained ease of operation

Retains the operability of the V6 series. Frequency volume provided.

Improvement of maintenance

Fault simulation function	Select this function to generate simulated alarms.
Startup count	Enables you to count the total number of startups/shutdowns.
Total motor operation time	Allows you to monitor the motor operation time.
Cumulative power	Set this function to measure total power consumption.
Trip history	Save and display up to 4 past trips.

Energy saving measures



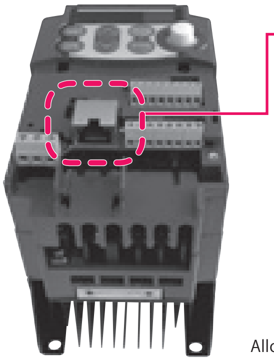
PID control function

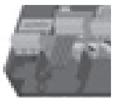
The operating temperature, pressure and flow rates can be controlled without external regulators such as temperature controllers.

Cooling fan ON/OFF control function

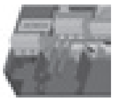
The inverter cooling fan can be stopped while the fan and pump are inoperative, reducing noise and saving energy.

RS-485 communications port as standard...





Bare wire sample
Suitable wire sizes
AWG26-AWG20



Example of twin terminal use
Suitable wire sizes for twin rod terminals
AWG20

Allows multiple wire connections
to one terminal as a normal screw terminal.

Compatible with user applications

V/F (3-step polygonal lines)
Dual motor switching (switching control for 2 motors)
Brake signals (brake release signal)
Rotation direction restrictor (prevents normal/reverse rotation)

Global compatibility

EC directives (CE markings)
UL and Canadian standards (c-UL certification)

V7 Model

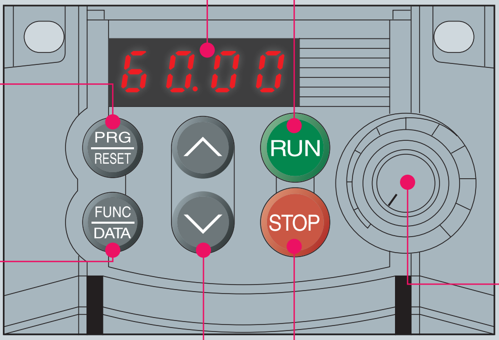
Specifications

	Type	V7-01-4	V7-02-4	V7-04-4	V7-07-4	V7-15-4	V7-22-4	V7-37-4
Output rating	Standard applied motor output [kW]	0.1	0.2	0.4	0.75	1.5	2.2	3.7
	Rated capacity [kVA]	0.3	0.57	1.1	1.9	3.0	4.2	6.5
	Voltage [V]	Three-phase, 200 to 240 V (with AVR function)						
	Rated current [A]	0.8 (0.7)	1.5 (1.4)	3.0 (2.5)	5.0 (4.2)	8.0 (7.0)	11.0 (10.0)	17.0 (16.5)
	Rated overload current	150%-1 min or 200%-0.5 s of the rated output current						
	Rated frequency [Hz]	50・60						
Input voltage	Number of phases, voltage, frequency	Three-phase, 200 to 240 V, 50/60 Hz						
	Allowable variations of voltage and frequency	Voltage: +10 to -15% (unbalance between phases: within 2% (∗ 10)) Frequency: +5 to -5%						
	Rated input current (with DCR) [A]	0.57	0.93	1.6	3.0	5.7	8.3	14.0
	Rated input current (without DCR) [A]	1.1	1.8	3.1	5.3	9.5	13.2	22.2
	Required power supply capacity [kVA]	0.2	0.3	0.6	1.1	2.0	2.9	4.9
Braking	Braking torque [%]	150	150	100	100	50	30	30
	DC braking	Braking start frequency: 0.0 to 60.0 Hz, braking time: 0.0 to 30.0 s, braking level: 0 to 100%						
	Braking transistor	—		Built-in				
Structure/ Methods	Applicable safety standard	UL508C IEC 61800-5-1:2007						
	Protection structure (IEC60529)	IP20 enclosure UL open type						
	Cooling method	Self-cooling				Fan cooling		
Environment	Operating atmosphere	Indoor with no exposure to corrosive gases, dust, oil mist (pollution degree 2 (IEC 60664-1:2007)) or direct sunlight						
	Ambient temperature [℃]	Open -10 to 50						
	Ambient humidity	5 to 95%RH						
	Altitude	1,000 m or below: No power reduction; 1001 to 1500 m: 0.97, 1501 to 2000 m: 0.95; 2001 to 2500 m: 0.91; 2501 to 3000 m: 0.88						
	Vibration	3 mm: 2 to 9 Hz or less; 9.8 m/s^2: 9 to 20 Hz or less; 2 m/s^2: 20 to 55 Hz or less; 1 m/s^2: 55 to 200 Hz or less						
	Storage temperature [℃]	-25 to 70						
	Storage humidity	5 to 95%RH						
	Mass [kg]	0.6	0.6	0.7	0.8	1.7	1.7	2.5

* The rated output current shown is for a carrier frequency (function code F26) set to 3 kHz or less. Use the current shown in parentheses or less if the carrier frequency is set to 4 kHz or more or if the operating ambient temperature is more than 40℃.

LED monitor
Displays the speed monitor (output frequency), etc.

RUN key
Used to start operation.



Program (PRG) key/Reset (RESET) key
Used to toggle between modes and reset a tripped stop state in Alarm mode

Function (FUNC) key/Data toggle (DATA) key
Used to toggle the LED monitor display and confirm entered function codes, etc.

Volume knob
Used to set the frequency and other settings

Up/Down keys
Used to increase and decrease the frequency and speed settings

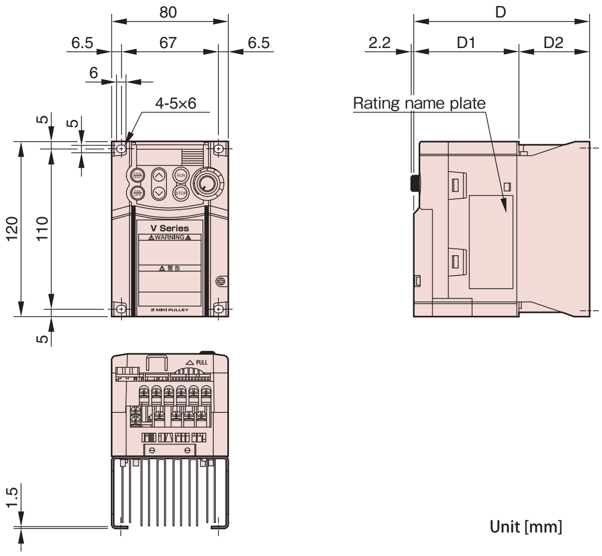
STOP key
Used to stop operation.

How to Place an Order

V7-01-4

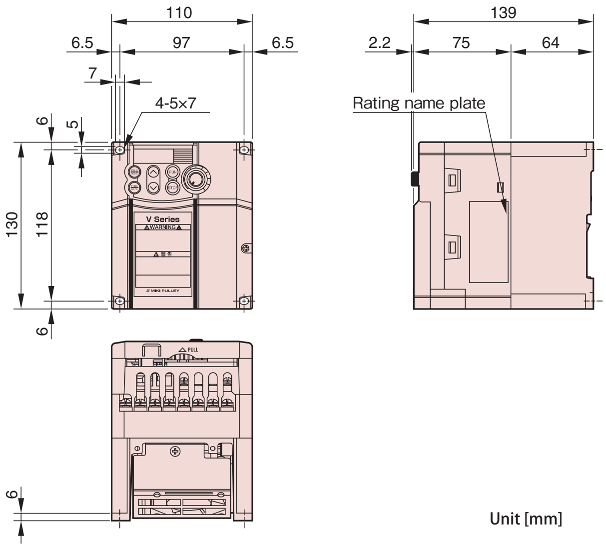
Size
Standard applicable nominal motor output

Dimensions



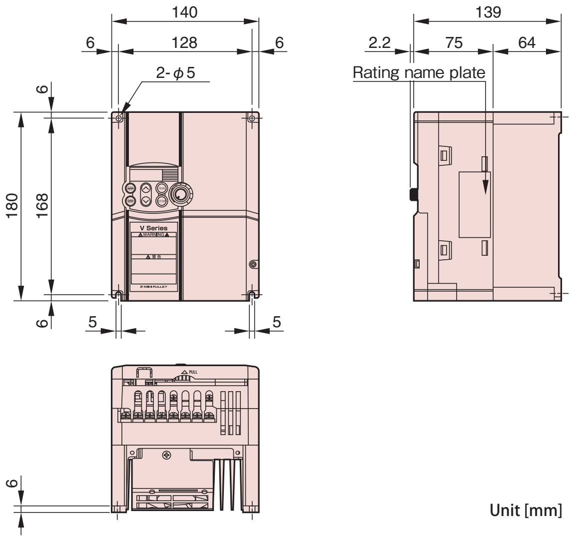
Unit [mm]

Motor for power supply	Type	D [mm]	D1 [mm]	D2 [mm]
Three-phase, 200 V, 0.1 kW	V7-01-4	80	70	10
Three-phase, 200 V, 0.2 kW	V7-02-4	80	70	10
Three-phase, 200 V, 0.4 kW	V7-04-4	95	70	25
Three-phase, 200 V, 0.75 kW	V7-07-4	120	70	50



Unit [mm]

Motor for power supply	Type
Three-phase, 200 V, 1.5 kW	V7-15-4
Three-phase, 200 V, 2.2 kW	V7-22-4



Unit [mm]

Motor for power supply	Type
Three-phase, 200 V, 3.7 kW	V7-37-4

V7 Model

Common Specifications

Common Specifications

Item			Specifications	Remark
Output frequency	Adjustment	**Max. output frequency**	25.0 to 400.0 Hz variable setting	
		Base frequency	25.0 to 400.0 Hz variable setting	
		Starting frequency	0.1 to 60.0 Hz variable setting	
		Carrier frequency	0.75 to 16 kHz variable setting * (*1) Depending on the ambient temperature and output conditions, carrier frequencies of 6 kHz or more maybe automatically lowered to protect the inverter (automatic reduction stop function)	
			Carrier modulation : Disperses the carrier frequency to reduce noise	
	Accuracy		Analog setting : ±2% or less of absolute accuracy (at 25℃), temperature drift of ±0.2% (25 ±10℃) Touch panel setting : ±0.01% or less of absolute accuracy (at 25℃), temperature drift of ±0.01% (25 ±10℃)	
	Setting resolution		Analog setting : 1/1000 of the highest output frequency	
			Touch panel setting : 0.01 Hz (99.99 Hz or less), 0.1 Hz (100.0 Hz to 400.0 Hz)	
			Link setting : 1/20000 of the highest output frequency or 0.01 Hz (fixed)	
Control	**Control method**		Induction motor drive : V/f control, slip compensation, auto torque boost, dynamic torque vector control, automatic energy saving control Synchronized motor drive : Magnetic position sensor-less (speed control range: 10% or less of base frequency)	
	Voltage and frequency		Can be set to between 80 and 240 V for the base and maximum output frequencies respectively	
			ON or OFF can be selected for AVR control (*1)	
			Polygonal line V/f (*1) setting (2 settings): Any voltage (0 to 500 V) and frequency (0 to 400 Hz) can be set	
	Torque boost（＊1）		Auto torque boost (for constant torque load) Manual torque boost: Any torque boost value (0.0% to 20.0%) can be set The applicable load can be selected (constant torque load or squared reduction torque load)	
	Starting torque（＊1）		150% or more/1 Hz set frequency for operation with slip compensation or auto torque boost	
	Run and stop		Key operation : Run or stop using the RUN and STOP keys (standard touch panel or optional remote touch panel) External signals (digital input) : Normal (reverse) rotation run/stop commands (3-wire operation available), free run command, external alarms, abnormal reset Link operation : Operation possible using RS-485 communication Run command switching : Switches to run commands issued via data communications	
	Frequency setting		Key operation : Can be set using the ∧ and ∨ keys (with data protection function) Can be set and data can be copied via function codes (communication only)	
			Set using the built-in volume control knob	
			Analog input : 0 to 10 V DC/0 to 100% (terminal 12) : 4 to 20 mA DC/0 to 100%, 0 to 20 mA DC/0 to 100% (terminal C1)	
			Multi-step frequency setting : Up to 16 steps (0 to 15 step) can be selected.	
			UP/DOWN operation : Increases or decreases the frequency while the digital input signal is ON	
			Link operation : Sets the frequency using RS-485 communication	
			Frequency setting switching : Two types of frequency setting can be selected via external signals (digital input) Frequency setting and multi-step frequency setting can be switched via communications	
			Frequency supplemental setting : Selectable as incremental input using the built-in volume knob, terminal 12 or terminal C1	
			Reverse operation : Switchable between 0 to 10 V DC/0 to 100% and 10 to 0 V DC/0 to 100% via external input : Switchable between 4 to 20 mA DC (0 to 20 mA DC)/0 to 100% and 20 to 4 mA DC (20 to 0 mA DC)/0 to 100% via external input	
	Acceleration/ deceleration time		Can be set from 0.00 to 3600 s. Two types of acceleration and deceleration time settings can be set and selected independently (switchable during operation) Curve : Choose from linear acceleration/deceleration, S-shaped acceleration/deceleration (slow or rapid) and curved acceleration/deceleration (fixed-output max. capacity acceleration) Free-run acceleration available with the OFF run command Acceleration/deceleration can be set for jogging operation (settings between 0.00 and 3600 s.)	
	Frequency limiter(Upper limit and lower limit frequencies)		Minimum and maximum frequencies can be set in Hz (0 to400 Hz)	
	Bias		Bias can be independently set between 0% and ±100% for frequency settings and PID commands	
	Gain		Analog input gain is set variably between 0% and 200%	
	Jump frequency		Operating points (6) and a common jump width (0 to 30 Hz) can be set	
	Timer operation		Operation stops and starts at the times set on the touch panel (1 operation cycle)	
	Jogging operation (*1)		Run by pressing the RUN key (standard touch panel or optional remote touch panel) or by digital contact input (dedicated common setting for the acceleration/deceleration time)	
	Restart in the event of an instantaneous power failure (*1)		Power failure trip : Tripped instantaneously when power fails	
			Power restoration trip : Runs freely when power fails and is tripped after power is restored	
			Speed reduction stop : Operation slows to a stop when power fails, and is tripped when the power fails.	
			Startup at pre-momentary-failure frequency : Runs freely when power fails and starts up at the frequency used when the power failed after power is restored	
			Startup at startup frequency : Runs freely when power fails and starts up at the startup frequency after power is restored	
	Current limitation (hardware current limitation) (*1)		To prevent overcurrent trips caused by a momentary power failure or marked load fluctuations that cannot be handled by software current limitation, hardware current limitation is used (can be canceled)	
	Slip compensation control (*1)		Compensates for speed reductions in response to load so as to ensure safe operation	
	Current limitation		Operation in which the current is kept to within a preset limit	
	PID control		Process PID regulator control	
			PID commands : Touch panel, analog input (terminal 12/C1), RS-485 communication	
			Feedback value : Analog input (terminal 12/C1)	
			Low flow stop function, selectable normal/reverse operation, integrated reset/hold function	
	Regeneration avoidance control		When the torque value reaches or exceeds a set level, the output frequency is automatically regulated, restricting the regenerated energy in the inverter and avoiding an overcurrent trip (*1). When the DC intermediate voltage reaches or exceeds the overvoltage restriction level during deceleration, the deceleration time is extended threefold to try to avoid an OU trip.	
	Speed reduction characteristics (braking capacity improvement)		During deceleration, the motor loss is increased so as to reduce the regenerated energy in the inverter and avoid an overvoltage trip.	

* (*1): Only valid for induction motor drive

Common Specifications

Item			Specifications		Remark
Control		Auto energy-saving (*1)	Controls the output voltage to ensure that total motor loss and inverter loss is minimized during constant speed operation		
		Regeneration avoidance control	Lowers the frequency to avoid overload when the ambient temperature or IGBT junction temperature rises due to overload		
		Off-line tuning (*1)	Carries out tuning of r1, Xσ, exciting current and rated slip frequency		
		Cooling fan on/off control	Monitors the internal inverter temperature and stops the cooling fan when the temperature is low		
		2nd motor setting	Allows 2 motors to be used alternately with 1 inverter (motors cannot be switched during operation) Only an induction motor can be set as the 2nd motor. Data that can be set includes the base frequency, rated current, torque boost, electronic thermal and slip compensation. Constants for the 2nd motor can be set internally (auto tuning can be used).		
		Rotation direction restrictor	Reverse operation prevention or normal operation prevention can be selected		
Display		When running/stopped	Speed monitor, output current (A), output voltage (A), power consumption (kW), PIC command value, PID feedback value, PID output, timer setting (s), total amount of power The following can be selected and displayed on the speed monitor: Output frequency (before slip compensation) (Hz), output frequency (after slip compensation) (Hz), setting frequency (Hz), load rotation speed (min-1), line speed (m/min), constant feed time (min)		
		End-of-life prediction	End-of-life prediction can be displayed for the main circuit capacitor, PCB capacitor and cooling fan, and predicted end-of-life data can be exported		
		Total operation time	Total motor operation time can be displayed along with the total operation time and total amount of power for the inverter		
		I/O check	Shows the I/O status for control circuit terminals		
		Energy-saving monitor	Power consumption, power consumption x coefficient		
		When a trip occurs	Displays the cause of a trip • OC1 : Overcurrent (during acceleration) • OC2 : Overcurrent (during deceleration)		
			• OC3 : Overcurrent (during constant speed operation) • Lin : Input open phase • LU : Undervoltage		
			• OPL : Output open phase • OU1 : Overvoltage (during acceleration) • OU2 : Overvoltage (during deceleration)		
			• OU3 : Overvoltage (during constant speed operation) • OH1 : Cooling fin overheating • OH2 : External alarm		
			• OH4 : Motor protection (PTC thermistor) • dbH : DB resistance thermal • CoF : PID feedback disconnect detection		
			• OL1 : Motor 1 overload • OL2 : Motor 2 overload • OLU : Inverter overload		
			• Er1 : Memory error • Er2 : Touch panel communications error • Er3 : CPU error		
			• Er6 : Operation error • Er7 : Tuning error • Er8 : RS485 comm. error		
			• ErF : Data saving error during undervol. cond. • Erd : Step out detection (for synchronized motor drive) • Err : Simulated fault		
		During operation or when a trip occurs	Trip history: Up to 4 past trip factors (codes) can be saved and displayed, and details can be saved and displayed for up to 4 trips.		
Protection functions		Overcurrent protection	Protect against overcurrent caused by overload and stop the inverter.		OC1 OC2 OC3
		Short-circuit protection	Protect against overcurrent caused by a short circuit in the output circuit and stop the inverter.		OC1 OC2 OC3
		Ground fault protection	Protects against overcurrent caused by a ground fault in the output circuit (initial ground fault only) and stops the inverter		OC1 OC2 OC3
		Overvoltage protection	Detects excessive DC link circuit voltage (400 V DC) and stops the inverter. Cannot provide protection where an unusually large input voltage is applied		OU1 OU2 OU3
		Undervoltage protection	Detects decreases in DC link circuit voltage (200 V DC) and stops the inverter. No alarm is output if "Restart following momentary power outage" is selected.		LU
		Input open phase protection	Protects or stops the inverter against open phase in the input voltage. Input open phase may not be detected if the connected load is light when the input open phase occurs or when the DC reactor is connected.		Lin
		Output open phase protection	Detect breaking of an output wire at startup and in operation and stop the inverter output.		OPL
		Overheat protection	Detects the temperature of the inverter coolant fin in the event of a cooling fan failure and overload, and stops the inverter.		OH1
			Uses the setting in the electronic thermal for the braking resistor to protect against braking resistor overheating		dbH
		Overload protection	Stops the inverter based on the inverter coolant temperature and the switching element temperature calculated using the output current		OLU
		External alarm input	Uses digital input (THR) to output and alarm and stop the inverter		OH2
	Motor protection	Electronic thermal	Uses the electronic thermal function setting to stop the inverter, protect the motor and protect the general-purpose motor and inverter motor across the entire the frequency range. The 2nd motor can also be protected (operating level and heat constant (0.5-75.0 min) can be set)		OL1 OL2
		PTC thermistor	A PTC thermistor is used to detect the motor temperature and output an alarm and stop the inverter to protect the motor. Connect the PCT thermistor between terminals C1 and 11, connect a resistor between terminals 13 and C1 and set the function code.		OH4
		Overload notification	Outputs a notification signal at a preset level before stopping the inverter using the electronic thermal function		
		Memory error	Checks data at power-on and when writing data, and stops the inverter if a memory error is detected		Er1
		Touch panel communication error	Detects a communication error between the touch panel and inverter main unit and stops the inverter during command-based operation from a remote touch panel.		Er2
		CPU error	Detects CPU errors such as those caused by noise and stops the inverter		Er3
		Run operation error	The STOP key has priority.	Pressing the STOP key on the touch panel forcibly stops operation even if the run command is issued via the terminal block or communication. (Er6 is displayed after the stop.)	
			Start check	Prohibits operation and displays Er6 on the LED monitor if a run command is input during the following status changes: At power-on; when an alarm is canceled; when the run command method is switched via link operation	Er6
		Tuning error	Stops the inverter if tuning fails or is interrupted during motor constant tuning or if an error is detected in the tuning results		Er7
		RS485 communication error	Detects a communication error in RS-485 communication with the inverter main unit and stops the inverter.		Er8
		Data save error during undervoltage	Displays an error if data could not be saved normally when undervoltage protection was running		ErF
		Step out detection	Detects step out in synchronized motors and stops the inverter		Erd
		PID feedback disconnect detection	Assigns a current input for PID feedback (terminal C1) and stops the inverter if a wire is judged to be broken (can be enabled/disabled)		CoF
		Stalling protection	Reduces the frequency to avoid an overcurrent trip when the output current exceeds a set limit during acceleration/deceleration or constant speed operation.		
		Batch alarm output	Outputs a relay signal when the inverter is stopped by an alarm Cancels the alarm stop state caused by a PRG/RESET or digital input signal (RST)		
		Retry	If the inverter is stopped by a trip, it can be reset and restarted automatically. (The number of retries and the wait time until reset can be set.)		
		Surge protection	Protects the inverter against surge voltage intruding between the main circuit power line and the ground.		
		Momentary power failure protection	The protection function operates (stops the inverter) if a momentary power failure lasting 15 ms or more occurs If "Restart following momentary power outage" is selected, the inverter is restarted for voltage recovery within the set time		
		Simulation fault	Simulated alarms can be output to check a fault sequence.		Err

* (*1): Only valid for induction motor drive

V7 Model

Terminal Functions

Terminal Functions

	Terminal symbol	Terminal name	Function	Remark
Main circuit	L1/R、L2/S、L3/T	Main power supply input	Connect a three-phase power supply.	
	U、V、W	Inverter output	Connect a three-phase motor.	
	P（+）、P1	For connecting a DC reactor	Connect a DC reactor (DCR).	
	P（+）、N（−）	For connecting a DC bus line	Used for connecting a DC bus line.	
	P（+）、DB	For connecting a braking resistor	Connects an external braking resistor	0.4 kW or more only. Cannot be used at 0.2 kW or below.
	⏚ G (terminal 2)	For grounding the inverter	Terminal for grounding the inverter	
Frequency settings	13	Power supply for a variable resistor	Used as a power supply for a frequency setter (variable resistor: 1to 5 kΩ)	DC10V
	12	Analog setting voltage input	Used as the frequency setting voltage input, 0 to +10 V DC/0 to 100%	
		(Reverse operation)	+10 to 0 V DC/0 to 100%	
		(For PID control)	Used as a setting signal (PID process command value) or PID feedback signal	
		(Frequency supplemental setting)	Used as a supplemental setting to be added to various frequency settings	
	C1	Analog setting current input	Used as the frequency setting voltage input, 4 to 20 mA (0 to 20 mA DC)/0 to 100%	
		(Reverse operation)	20 to 4 mA (20 to 0 mA DC)/0 to 100%	
		(For PID control)	Used as a setting signal (PID process command value) or PID feedback signal	
		(Frequency supplemental setting)	Used as a supplemental setting to be added to various frequency settings	
		For connecting a PTC thermistor	Connects a PTC thermistor for motor protection	
	11 (terminal 2)	Analog input common	Common terminals for frequency setting signals (12, 13, C1, FMA)	Isolated from terminals CM and Y1E
Digital input	X1	Digital input 1	The function terminals X1-X3 below can be set to FWD or REV	
	X2	Digital input 2	(Common functions)	
	X3	Digital input 3	Sink/source can be switched by switching the jumper switch built into the main unit.	
	FWD	Normal rotation run/stop command	"ON for short circuit" or "ON for open" can be set for terminals X1 to CM	
	REV	Reverse rotation run/stop command	* The same settings can be used between terminals X2, X3, FWD and REV to CM	
	(FWD)	Normal rotation run/stop command	Normal rotation operation when (FWD) is ON, and deceleration and stop when (FWD) is OFF.	Functions can only be assigned to terminals FWD and REV, "Short circuit ON" only
	(REV)	Reverse rotation run/stop command	Reverse rotation operation when (REV) is ON, and deceleration and stop when (REV) is OFF.	Functions can only be assigned to terminals FWD and REV, "Short circuit ON" only
	(SS1) (SS2) (SS4) (SS8)	Multi-step frequency setting	Enables 16-step operation using ON/OFF signals for SS1 to SS8	

Digital input	Multi-step frequency															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(SS1)	−	ON	−	ON	−	ON	−	ON	−	ON	−	ON	−	ON	−	ON
(SS2)	−	−	ON	ON	−	−	ON	ON	−	−	ON	ON	−	−	ON	ON
(SS4)	−	−	−	−	ON	ON	ON	ON	−	−	−	−	ON	ON	ON	ON
(SS8)	−	−	−	−	−	−	−	−	ON	ON	ON	ON	ON	ON	ON	ON

	Terminal symbol	Terminal name	Function	Remark
Digital input	(RT1)	Acceleration/deceleration time selection	When (RT1) is OFF (ON), acceleration/deceleration time setting 1 (2) is enabled	
	(HLD)	Self-hold selection	Used as a self-hold signal during 3-wire operation Setting (HLD) to ON self-holds the (FWD) or (REV) signal. OFF releases the signal	
	(BX)	Free-run command	Setting (BX) to ON immediately blocks inverter output and the motor runs freely (no alarm output)	
	(RST)	Alarm (error) reset	Releases the alarm hold state when (RST) is ON	For input signals of 0.1 s or longer
	(THR)	External alarm	Setting (THR) to OFF immediately blocks inverter output and the motor runs freely (alarm output: OH2)	
	(JOG)	Jogging operation	Setting (JOG) to ON switches to jogging mode and switches the frequency and acceleration/deceleration time settings to the jogging frequency and jogging operation time respectively, enabling jogging operation	(＊1)
	(Hz2/Hz1)	Frequency setting 2/frequency setting 1	When (Hz2/Hz1) is ON, frequency setting 2 is selected	
	(M2/M1)	Motor 2/motor 1	When (M2/M1) is OFF (ON) the motor setting 1 (2) settings are enabled	
	(DCBRK)	DC braking command	Setting (DCBRK) to ON starts DC control operation	
	(WE-KP)	Edit permission command (Data can be changed)	Function code data can only be changed from the touch panel when (WE-KP) is ON	
	(UP)	UP command	The output frequency increases while (UP) is ON	
	(DOWN)	DOWN command	The output frequency decreases while (DOWN) is ON	
	(Hz/PID)	PID control cancellation	When (Hz/PID) is ON, PID control is canceled (multi-step frequency, touch panel and analog input operate at the selected frequency)	
	(IVS)	Normal operation/ reverse operation switching	Allows the operation mode (normal/reverse operation) for analog frequency setting or PID control output signals (frequency setting) to be switched. Setting (IVS) to ON selects reverse operation.	
	(LE)	Link operation selection	When (LE) is ON, operation conforms to commands issued via RS-485	
	(PID-RST)	PID integration/differentiation reset	Setting (PID-RST) to ON resets the PID integration and differentiation values	
	(PID-HLD)	PID integration hold	Setting (PID-HLD) to ON holds PID integration	
	PLC	PLC signal power supply	Connects a PLC output signal power supply and can be used for a 24 V power supply	+24 V (22 to 27 V), max. 50 mA
	CM (terminal 2)	Digital input common	Common terminal for digital input signals	Isolated from terminals 11 and Y1E
Transistor output	(PLC)	Transistor output power supply	Power supply for the transistor output load (24 V DC, 50 mA DC max.) * Note: Same terminal as the digital input PLC terminal	Used to short-circuit terminals CM and Y1E
	Y1	Transistor output	Outputs the signal selected from the following: Select either "Short circuit for ON signal output" or "Open circuit for ON signal output"	Max. voltage 27 V DC Max. current 50 mA DC, leakage current 0.1 mA or less ON voltage: 2 V or less (for 50 mA)
	(RUN)	Running	Outputs an ON signal when the inverter is running at a the starting frequency or above	

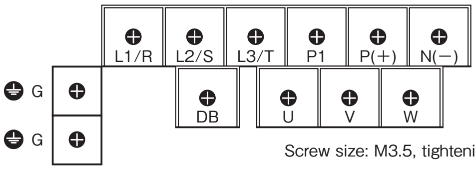
* (*1): Only valid for induction motor drive

Terminal Functions

	Terminal symbol	Terminal name	Function	Remark
Transistor output	(FAR)	Frequency attainment	Outputs an ON signal when the difference between the output frequency and the set frequency is at or below the frequency attainment detection width (function code E30)	
	(FDT)	Frequency detection	Outputs an ON signal when the output frequency is at or above the operating level (function code E31). OFF when the output level (function code E31) is at or below the hysteresis width (function code E32)	
	(LU)	Undervoltage stopped	Outputs an ON signal when there is a run command and operation is stopped due to undervoltage	
	(IOL)	Inverter limiting output	Outputs an ON signal when the inverter is limiting current, running regeneration avoidance or limiting torque	
	(IPF)	Instantaneous power failure recovery	Outputs an ON signal from the time the inverter blocks output due to a momentary power failure until restart is completed	
	(OL)	Overload notification (motor)	Outputs an ON signal when the calculated electronic thermal value is at or above the preset detection value	
	(SWM2)	Switch to motor 2	Outputs an ON signal when motor 2 is selected in the input signal for the motor switching signal (M2/M1)	
	(TRY)	Retrying	Outputs an ON signal during retrying	
	(LIFE)	End-of-life notification	Outputs a notification signal in accordance with the inverter's internal end-of-life criterion	
	(PID-CTL)	Controlling PID	Outputs an ON signal while PID control is enabled	
	(PID-STP)	PID low flow stopping	Outputs an ON signal while low flow stop is running in PID control * Stops operation even when a run command is entered	
	(RUN2)	Inverter outputting	Outputs an ON signal when the inverter is running at the starting frequency or above and DC braking is running * Outputs an ON signal when the inverter main circuit (gate) is set to ON	
	(OLP)	Overload avoidance control is running	Outputs an ON signal during while overload avoidance control is running	
	(ID2)	Current detection 2	Outputs an ON signal when the set current detection level (for ID2) is exceeded and the elapsed time exceeds the timer time	
	(THM)	Thermistor detection	Outputs an ON signal when motor overheating is detected by the PTC/NTC thermistor	(*1)
	(BRKS)	Brake signal	Outputs a brake application/release signal	(*1)
	(MNT)	Maintenance timer	Outputs a notification or warning when the preset maintenance time or number of restarts is exceeded	
	(FARFDT)	Frequency attainment/detection	Outputs an ON signal when both (FAR) and (FDT) are ON	
	(C10FF)	C1 terminal breakage detection	Outputs an ON signal when terminal C1 input is 2 mA or less and it is determined that there is a wire breakage	
	(ID)	Current detection	Outputs an ON signal when the set current detection level is exceeded and the elapsed time exceeds the timer time	
	(IDL)	Low current detection	Outputs an ON signal when the current is at or below the set low current detection level and the elapsed time exceeds the timer time	
	(ALM)	Batch alarm	Outputs a batch alarm signal as a transistor output signal	
	Y1E	Transistor output common	Transistor output common terminal	Isolated from terminals 11 and CM
Contact output	30A、30B、30C	Batch alarm output	Outputs a no-voltage contact signal (1c) when the inverter is stopped by an alarm The same signal as the Y1 signal can be selected as multi-purpose relay output * Can be switched between excited operation alarm output and non-excited (spring-actuated) operation alarm output	Contact capacity: 250 V AC, 0.3 A, cos dia.: 0.3 48 V DC, 0.5 A
Analog output	FMA	Analog monitor	Output mode: DC voltage (0 to 10 V) One item selected from the following can be output in the selected analog state: Output frequency 1 (before slip compensation), output frequency 2 (after slip compensation), output current, output voltage, power consumption, PID feedback value, DC link circuit voltage, analog output test, PID command, PID output	Gain adjustment range: 0 to 300%
Communication		Built-in RJ-45 connector RS-485 communication	Any of the following protocols can be selected: Dedicated touch panel protocol, Modbus RTU, dedicated Fuji inverter protocol, SX protocol for PC loaders	Power supply to touch panel Terminating resistance with ON/OFF switch The save location for data set via communication can be selected

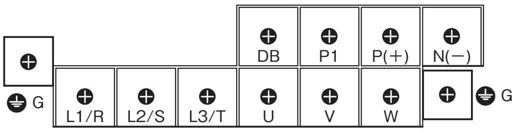
* (*1): Only valid for induction motor drive

Main circuit terminals



Screw size: M3.5, tightening torque: 1.2 N·m

0.1 to 0.75 kW：V7-01 / V7-02 / V7-04 / V7-07

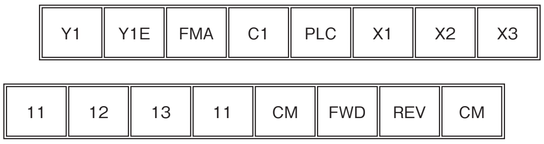


Screw size: M4, tightening torque: 1.8 N·m

1.5 to 3.7 kW：V7-15 / V7-22 / V7-37

Control circuit terminals

Screw size: M2.5, tightening torque: 0.4 N·m



Screw size: M2, tightening torque: 0.2 N·m

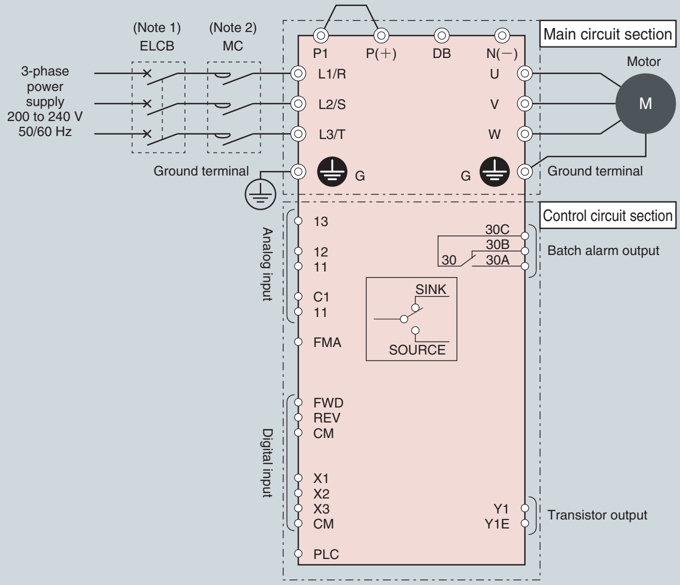
V7 Model

Connection Diagram

Connection Diagram

* This is just reference information. Please be sure to refer to the instruction manual when you really make connections.

When running/stopping and setting frequency from the touch panel



■ Wiring procedure

(1) Wire only the main circuit section. The function codes are preset at the factory.

■ Operation method

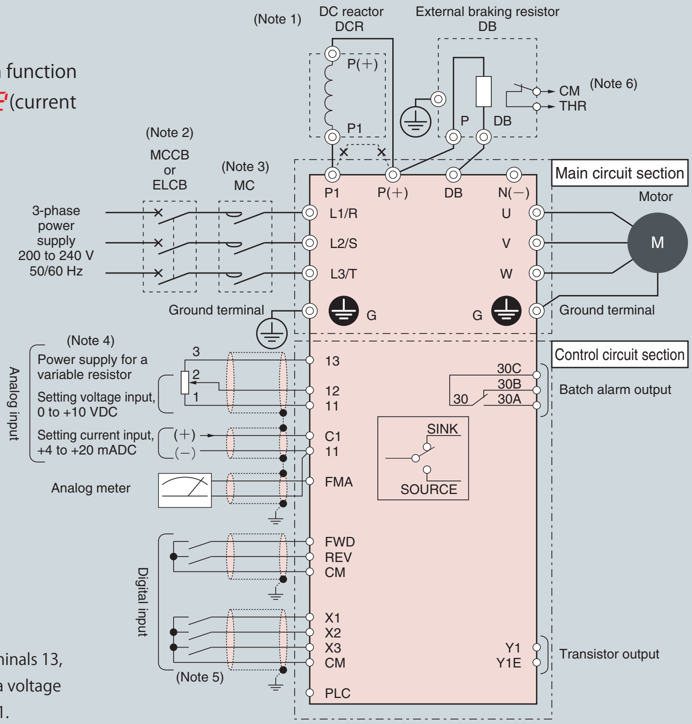
(1) Run/stop: Run and stop with key operation (RUN , STOP keys) on the touch panel.

(2) Frequency setting: The frequency can be set using a knob.

(Note 1) Install the recommended molded case circuit breaker (MCCB) or earth leakage circuit breaker (ELCB) (with overcurrent protection function) on the input side (primary side) of the inverter for wiring protection.
Do not use a circuit breaker with a capacity greater than the recommended capacity.

(Note 2) Since this is used to isolate the inverter from the power supply separate from MCCB or ELCB, install the recommended electromagnetic contactor (MC) for each inverter as needed.
Note that if coils such as an MC and solenoid are installed near the inverter, connect a surge absorber in parallel.

When running/stopping and setting frequency using external signals



■ Wiring procedure

(1) Wire the main circuit section and control circuit section.

(2) Assign function code F02 to 1 (external signal). Next, assign function code F01 to 1 (voltage input (terminal 12) (0 to +10 VDC), 2 (current input (terminal C1) (+4 to +20 mADC)), etc.

■ Operation method

(1) Run / stop: Run when terminals FWD and CM are short circuited and stop when they are open circuited.

(2) Frequency setting: Voltage input (0 to +10 VDC), current input (+4 to +20 mADC)

(Note 1) When you connect a DC reactor (option), first remove the short circuit bar between terminals P1 and P (+) and then connect it.

(Note 2) Install the recommended molded case circuit breaker (MCCB) or earth leakage circuit breaker (ELCB) (with overcurrent protection function) on the input side (primary side) of the inverter for wiring protection.
Do not use a circuit breaker with a capacity greater than the recommended capacity.

(Note 3) Since this is used to isolate the inverter from the power supply separate from MCCB or ELCB, install the recommended electromagnetic contactor (MC) for each inverter as needed.
Note that if coils such as an MC and solenoid are installed near the inverter, connect a surge absorber in parallel.

(Note 4) You can connect a frequency setter (external knob) between terminals 13, 12, and 11 and assign the setting frequency instead of inputting a voltage signal (0 to +10 VDC or 0 to +5 VDC) between terminals 12 and 11.

(Note 5) Use a twisted wire or shielded wire for the control signal wire.
Ground the shielded wire.
Place the control signal wire so that it is as far away as possible from the main circuit wire, and never put them in the same duct to prevent malfunction caused by noise. (A distance of 10 cm or more is recommended.) If the wires cross each other, place them so that they are at right angles to each other.

(Note 6) The (THR) function can be used by assigning code 9 (external alarm) to any of terminals X1 to X3, FWD, or REV (function codes: E01 to E03, E98 or E99).

Function Selection List

Basic Functions: F Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
F00	Data protection	0: Without data protection , without digital settings protection 1: With data protection , without digital settings protection 2: Without data protection , with digital settings protection 3: With data protection , with digital settings protection	–	–	0
F01	Frequency setting 1	0: Touch panel key operation (⌃ / ⌄ keys) 1: Analog voltage input (terminal 12) (0 to 10 V DC) 2: Analog current input (terminal C1) (4 to 20 mA DC) 3: Analog voltage input (terminal 12) + analog current input (terminal C1) 4: Main unit volume knob 7: UP/DOWN control	–	–	4
F02	Run/operation	0: Touch panel operation (rotation direction input: terminal block) 1: External operation (digital input) 2: Touch panel operation (normal rotation) 3: Touch panel operation (reverse rotation)	–	–	2
F03	Max. output frequency 1	25.0 to 400.0 Hz	0.1	Hz	60.0
F04	Base frequency 1	25.0 to 400.0 Hz	0.1	Hz	60.0
F05	Base frequency voltage 1	0 V: Outputs a voltage proportional to the power supply voltage; 80 to 240 V: AVR operation	1	V	0
F06	Max. output voltage 1	80 to 240 V: AVR operation	1	V	200
F07	Acceleration time 1	0.00 to 3600 s * 0.00 cancels the acceleration time (when externally performing a soft start and stop)	0.01	s	6.00
F08	Deceleration 1	0.00 to 3600 s * 0.00 cancels the deceleration time (when externally performing a soft start and stop)	0.01	s	6.00
F09	Torque boost 1	0.0 to 20.0% (F05: Percent value (%) against the base frequency voltage 1)	0.1	%	Motor's rated current
F10	Electronic thermal 1 (For motor protection) (Characteristic function)	1: Operation (self-cooling fan: for general-purpose motor/standard synchronized motors) 2: Operation (for separately excited fan/inverter (FV) motor)	–	–	1
F11	(Operation level)	0.00 (no operation), 0.01 to 100.0 A Current value of 1 to 135% of inverter's rated current	0.01	A	Motor's rated current
F12	(Thermal time constant)	0.5 to 75.0 min	0.1	min	5.0
F14	Instantaneous power failure restart (Operation selection)	0: No operation (immediate trip without restart) 1: No operation (trip at recovery without restart) 2: Trip after deceleration stop 4: Operation (restart from frequency at power failure, for ordinary loads) 5: Operation (restart from startup frequency)	–	–	1
F15	Frequency limiter (Upper limit)	0.0 to 400.0 Hz	0.1	Hz	70.0
F16	(Lower limit)	0.0 to 400.0 Hz	0.1	Hz	0.0
F18	Bias (for frequency setting 1)	-100.00 to 100.00%	0.01	%	0.00
F20	DC braking 1 (Start frequency)	0.0 to 60.0 Hz	0.1	Hz	0.0
F21	(Operation level)	0 to 100% (inverter's rated current standard)	1	%	0
F22	(Time)	0.00: (No operation) 0.01 to 30.00 s	0.01	s	0.00
F23	Starting frequency 1	0.1 to 60.0 Hz	0.1	Hz	1.0
F24	(Continuation time)	0.00 to 10.00 s	0.01	s	0.00
F25	Stopping frequency	0.1 to 60.0 Hz	0.1	Hz	0.2
F26	Motor operating noise (Carrier frequency)	0.75 to 16 kHz	1	kHz	2
F27	(Tone)	0: Level 0 (No operation) 1: Level 1 2: Level 2 3: Level 3	–	–	0
F30	Terminal FMA (Output gain)	0 to 300%	1	%	100
F31	(Function selection)	For the following items, functions are set using the given codes. 0: Output frequency 1 (before slip compensation) 1: Output frequency 2 (after slip compensation) 2: Output current 3: Output voltage 6: Power consumption 7: PID feedback amount 9: DC link circuit voltage 14: Analog output test (+) 15: PID command (SV) 16: PID output (MV)	–	–	0
F37	Load selection/auto torque boost/ auto energy-saving operation 1	0: Square reduction torque load 1: Constant torque load 2: Auto torque boost 3: Auto energy-saving operation (square reduction torque load) 4: Auto energy-saving operation (constant torque load) 5: Auto energy-saving operation (auto torque boost)	–	–	1
F39	Stop frequency (Continuation time)	0.00 to 10.00 s	0.01	s	0.00

* The available setting range may be limited by signs and the number of digits.

V7 Model

Function Selection List

Basic Functions: F codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
F42	Control method selection 1	0: V/f control (without slip compensation) 1: Dynamic torque vector control 2: V/f control (with slip compensation) 11: V/f control (synchronized motor)	—	—	0
F43	Current limitation (Operation selection)	0: No operation 1: At constant speed (does not operate during acceleration/deceleration) 2: During acceleration and at constant speed (does not operate during deceleration)	—	—	2
F44	(Operation level)	20 to 200% (inverter's rated current standard)	1	%	180
F50	Electronic thermal 1 (Discharge withstand current rating) (For braking resistor protection)	1 to 900 kWs, OFF (cancel)	1	kWs	OFF
F51	(Allowable average loss)	0.001 to 50.00 kW	0.001	kW	0.001

* The available setting range may be limited by signs and the number of digits.

Terminal Functions: E Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
E01	Terminal X1 (Function selection)	For the following items, functions are set using the code values 0: (1000) Multi-step frequency selection (0 to 1 step) [SS1] 1: (1001) Multi-step frequency selection (0 to 3 steps) [SS2] 2: (1002) Multi-step frequency selection (0 to 7 steps) [SS4] 3: (1003) Multi-step frequency selection (0 to 15 steps) [SS8] 4: (1004) Acceleration/deceleration selection (2 steps) [RT1] 6: (1006) Self-hold selection [HLD] 7: (1007) Free-run command [BX] 8: (1008) Alarm (error) reset [RST] 9: (1009) External alarm [THR] 10: (1010) Jogging operation [JOG] 11: (1011) Frequency setting 2/frequency setting 1 [Hz 2/Hz 1] 12: (1012) Motor 2/motor 1 [M2/M1] 13: DC braking command [DCBRK] 17: (1017) UP command [UP] 18: (1018) DOWN command [DOWN] 19: (1019) Edit permission command (data can be changed) [WE-KP] 20: (1020) PID control cancellation [Hz/PID] 21: (1021) Normal operation/reverse operation switching [IVS] 24: (1024) Link operation selection (RS485 communication <option>) [LE] 33: (1033) PID integration/differentiation reset [PID-RST] 34: (1034) PID integration hold [PID-HLD] * 4 digit numbers in parentheses (10nn) are logic inversion signals. (OFF when active.) Note that for (THR), 9: Active OFF: 1009: Active ON. Note also that logic inversion cannot be used for signals with no defined values in parentheses.	—	—	0
E02	Terminal X2 (Function selection)		—	—	7
E03	Terminal X3 (Function selection)		—	—	8
E10	Acceleration time 2	0.00 to 3600 s. *0.00 cancels the acceleration time (for an external soft start/stop)	0.01	s	6.00
E11	Deceleration time 2	0.00 to 3600 s. *0.00 cancels the deceleration time (for an external soft start/stop)	0.01	s	6.00

* The available setting range may be limited by signs and the number of digits.

Terminal Functions: E Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
E20	Terminal Y1 (Function selection)	For the following items, functions are set using the code values 0 ：(1000) 〔RUN〕 1 ：(1001) 〔FAR〕 2 ：(1002) 〔FDT〕 3 ：(1003) 〔LU〕 5 ：(1005) 〔IOL〕 6 ：(1006) 〔IPF〕 7 ：(1007) 〔OL〕 26 ：(1026) 〔TRY〕 30 ：(1030) 〔LIFE〕 35 ：(1035) 〔RUN2〕 36 ：(1036) 〔OLP〕 37 ：(1037) 〔ID〕 38 ：(1038) 〔ID2〕 41 ：(1041) 〔IDL〕 43 ：(1043) 〔PID-CTL〕 44 ：(1044) 〔PID-STP〕 49 ：(1049) 〔SWM2〕 56 ：(1056) 〔THM〕 57 ：(1057) 〔BRKS〕 59 ：(1059) 〔C1OFF〕 84 ：(1084) 〔MNT〕 87 ：(1087) 〔FARFDT〕 99 ：(1099) 〔ALM〕 * 4 digit numbers in parentheses (10nn) are logic inversion signals. (OFF when active.)	–	–	0
E27	Terminal 30A/B/C (Relay output)		–	–	99
E30	Frequency attainment detection width (Detection width)	0.0 to 10.0 Hz	0.1	Hz	2.5
E31	Frequency detection (Operation level)	0.0 to 400.0 Hz	0.1	Hz	60.0
E32	(Hysteresis width)	0.0 to 400.0 Hz	0.1	Hz	1.0
E34	Overload notification/current (Operation level)	0.00 (no operation), 0.01 to 100.0 A 1 to 200% of inverter's rated current	0.01	A	Motor's rated current
E35	detection/low current detection (Timer)	0.01 to 600.00 s	0.01	s	10.00
E37	Current detection 2 (Operation level)	0.00 (no operation), 0.01 to 100.0 A 1 to 200% of inverter's rated current	0.01	A	Motor's rated current
E38	(Timer)	0.01 to 600.00 s	0.01	s	10.00
E39	Constant feeding time coefficient	0.000 to 9.999	0.001	–	0.000
E40	PID display coefficient A	−999 to 0.00 to 9990	0.01	–	100
E41	PID display coefficient B	−999 to 0.00 to 9990	0.01	–	0.00
E42	Display filter	0.0 to 5.0 s	0.1	s	0.5
E43	LED monitor (Display selection)	0: Speed monitor (selected in E48) 3: Output current 4: Output voltage 9: Power consumption 10: PID command value 12: PID feedback value 13: Timer value (timer operation) 14: PID output 25: Total amount of power	–	–	0
E45	Displayed, but cannot be used with this inverter.				
E46					
E47					
E48	LED monitor details (Speed monitor selection)	0: Output frequency (before slip compensation) 1: Output frequency (after slip compensation) 2: Setting frequency 4: Load rotation speed 5: Line speed 6: Constant feeding time	–	–	0
E50	Speed display coefficient	0.01 to 200.00	0.01	–	30.00
E51	Total power data display coefficient	0.000 (cancel and reset), 0.001 to 9999	0.001	–	0.010
E52	Touch panel menu selection	0: Function code data setting mode (Menu No. 1) 1: Function code data confirmation mode (Menu No. 2) 2: Full menu mode	–	–	0

* The available setting range may be limited by signs and the number of digits.

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Function Selection List

Terminal Functions: E Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
E60	Main unit knob (Function selection)	0: Function selection not available 1: Frequency supplemental setting 1 2: Frequency supplemental setting 2 3: PID process command 1	1	—	0
E61	Terminal 12 (Extended function selection)	The function is set using the code of the following items. 0: Function selection not available 1: Frequency supplemental setting 1 2: Frequency supplemental setting 2 3: PID process command 1 5: PID feedback value	—	—	0
E62	Terminal C1 (Extended function selection)		—	—	0
E98	Terminal FWD (Function selection)	The function is set using the code of the following items. 0: (1000) Multi-step frequency selection (0 to 1 step) [SS1] 1: (1001) Multi-step frequency selection (0 to 3 steps) [SS2] 2: (1002) Multi-step frequency selection (0 to 7 steps) [SS4] 3: (1003) Multi-step frequency selection (0 to 15 steps) [SS8] 4: (1004) Acceleration/deceleration selection (2 steps) [RT1] 6: (1006) Self-hold selection [HLD] 7: (1007) Free-run command [BX] 8: (1008) Alarm (error) reset [RST] 9: (1009) External alarm [THR] 10: (1010) Jogging operation [JOG] 11: (1011) Frequency setting 2/frequency setting 1 [Hz 2/Hz 1] 12: (1012) Motor 2/motor 1 [M2/M1] 13: DC braking command [DCBRK] 17: (1017) UP command [UP] 18: (1018) DOWN command [DOWN] 19: (1019) Edit permission command (data can be changed) [WE-KP] 20: (1020) PID control cancellation [Hz/PID] 21: (1021) Normal operation/reverse operation switching [IVS] 24: (1024) Link operation selection (RS485 communication <option>) [LE] 33: (1033) PID integration/differentiation reset [PID-RST] 34: (1034) PID integration hold [PID-HLD] 98: Normal rotation run/stop command [FWD] 99: Reverse rotation run/stop command [REV] * 4 digit numbers in parentheses (10nn) are logic inversion signals. (OFF when active.) Note that for (THR), 9: Active OFF: 1009: Active ON. Note also that logic inversion cannot be used for signals with no defined values in parentheses.	—	—	98
E99	Terminal REV (Function selection)		—	—	99

* The available setting range may be limited by signs and the number of digits.

Control Functions: C Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
C01	Jump frequency 1	0.0 to 400.0 Hz	0.1	Hz	0.0
C02	2				0.0
C03	3				0.0
C04	(Width)	0.0 to 30.0 Hz	0.1	Hz	3.0
C05	Multi-step frequency 1	0.00 to 400.00 Hz	0.01	Hz	0.00
C06	2				0.00
C07	3				0.00
C08	4				0.00
C09	5				0.00
C10	6				0.00
C11	7				0.00
C12	8				0.00
C13	9				0.00
C14	10				0.00
C15	11				0.00
C16	12				0.00
C17	13				0.00
C18	14				0.00
C19	15				0.00
C20	Jogging frequency	0.0 to 400.00 Hz	0.01	Hz	0.00
C21	Timer operation (Operation selection)	0: No operation 1: Operation	—	—	0
C30	Frequency setting 2	0: Touch panel key operation (∧ / ∨ keys) 1: Analog voltage input (terminal 12) (0 to +10 VDC) 2: Analog current input (terminal C1) (4 to 20 mADC) 3: Analog voltage input (terminal 12) + analog current input (terminal C1) 4: Main unit knob 7: UP/DOWN control	—	—	2
C32	Analog input adjustment (Terminal 12) (Gain)	0.00 to 200.00%	0.01	%	100.0
C33	(Filter)	0.00 to 5.00 s	0.01	s	0.05
C34	(Gain Reference point)	0.00 to 100.00%	0.01	%	100.00
C37	Analog input adjustment (Terminal C1) (Gain)	0.00 to 200.00%	0.01	%	100.00
C38	(Filter)	0.00 to 5.00 s	0.01	s	0.05
C39	(Gain Reference point)	0.00 to 100.00%	0.01	%	100.00
C40	Terminal C1 range selection	0：4 to 20 mA 1：0 to 20 mA	—	—	0
C50	Bias (frequency setting 1) (Bias Reference point)	0.00 to 100.00%	0.01	%	0.00
C51	Bias (PID command 1) (Bias value)	−100.0 to 100.0%	0.01	%	0.00
C52	(Bias Reference point)	0.00 to 100.00%	0.01	%	0.00
C94	Jump frequency 4	0.0 to 400.0 Hz	0.1	Hz	0.0
C95	5				0.0
C96	6				0.0
C99	Digital setting frequency	0.00 to 400.00 Hz	0.01	Hz	0.00

* The available setting range may be limited by signs and the number of digits.

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Function Selection List

Motor 1 Parameters: P Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
P02	Motor 1 (Capacity)	0.01 to 30.00 kW (P99: when 0, 3, 4, 20 or 21 is selected)	0.01	kW	Applicable motor rating
		0.01 to 30.00 HP (P99: when 1 is selected)	0.01	HP	Applicable motor rating
P03	(Rated current)	0.00 to 100.00 A	0.01	A	Applicable motor rating
P04	(Auto tuning)	0: No operation 1: Stop tuning (%R1, %X) 2: Rotation tuning for V/f control (%R1, %X, no-load current, slip frequency)	–	–	0
P06	(No-load current)	0.00 to 50.00 A	0.01	A	Applicable motor rating
P07	(%R1)	0.00 to 50.00%	0.01	%	Applicable motor rating
P08	(%X)	0.00 to 50.00%	0.01	%	Applicable motor rating
P09	(Slip compensation gain (drive))	0.0 to 200.0%	0.1	%	100.0
P10	(Slip compensation response time)	0.01 to 10.00 s	0.01	s	1.00
P11	(Slip compensation gain (braking))	0.0 to 200.0%	0.1	%	100.0
P12	(Rated slip)	0.00 to 15.00 Hz	0.01	Hz	Applicable motor rating
P60	Synchronized motor (Armature resistance)	0.00 (synchronized motor not operating), 0.01 to 50.00 Ω	0.01	Ω	0.00
P61	(d-axis inductance)	0.00 (high-efficiency control not operating), 0.01 to 500.0 mH	0.01	mH	0.00
P62	(q-axis inductance)	0.00 (synchronized motor not operating), 0.01 to 500.0 mH	0.01	mH	0.00
P63	(Induced voltage)	0 (synchronized motor not operating), 80 to 240 V	1	V	0
P74	(Starting current level)	10 to 200%	1	%	80
P89	(Control switching level)	10 to 100%	1	%	10
P90	(Overcurrent protection level)	0.00 (no operation), 0.01 to 300.0 A	0.01	A	0.00
P91	(Damping control d-axis compensation gain)	0.00 to 25.00, 999 (table value)	0.01	–	999
P92	(Damping control q-axis compensation gain)	0.00 to 25.00, 999 (table value)	0.01	–	999
P93	(Current detection level for step-out detection)	0 to 100, 999 (table value)	1	%	999
P99	Motor 1 selection	0 : Motor characteristic 0 (standard applicable motor) 1 : Motor characteristic 1 (HP representative motor, typical model) 3 : Motor characteristic 3 (not used) 4 : Other (induction motor) 20: Other (synchronized motor) 21: Sensor-less standard rating	–	–	0

* The available setting range may be limited by signs and the number of digits.

High Level Functions: H Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
H03	Data initialization	0: Manual setting value 1: Initial value (factory default setting) 2: Motor 1 constant initialization 3: Motor 2 constant initialization	–	–	0
H04	Retry (Number of times)	0: No operation, 1 to 10 times	1	Times	0
H05	(Waiting time)	0.5 to 20.0 s	0.1	s	5.0
H06	Cooling fan on/off control	0: No operation (fan always ON) 1: Operation (ON/OFF control enabled)	–	–	0
H07	Curve acceleration/deceleration	0: No operation (linear acceleration/deceleration) 1: S-shaped acceleration/deceleration (slow) 2: S-shaped acceleration/deceleration (rapid) 3: Curve acceleration/deceleration	–	–	0
H08	Rotation direction restrictor	0: No operation 1: Operation (reverse rotation prevented) 2: Operation (normal rotation prevented)	–	–	0
H11	Deceleration mode	0: Normal deceleration 1: Free run	–	–	0
H12	Instantaneous overcurrent limitation (Operation selection)	0: No operation 1: Operation	–	–	1
H13	Momentary power failure restart (Wait time)	0.1 to 10.0 s	0.1	s	0.5
H14	(Rate of frequency decrease)	0.00: Selected deceleration time, 0.01 to 100.00 Hz/s, 999 (by current limitation)	0.01	Hz/s	999
H15	(Operation continuance level)	200 to 300 V	1	V	235
H26	Thermistor (for motor) (Operation selection)	0: No operation 1: PTC: Trips at OH4, inverter stops 2: PTC: Outputs signal (THM), operation continues	–	–	0
H27	(Operation level)	0.0 to 5.00 V	0.01	V	0.16

* The available setting range may be limited by signs and the number of digits.

High Level Functions: H Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
H30	Link function (Operation selection)	Frequency command / Run command 0: F01 / C30 — F02 1: RS-485 communication — F02 2: F01 / C30 — RS-485 communication 3: RS-485 communication — RS-485 communication	–	–	0
H42	Main circuit capacitor measurement	For adjustment during replacement (0000 to FFFF (hexadecimal))	1	–	–
H43	Total cooling fan operation time	For adjustment during replacement (0000 to 9999 (10-hour units))	1	10h	–
H44	Startup count 1	For adjustment during replacement (0000 to FFFF (hexadecimal))	–	–	–
H45	Simulated fault	0: No operation 1: Simulated fault occurrence	–	–	0
H47	Initial main circuit capacitor value	For adjustment during replacement (0000 to FFFF (hexadecimal))	1	–	–
H48	Total PCB capacitor operation time	For adjustment during replacement (0000 to 9999 (10-hour units))	1	10h	–
H50	Polygonal line V/f1 (Frequency)	0.0 (cancel), 0.1 to 400.0 Hz	0.1	Hz	0.0
H51	(Voltage)	0 to 240 V: AVR operation	1	V	0
H52	Polygonal line V/f2 (Frequency)	0.0 (cancel), 0.1 to 400.0 Hz	0.1	Hz	0.0
H53	(Voltage)	0 to 240 V: AVR operation	1	V	0
H54	Acceleration/deceleration time (Jogging operation)	0.00 to 3600 s	0.01	s	6.00
H61	Initial UP/DOWN control value selection	0: Initial value is 0.00 Hz 1: Initial value is the frequency set by the UP/DOWN command just before the run command expired	–	–	1
H63	Lower limit limiter (Operation selection)	0: Lower limit is restricted by the F16 frequency limiter (minimum), operation continues 1: When the lower limit no longer meets the F16 frequency limiter (minimum), deceleration stops	–	–	0
H64	(Minimum frequency during limitation operation)	0.0 (F16: Dependent on the frequency limiter (minimum)), 0.1 to 60.0 Hz	0.1	Hz	2.0
H69	Regeneration avoidance control (Operation selection)	0: No operation 1: Operation (3 times the deceleration time during voltage limitation (V6 model compatibility operation)) 2: Operation (torque limitation: cancel enabled when 3 times the deceleration time has elapsed) 4: Operation (torque limitation: forcible stop process disabled)	–	–	0
H70	Overload avoidance control	0.00 (conforms to the selected deceleration time), 0.01 to 100.00 Hz/s, 999 (cancel)	0.01	Hz/s	999
H71	Deceleration characteristics	0: No operation 1: Operation	–	–	0
H76	Regeneration avoidance (increased frequency limiter)	0.0 to 400.0 Hz	0.1	Hz	5.0
H78	Maintenance setting time	0: No operation, 1 to 9999 (10-hour units)	1	–	8760
H79	Maintenance setting start time	0000: No operation, 0001 to FFFF (hexadecimals)	1	–	0000
H80	Current vibration suppression gain 1	0.00 to 0.40	0.01	–	0.20
H89	Electronic thermal (Motor protection) (Data retention)	For the following items, code values are set 0: No operation 1: Operation	–	–	1
H91	PID feedback disconnect detection (Terminal C1)	0.0: Alarm does not operate, 0.1 to 60.0 s: Alarm issued after set time	0.1	s	0.0
H92	Operation continues (P)	0.000 to 10.000 times, 999: Standard value	0.001	Times	999
H93	(I)	0.000 to 10.000 s, 999: Standard value	0.001	s	999
H94	Total motor operation time 1	0 to 9999 (10-hour units)	–	–	–
H95	DC braking (Characteristic selection)	0: Slow response 1: Quick response	–	–	0
H96	STOP key priority/Start check function	0: STOP key priority function disabled, start check function disabled 1: STOP key priority function enabled, start check function disabled 2: STOP key priority function disabled, start check function enabled 3: STOP key priority function enabled, start check function enabled	–	–	0
H97	Alarm data clear	0: No operation 1: Alarm clear	–	–	0
H98	Protection and maintenance function (Operation selection)	Bit 0: Automatic carrier frequency decrease function (0: disabled; 1: enabled) Bit 1: Input open phase protection operation (0: disabled; 1: enabled) Bit 2: Output open phase protection operation (0: disabled; 1: enabled) Bit 3: Main circuit capacitor end-of-life judgment selection (0: factory default setting; 1: user 0 setting) Bit 4: Main circuit capacitor end-of-life judgment (0: disabled; 1: enabled)	–	–	19

* The available setting range may be limited by signs and the number of digits.

* Where a V6 model is replaced by a V7 model, the V6 model H71 function code may be set to "1" . However, because there is no function with the H71 function code on V6 models, there is no need to set the H71 function code to "1" on the V7 model.

V7 Model

Function Selection List

Motor 2 Parameters: A Codes

Function code	Name	Available range	Increments	Unit	Factory default setting values
A01	Max. output frequency 2	25.0 to 400.0 Hz	0.1	Hz	60.0
A02	Base frequency 2	25.0 to 400.0 Hz	0.1	Hz	60.0
A03	Base frequency voltage 2	0V: Output a voltage proportional to the power supply voltage. 80 to 240 V: AVR operation	1	V	0
A04	Max. output voltage 2	80 to 240 V: AVR operation	1	V	200
A05	Torque boost 2	0.0 to 20.0% (A03: % value for base frequency voltage 2)	0.1	%	Applicable motor rating
A06	Electronic thermal (Characteristic selection) (For motor protection)	1: Operation (self-cooling fan/general-purpose motor) 2: Operation (for separately excited fan/inverter (FV) motor)	—	—	1
A07	(Operation level)	0.00 (no operation), current value of 1 to 135% compared to the inverter's rated current	0.01	A	Applicable motor rating
A08	(Thermal time constant)	0.5 to 75.0 min	0.1	min	5.0
A09	DC braking 2 (Start frequency)	0.0 to 60.0 Hz	0.1	Hz	0.0
A10	(Operation level)	0 to 100% (inverter's rated current standard)	1	%	0
A11	(Time)	0.00: (No operation) 0.01 to 30.00 s	0.01	s	0.00
A12	Starting frequency 2	0.1 to 60.0 Hz	0.1	Hz	1.0
A13	Load selection/auto torque boost/ auto energy-saving operation 2	0: Square reduction torque load 1: Constant torque load 2: Auto torque boost 3: Auto energy-saving operation (square reduction torque load) 4: Auto energy-saving operation (constant torque load) 5: Auto energy-saving operation (auto torque boost)	—	—	1
A14	Control method selection 2	0: V/f control (without slip compensation) 1: Dynamic torque vector control 2: V/f control (with slip compensation)	—	—	0
A16	Motor 2 (Capacity)	0.01 to 30.00 kW (A39: when 0, 3 or 4 is selected) 0.01 to 30.00 HP (A39: when 1 is selected)	0.01 0.01	kW HP	Applicable motor rating Applicable motor rating
A17	(Rated current)	0.00 to 100.0 A	0.01	A	Applicable motor rating
A18	(Auto tuning)	0: No operation 1: Stop tuning (%R1, %X) 2: Rotation tuning for V/f control (%R1, %X, no-load current, slip frequency)	—	—	0
A20	(No-load current)	0.00 to 50.0 A	0.01	A	Applicable motor rating
A21	(%R1)	0.00 to 50.0%	0.01	%	Applicable motor rating
A22	(%X)	0.00 to 50.0%	0.01	%	Applicable motor rating
A23	(Slip compensation gain (drive))	0.0 to 200.0%	0.1	%	100.0
A24	(Slip compensation response time)	0.01 to 10.00 s	0.01	s	1.00
A25	(Slip compensation gain (braking))	0.0 to 200.0%	0.1	%	100.0
A26	(Rated slip)	0.00 to 15.00 Hz	0.01	Hz	Applicable motor rating
A39	Motor 2 selection	0: Motor characteristic 0 (standard applicable motor) 1: Motor characteristic 1 (HP representative motor) 3: Motor characteristic 3 (not used) 4: Other	—	—	0
A41	Current vibration suppression gain 2	0.00 to 0.40	0.01	—	0.20
A51	Total motor operation time 2	0 to 9999 (10-hour units)	—	—	—
A52	Startup count 2	For adjustment during replacement (0000 to FFFF (hexadecimal))	—	—	—

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Application Functions: J Codes

Function code	Name		Available range	Increments	Unit	Factory default setting values
J01	PID control	(Operation selection)	0: No operation 1: For process (normal operation) 2: For process (reverse operation)	–	–	0
J02		(Remote command)	0: Touch panel key operation (∧ / ∨ keys) 1: PID process command 1 (analog input terminal 12/C1) 3: UP/DOWN 4: Communication	–	–	0
J03		P (gain)	0.000 to 30.000 times	0.001	Times	0.100
J04		I (integration time)	0.0 to 3600.0 s	0.1	s	0.0
J05		D (differentiation time)	0.00 to 600.00 s	0.01	s	0.00
J06		(Feedback filter)	0.0 to 900.0 s	0.1	s	0.5
J15		(Low flow stop operation frequency level)	0.0 (no operation), 1.0 to 400.0 Hz	0.1	Hz	0.0
J16		(Low flow stop elapsed time)	0 to 3600 s	1	s	30
J17		(Starting frequency)	0.0 to 400 Hz	0.1	Hz	0.0
J23		(Low flow stop activation deviation level)	0.0 to 100.0%	0.1	%	0.0
J24		(Startup wait time for low flow stop)	0 to 3600 s	1	s	0
J68	Brake signal	(Release current)	0 to 200%	1	%	100
J69		(Release frequency)	0.0 to 25.0 Hz	0.1	Hz	1.0
J70		(Release timer)	0.0 to 5.0 s	0.1	s	1.0
J71		(Insertion frequency)	0.0 to 25.0 Hz	0.1	Hz	1.0
J72		(Insertion timer)	0.0 to 5.0 s	0.1	s	1.0

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Link Functions: y Codes

Function code	Name		Available range	Increments	Unit	Factory default setting values
y01	RS485 communication setting 1	(Station address)	1 to 255	1	–	1
y02		(Operation selection in the event of errors)	0: Er8 trip immediately 1: Er8 trip after the timer time expires 2: Performs a communication retry while the timer is running, and triggers a Er8 trip if communication is not restored. If communication is restored, operation continues 3: Operation continuation	–	–	0
y03		(Timer time)	0.0 to 60.0 s	0.1	s	2.0
y04		(Transmission rate)	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps	–	–	3
y05		(Data length selection)	0: 8 bits 1: 7 bits	–	–	0
y06		(Parity bit selection)	0: None (for RTU, stop bit is 2 bits) 1: Even parity (for RTU, stop bit is 1 bit) 2: Odd parity (for RTU, stop bit is 1 bit) 3: None (for RTU, stop bit is 1 bit)	–	–	0
y07		(Stop bit selection)	0: 2 bits 1: 1 bit	–	–	0
y08		(Communication disconnection detection time)	0: No detection, 1 to 60 s	1	s	0
y09		(Response interval time)	0.00 to 1.00 s	0.01	s	0.01
y10		(Protocol selection)	0: Modbus RTU protocol 1: SX protocol (loader protocol) 2: V7 series inverter protocol	–	–	1
y97	Communication data save method selection		0: Store in non-volatile memory (limit on number of times) 1: Store in temporary storage (no limit on number of times) 2: Save all from temporary storage to non-volatile memory (reverts to data 1 after execution)	–	–	0
y99	Link function for assistance	(Operation selection)	Frequency command / Run command 0: Using H30 / Using H30 1: Command from loader / Using H30 2: Using H30 / Command from loader 3: Command from loader / Command from loader	–	–	0

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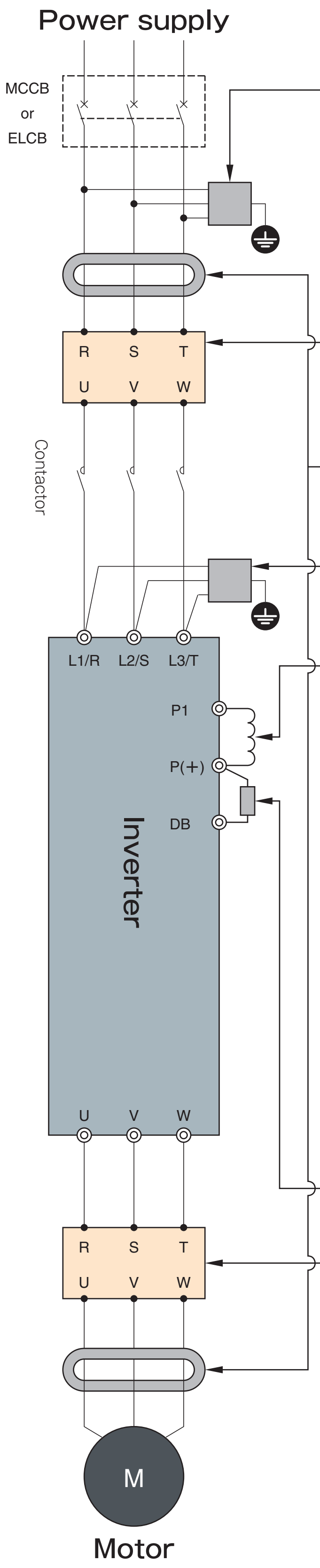
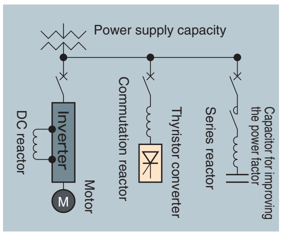
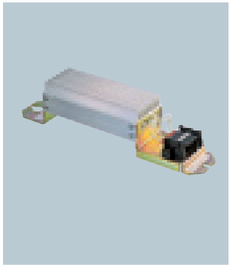
Option

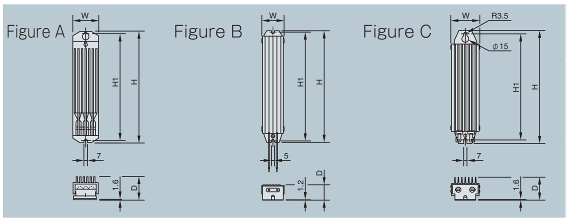
Option Guide



Name	Main application/use
Surge absorber	Absorb surge and noise intruding from outside to prevent malfunction of devices such as an electromagnetic contactor, control relay, and timer.
Arrestor	Used to absorb induced lightning surge from the power supply to protect all the devices connected to the power supply.
Surge killer	Applied to absorb surge and noise intruding from outside to prevent malfunction of electronic devices used on the board.
Frequency setter	Used as an external knob to set the frequency.
Frequency indicator	Indicate the frequency using an output signal from the inverter.
AC reactor（ACR）	Used as a reactor for improving the power factor and coordinating the power supply. However, the use of a more effective and smaller and lighter DC reactor is recommended. Use a DC reactor (DCR) to prevent harmonics. Use it for applications that particularly require stable power supply, such as DC bus connection operation (PN connection operation)
Zero-phase reactor for reducing radio noise	Used to reduce radio noise. It is recommended to insert it on the power supply side if the wiring distance between the motor and inverter is short (about 20 m or less), and insert it on the output side if the distance is longer than 20 m.
Filter capacitor for reducing radio noise	Used to reduce noise. Noise can be effectively reduced in the AM radio frequency band (1 MHz or less) Never connect it to the output side of the inverter.
DC reactor（DCR）	[For coordinating the power supply] (1) Use this if the power-supply transformer capacity is 500 kVA or more and is more than 10 times the inverter rated capacity. (2) Use this if a thyristor converter is connected as a load of the same transformer. Note that if a commutation reactor is not used in the thyristor converter, an AC reactor is required on the input side of the inverter.  (3) If a OU trip occurs with the inverter due to opening/closing the phase advance capacitor in the power supply system, connect this to prevent the trip. (4) Use this if there is 2% or more unbalance between phases in the power supply voltage. Unbalance between phases [%] = $\frac{\text{Max. voltage [V] - min. voltage [V]}}{\text{Three-phase average voltage [V]}} \times 67$ (as per IEC61800-3 (5.2.3)) [For improving the Input power factor and reducing harmonics] Used to reduce the input harmonic current (improve the power factor). * For the reduction effect, refer to the document attached to the guidelines, etc.
Braking resistor	Used to increase braking capability for applications involving frequent starting/stopping and a large moment of inertia.
Filter for output circuit	Connect this to the output side of the inverter for use for the following purposes. (1) Vibration suppression of motor terminal voltage Prevent damage to the motor insulation caused by a surge voltage in the inverter. (2) Suppression of output side wiring leakage current Reduce leakage current in parallel operation of multiple motors and long-distance wiring. (3) Suppression of radiation noise and induced noise from the output side wiring Effective in reducing noise if long-distance wiring is used in plants, etc.
Extension cable for remote operation	Used to connect to devices such as the remote touch panel via RS-485 communication.
Remote touch panel	Used to remotely operate the inverter.
Inverter assistance loader software	Inverter assistance loader for Windows to facilitate the setting of function code

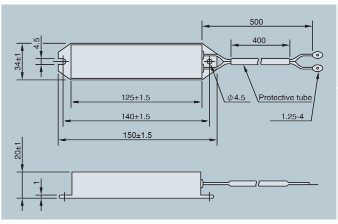
Braking resistor

Exterior	Braking resistor types	Inverter type	Braking resistor model	Resistance [Ω]	Max. braking torque			Continuous braking (100% torque conversion value)		Repeated braking (frequency 100 [s] or less)	
					[%]	50 Hz [N・m]	60 Hz [N・m]	Discharge withstand current rating [kWs]	Braking time [s]	Allowable average loss [kW]	Utilization rate [%ED]
	Standard	V7-04-4	DB0.75-2	100	150	4.02	3.32	9	45	0.044	22
		V7-07-4	DB0.75-2	100	150	7.57	6.25	17	45	0.068	18
		V7-15-4	DB2.2-2	40	150	15.0	12.4	34	45	0.075	10
		V7-22-4	DB2.2-2	40	150	22.0	18.2	33	30	0.077	7
		V7-37-4	DB3.7-2	33	150	37.1	30.5	37	20	0.093	5
	10%ED	V7-04-4	DB0.75-2C	100	150	4.02	3.32	50	250	0.075	37
		V7-07-4	DB0.75-2C	100	150	7.57	6.25	50	133	0.075	20
		V7-15-4	DB2.2-2C	40	150	15.0	12.4	55	73	0.110	14
		V7-22-4	DB2.2-2C	40	150	22.0	18.2	55	50	0.110	10
		V7-37-4	DB3.7-2C	33	150	37.1	30.5	140	75	0.185	10



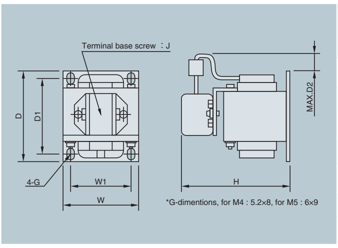
Types	Model	Figure	W [mm]	H [mm]	H1 [mm]	D [mm]	Mass [kg]
Standard	DB0.75-2	A	68	310	295	67	1.3
	DB2.2-2	A	80	345	332	94	2.0
	DB3.7-2	A	80	345	332	94	2.0
10%ED	DB0.75-2C	B	43	221	215	30.5	0.4
	DB2.2-2C	C	67	188	172	55	0.8
	DB3.7-2C	C	67	328	312	55	1.4

Braking resistor [Small type]



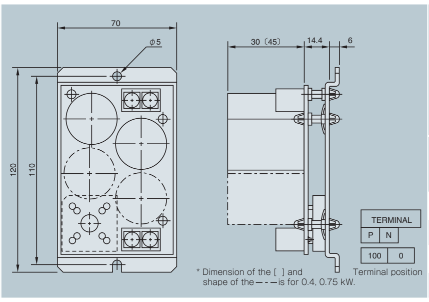
Model	Resistance		Applied inverter model	Average braking torque [%]	Allowable braking characteristic		Braking unit
	Capacity [kW]	Resistance [Ω]			Allowable braking frequency [%]	Allowable continuous braking time [s]	
TK80W120Ω	0.08	120	V7-04-4	150	15	15	No need
			V7-07-4	150	5	15	No need
			V7-15-4	150	5	10	No need
			V7-22-4	65	5	10	No need
			V7-37-4	45	5	10	No need

DC reactor (DCR)



Applied inverter model	Reactor model	W [mm]	W1 [mm]	D [mm]	D1 [mm]	D2 [mm]	G [Nominal dia.]	H [mm]	J [Nominal dia.]	Mass [kg]
V7-01-4	DCR2-0.2	66	56	90	72	5	M4	94	M4	0.8
V7-02-4	DCR2-0.2	66	56	90	72	5	M4	94	M4	0.8
V7-04-4	DCR2-0.4	66	56	90	72	15	M4	94	M4	1.0
V7-07-4	DCR2-0.75	66	56	90	72	20	M4	94	M4	1.4
V7-15-4	DCR2-1.5	66	56	90	72	20	M4	94	M4	1.6
V7-22-4	DCR2-2.2	86	71	100	80	10	M5	110	M4	1.8
V7-37-4	DCR2-3.7	86	71	100	80	20	M5	110	M4	2.6

Voltage Doubler Unit



* Dimension of the [ ] and shape of the — - — is for 0.4, 0.75 kW.

By using this voltage doubler unit, 0.75 kW or lower models (3-phase 200 V input) can be used in with a single-phase 100 V power supply.
The driving motor is three-phase 200 V.
***Rated input AC voltage: Single-phase 100 to 115 V, 50/60 Hz**
***Rated output voltage: 255 to 280 VDC**

Applied inverter model	Voltage doubler unit model	Rated capacity [kVA]
V7-01-4	CAPA6-0.2	0.5
V7-02-4	CAPA6-0.2	0.5
V7-04-4	CAPA6-0.4	1.1
V7-07-4	CAPA6-0.75	1.8

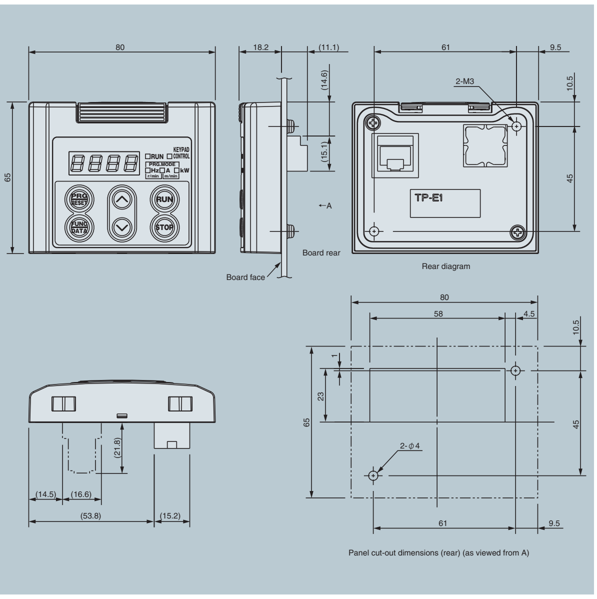
V7 Model

Option

Remote Touch Panel (TP-E1)

The remote touch panel allows you to remotely operate and display data for the V series (with copy function).

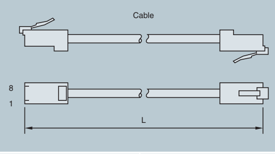
* Requires a separate extension cable for remote operation.



Extension Cable for Remote Operation

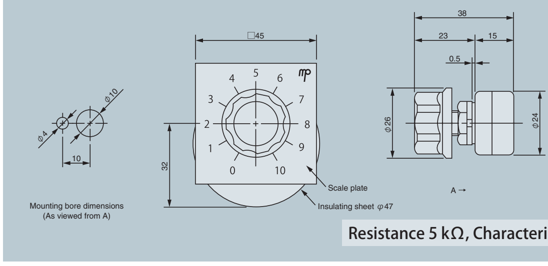
Cable for connecting the remote touch panel via RS-485 communication.

Straight cable is available in 3 lengths: 1, 3, and 5 m



Model	Length L [m]
CB-1S	1
CB-3S	3
CB-5S	5

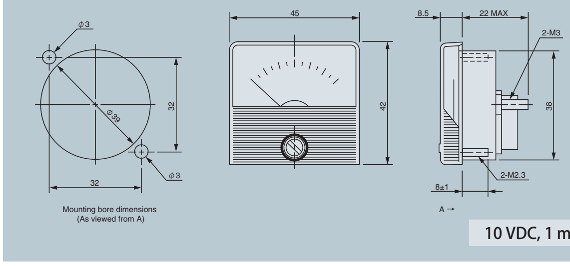
Frequency Setter <for VR Set 24 (B5K Ohm)>



Resistance 5 kΩ, Characteristics B

Frequency Meter (TRM-45-V6)

The output frequency can be measured by connecting the frequency meter to control circuit terminals FMA and 11 on the inverter.



10 VDC, 1 mA

Wiring Applied Devices

Inverter type	Standard applied motor	Molded case circuit breaker (MCCB) Earth leakage circuit breaker (ELCB) Rated current [A]		Electromagnetic contactor (MC)			Recommended wire size [mm²]				
				Input circuit		Output circuit	Input circuits [L1/R, L2/S, L3/T]		Output circuit (U, V, W)	DC link circuit [P1, P(+)]	Braking circuit [P(+), DB, P(−)]
	[kW]	With DCR	No reactor	With DCR	No reactor		With DCR	No reactor			
V7-01-4	0.1	5	5	SC-05	SC-05	SC-05	2.0	2.0	2.0	2.0	−
V7-02-4	0.2	5	5	SC-05	SC-05	SC-05	2.0	2.0	2.0	2.0	−
V7-04-4	0.4	5	5	SC-05	SC-05	SC-05	2.0	2.0	2.0	2.0	2.0
V7-07-4	0.75	5	10	SC-05	SC-05	SC-05	2.0	2.0	2.0	2.0	2.0
V7-15-4	1.5	10	15	SC-05	SC-05	SC-05	2.0	2.0	2.0	2.0	2.0
V7-22-4	2.2	10	20	SC-05	SC-05	SC-05	2.0	2.0	2.0	2.0	2.0
V7-37-4	3.7	20	30	SC-05	SC-4-0	SC-05	2.0	5.5	3.5	3.5	2.0

* The model frame and series for the molded case circuit breaker (MCCB) and earth leakage circuit breaker (ELCB) differ depending on the capacity of the transformer provided. Choose a model based on the information in the breaker catalog and the technical data. * The rated sensed current for the earth leakage circuit breaker (ELCB) should also be selected based on the technical data. The rated currents for the MCCB and ELCB in this table are for an SA□B/□ or SA□R/□. * The magnetic contactor (MC) model shown is manufactured by Fuji Electric FA Components & Systems Co., Ltd.

- The recommended wire size is under the board temperature condition of 50℃ or less.
- The type of wire is for a 600 V, HIV-insulated single wire (at 75℃).
- The actual values may differ from those in the table above depending on conditions such as the ambient temperature and power supply voltage.

Items Checked for Design Purposes

Motor operation

■ Torque characteristics and temperature rise

If a general-purpose motor is operated with an inverter, the temperature rises slightly higher than when operating using commercially available batteries. Reduce the output torque as the cooling effect decreases at low speeds. If you need to perform constant torque operation at low speeds, use an "inverter motor" or a motor with "separately-driven draft fan."

■ Vibrations

If a motor operated with an inverter is mounted in a machine, resonance may occur due to the natural frequency of the machine system, etc.

If a 2-pole motor is operated at 60 Hz or more, abnormal vibrations may occur.

* Consider using our CENTAFLEX coupling or anti-vibration rubber.

* Use the "jump frequency" function of the inverter to avoid the resonance point.

■ Noise

If a general-purpose motor is operated with an inverter, noise may be slightly louder than when operating using commercially available batteries. Set the carrier frequency of the inverter higher to reduce the noise. If high-speed operation is performed at 60 Hz or more, wind noise may be louder.

Application of special motors

■ High-speed motor

If you set the frequency of the inverter to 120 Hz or more to operate a high-speed motor, carry out a compatibility test with the motor beforehand to ensure operation can be performed safely.

■ Explosion-proof motor

If you drive an explosion-proof motor with an inverter, you need to use an inverter and motor whose compatibility has been tested and verified.

■ Submersible motor/Submersible pump

The rated current of a submersible motor and pump is generally greater than that of a general-purpose motor. Select an inverter with a rated output current greater than the rated current of the motor. Set the "thermal time constant" for the electronic thermal function to a smaller value according to the motor you use as the thermal characteristics differ among motors.

■ Brake motor

For a motor with a parallel brake, be sure to connect the brake power supply to the input side (primary side) of the inverter. If connected to the output side (secondary side) of the inverter, power cannot be supplied to the brake so the brake may not work. It is not recommended to drive a motor with a serial brake using an inverter.

■ Geared motor

If you use an oil lubricated gearbox or speed changer/reducer as the power transmission mechanism, continuous operation at low speeds only results in a decrease in the effect of oil lubrication. Do not perform continuous operation at low speeds only.

■ Synchronized motor

Special support according to the type of motor is required. Please contact Miki Pulley individually.

■ Single-phase motor

A single-phase motor is not suitable for variable operation using an inverter. Use a three-phase motor as the inverter produces a three-phase output even in a single-phase power supply.

Ambient environment

■ Installation location

Use the inverter within the "allowable operating temperature (-10 to +50℃)." Install the inverter on an inflammable (e.g. metallic) surface as the "cooling fin" and "braking resistor" in the inverter may rise in temperature under some operation conditions of the inverter. Install the inverter in a location that meets the "environmental conditions" of the inverter.

Connecting peripheral devices

■ Installing the Molded case circuit breaker

Install the recommended molded case circuit breaker (MCCB) or earth leakage circuit breaker (ELCB) (with overcurrent protection function) on the input side (primary side) of the inverter for wiring protection. Do not use devices with a capacity greater than the recommended capacity.

■ Output side (secondary side) electromagnetic contactor

If an electromagnetic contactor is to be installed on the output side (secondary side) of the inverter for switching to a commercially available power supply or other purposes, perform the switch while both the inverter and motor are stopped. Remove the surge killer integrated into the electromagnetic contactor.

■ Input side (primary side) electromagnetic contactor

Make sure the open/close operation is not performed using the electromagnetic contactor on the input side (primary side) frequently (more than once per hour). It may cause an inverter failure. If running and stopping is required frequently, do it using signals of the control circuit terminals FWD and REV.

■ Motor protection

The motor can be protected using "the electronic thermal" function of the inverter.

Set the "operation level" and the type of motor (general-purpose motor or inverter motor). For a high-speed motor and water-cooling motor, set the "thermal time constant" lower, and separately protect the motor in combination with the "cooling system disconnection" detection. If you use a motor thermal relay, a trip may occur if the current is less than the set value for the thermal relay, due to the influence of harmonic current flowing through the floating capacitance of wiring if the wiring distance to the motor is long. In such a case, lower the carrier frequency or use an output circuit filter (OFL)

■ Not using a capacitor for improving power factor

Do not install a capacitor for improving the power factor on the primary side of the inverter as it does not produce any effect. Use a "DC reactor" to improve the power factor of the inverter. Furthermore, do not install the capacitor for improving the power factor on the secondary side of the inverter. Doing so may cause an "overcurrent trip" to stop the inverter.

■ Not using a surge killer

Do not install a surge killer on the secondary side of the inverter.

■ Anti-noise measures

The EMC Directive must generally be met, and it is recommended to connect a filter and use shielded wiring.

■ Anti-surge measures

If an "0U trip" occurs while the inverter is stopped or during light-load operation, the open/close surge of the advance phase capacitor in the power supply system is considered to be the cause. Application of a "DC reactor" is recommended as a measure on the inverter side.

■ Megger test

When you carry out a megger test of the inverter main unit, use a 500 V megger and carry out the test in accordance with the instructions in the instruction manual.

Wiring

■ Control circuit wiring distance

When you perform remote operation, make sure the wiring distance between the inverter and operation box is 20 m or less, and use a twisted shielded wire for wiring.

■ Wiring distance between inverter and motor

If the wiring distance between the inverter and motor is great, the inverter may overheat or an overcurrent trip may occur due to the influence of harmonic current flowing through the floating capacitance between the wires of different phases. Make sure the distance is about 50 m or less. If the distance is greater than 50 m, lower the carrier frequency or use an output circuit filter (OFL).

■ Wire size

Select a large enough wire by reference to the current value and recommended wire size.

■ Type of wire

Do not use a multi-core cable for connecting multiple inverters and multiple motors.

■ Ground wiring

Be sure to ground the inverter using the ground terminal.

Capacity selection

■ General-purpose motor drive

Generally select the capacity for the "standard applied motor" in the inverter list. If you need a large starting torque or acceleration/deceleration in a short period of time, select an inverter capacity that is larger by one than the nominal one.

■ Special motor drive

Generally select the capacity under the condition "the inverter rated current is larger than motor rated current."

Transportation/storage

When you transport and store the inverter, select the method and location that meet the environmental conditions in the inverter specifications column.

Cylindrical Linear Motors

LINEAR SHAFT DRIVES

Application Optical equipment, semiconductor manufacturing equipment, food machinery, inspection equipment

Cylindrical Linear Motor System with Unique Control Method

A permanent magnet is placed in the shaft. A coil is wrapped around the magnet to make the cylindrical linear motor system. A cylindrical shape enables the coil to capture magnetic flux around its whole circumference to ensure it can be efficiently converted to thrust. Thus, high thrust can be obtained even with a small-diameter shaft. The most significant feature is the unique control method. It can detect the position using magnetic flux generated from the shaft so devices such as an external linear scale can be eliminated and a simple system can be built.

Linear Scale Is Not Required

Since magnetic flux generated from the shaft is used to detect the position, you do not need to provide an external position sensor and origin sensor.

Positioning Operation Function Is Included

Since a positioning operation function is included in the driver, an external controller is not required to perform positioning operation. Pressing operation and continuous operation can also easily be performed. (Repeated positioning accuracy: ± 10 μ m)

Dustproof and Waterproof

The moving part is made of A6063S, the shaft is made of SUS304, and the product is dustproof and waterproof with JIS protection class IP65. The product can be used in various environments. (With the exception of the connector area and driver)

Automatic Magnetic Pole Detection Is Available

Since a built-in position sensor detects the magnetic pole position of the shaft, thrust is generated immediately after power-on.

Available Models

Series	Thrust	Lineup
LINEAR SHAFTS	Thrust: 11 N to 25 N	SHM-16+SHD2-06
	Thrust: 28 N to 118 N	SHM-16+SHD2-06
	Thrust: 150 N	SHM-35+SHD-16

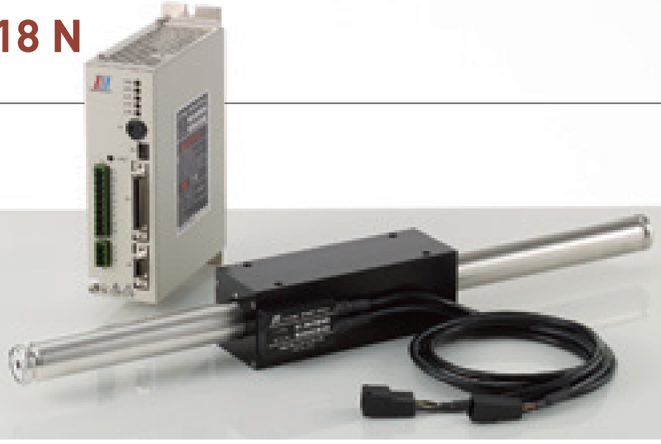
Rated Thrust: 11 N to 25 N

(Max. Thrust 51 N to 117 N)

- Shaft diameter: ø16 mm
- Number of coil sets: 2, 3, or 5
- Max. speed: 4,000 mm/s
- Effective stroke length: 199 to 1,045 mm
- Number of positioning points: 32
- Number of speed settings: 32
- Vibration suppression control

Rated Thrust: 28 N to 118 N

(Max. Thrust 126N to 532N)



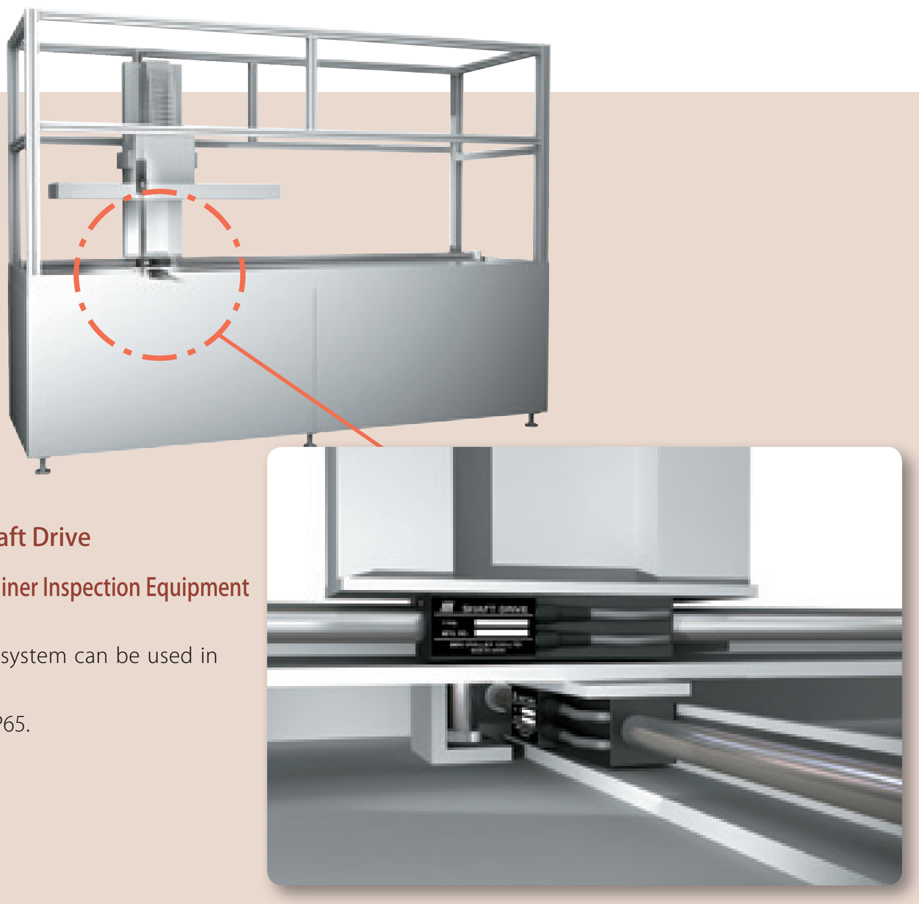
- Shaft diameter: ø25 mm
- Number of coil sets: 2, 4, 6, or 8
- Max. speed: 2,600 to 4,000 mm/s
- Effective stroke length: 117 to 1,041 mm
- Number of positioning points: 32
- Number of speed settings: 32
- Vibration suppression control

Rated Thrust: 150 N

(Max. Thrust: 700 N)

- Shaft diameter: ø35 mm
- Number of coil sets: 6
- Max. speed: 2,500 mm/s
- Effective stroke length: 233 to 1,253 mm
- Number of positioning points: 32
- Number of speed settings: 10

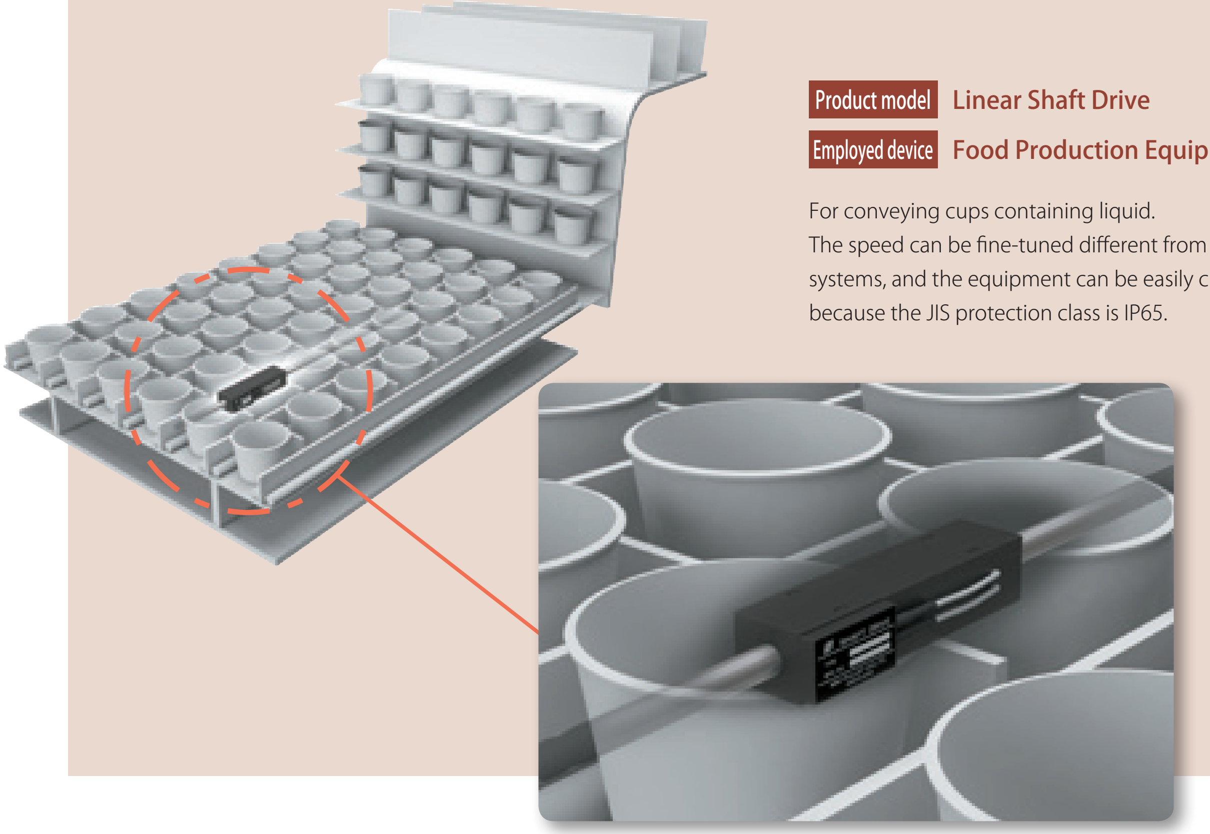
Applications



Product model Linear Shaft Drive

Employed device Food Container Inspection Equipment

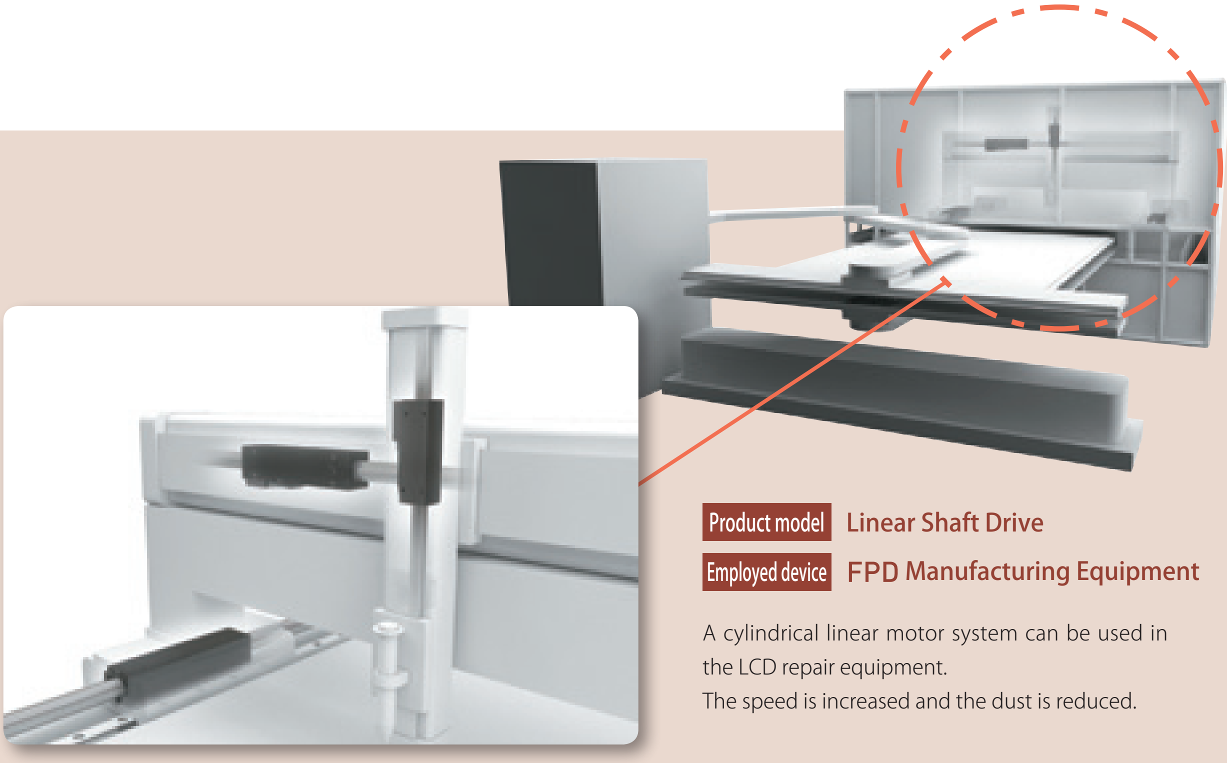
A cylindrical linear motor system can be used in the conveyor drive unit.
The JIS protection class is IP65.



Product model Linear Shaft Drive

Employed device Food Production Equipment

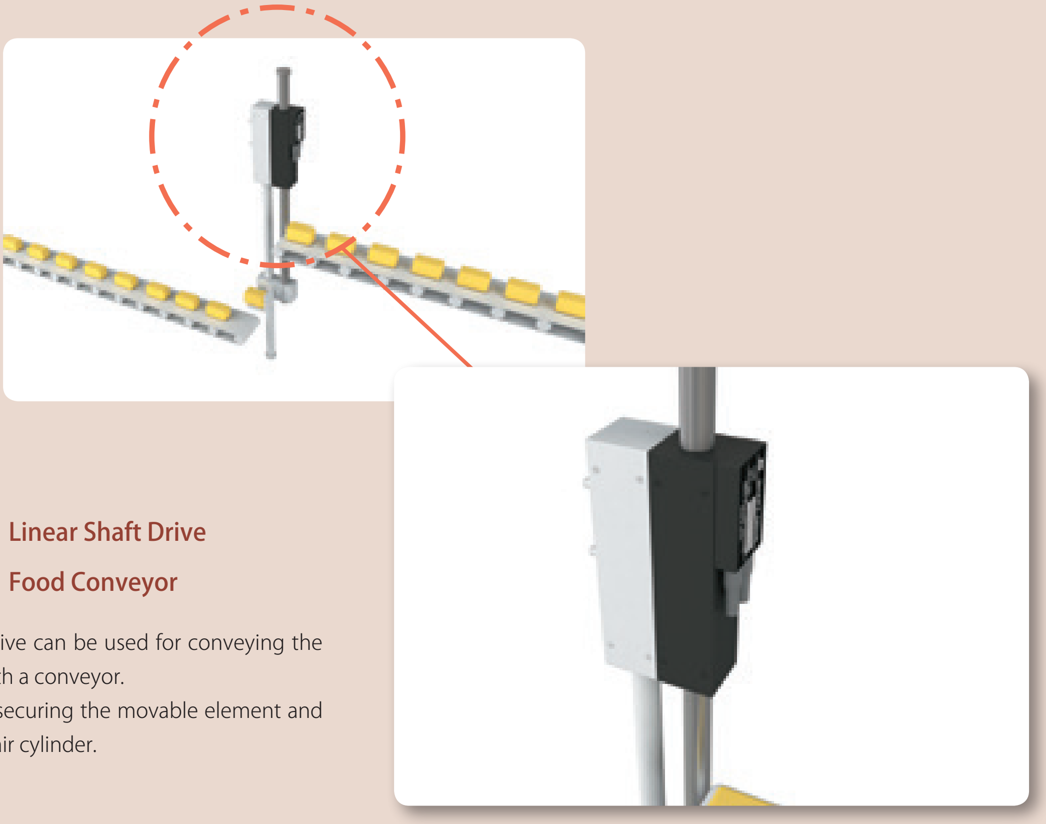
For conveying cups containing liquid.
The speed can be fine-tuned different from air systems, and the equipment can be easily cleaned because the JIS protection class is IP65.



Product model Linear Shaft Drive

Employed device FPD Manufacturing Equipment

A cylindrical linear motor system can be used in the LCD repair equipment.
The speed is increased and the dust is reduced.



Product model Linear Shaft Drive

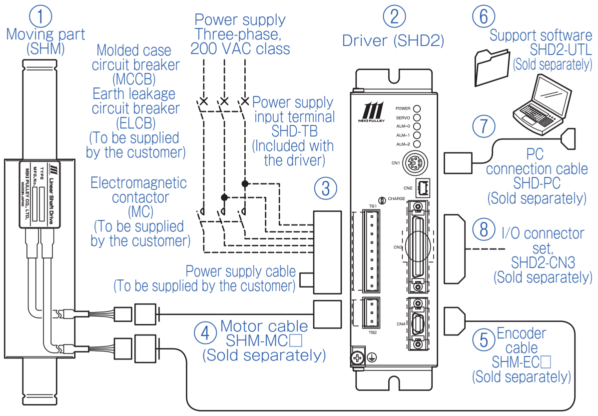
Employed device Food Conveyor

Linear shaft drive can be used for conveying the rolled eggs with a conveyor.
Motorized by securing the movable element and replacing the air cylinder.

MODELS
SHM-16+SHD2-06
SHM-25+SHD2-08
SHM-35+SHD-16

Rated Thrust: 11 N to 25 N

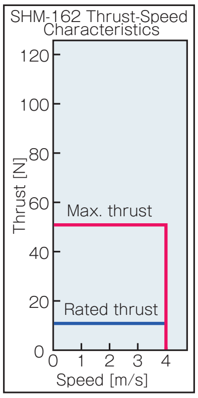
System Configuration

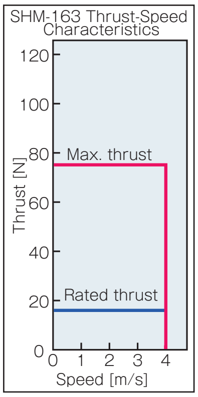


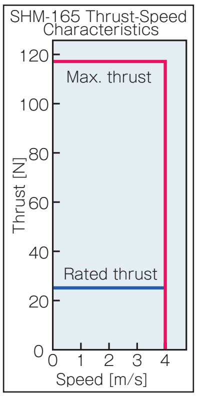
No.	Name	Description
①	Moving part	Consists of a moving part (coil) and shaft (magnet).
②	Driver	For operating the moving part.
③	Power supply input terminal	For connecting the power cable. (Included in the driver)
④	Motor cable	For connecting the driver and the motor of the moving part. (Sold separately)
⑤	Encoder cable	For connecting the driver and the encoder of the moving part. (Sold separately)
⑥	Support software	For configuring and changing the settings of the driver on a PC. (Sold separately)
⑦	PC connection cable	For connecting to a PC. (Sold separately)
⑧	I/O connector set	Connector for inputting/outputting command signals to the driver (Sold separately)

Moving Part Specifications

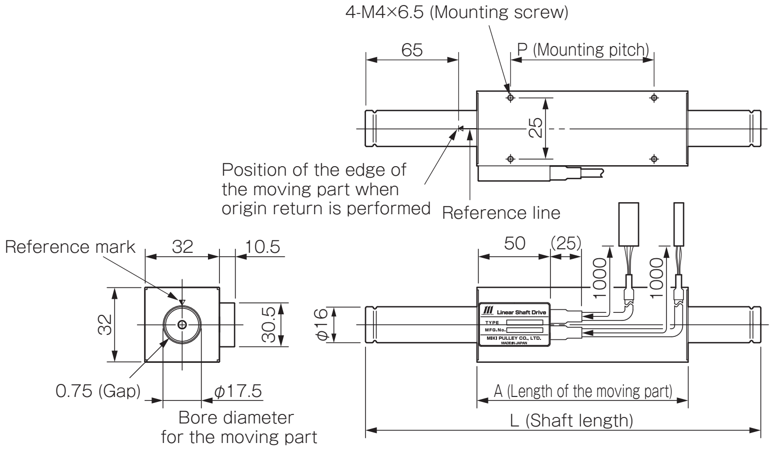
Model	SHM-162	SHM-163	SHM-165
Number of coil sets	2	3	5
Rated thrust	11 N	16 N	25 N
Max. thrust	51 N	75 N	117 N
Max. speed	4000 mm/s		
Rated current	0.64 A rms		
Max. current	3.0 A rms		
Time rating	Continuous		
Ambient temperature	0～40 ℃		
Ambient humidity	80% relative humidity or under (with no condensation)		
Insulating resistance	500 VDC 10 M Ω or more		
Dielectric strength voltage	1,500 VAC for 1 minute		
Heat resistance class	Class F (coil part)		
Structure	Fully-closed, self-cooling		
Shaft unit mass	0.0015 kg/mm		
Moving part mass	0.25 kg	0.33 kg	0.50 kg







Moving Part Dimensions



Unit [mm]

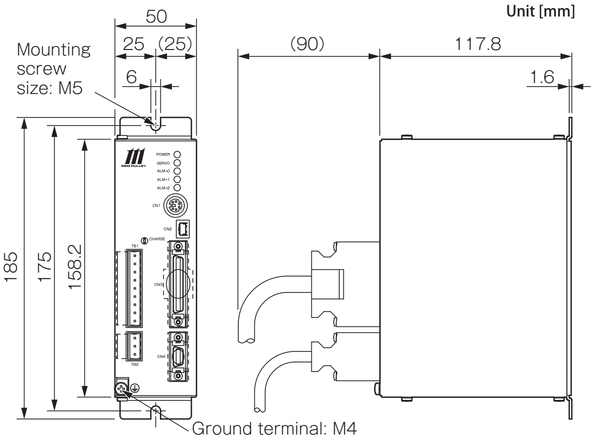
Model	A	P	Effective stroke length						
			L=472	L=600	L = 728	L=856	L=984	L=1112	L=1240
SHM-162	94	64	277	405	533	661	789	917	1045
SHM-163	120	90	251	379	507	635	763	891	1019
SHM-165	172	142	199	327	455	583	711	839	967

Driver Specifications

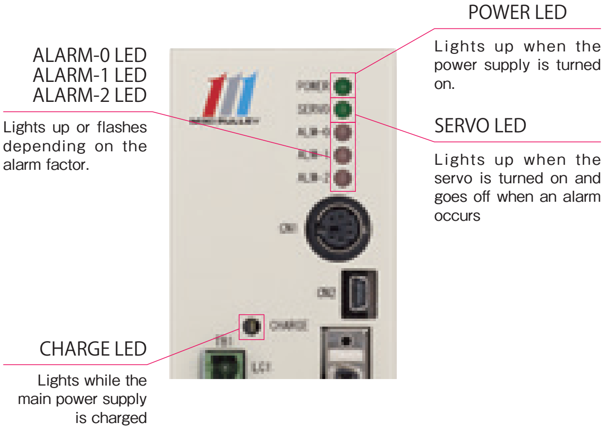
Model		SHD2-06-162	SHD2-06-163	SHD2-06-165
Number of coil sets in moving part		2	3	5
Input voltage		Main power supply: Three-phase 200 VAC, Control power supply: Single-phase 200 VAC		
Input power supply range (common)		200 to 230 VAC +10 to -15%　50/60 Hz　± 5%		
Rated continuous output current		0.64 A rms		
Max. current (limit)		3.0 A rms		
Max. instantaneous current (peak value)		6.0 A peak		
Power supply equipment capacity		0.6 kVA		
Position command pulse input	Signal	Line driver signal		
	Input method	Select one from 2-pulse, 1-pulse, and 2-phase pulse		
	Max. frequency	4 M pulses/s		
Input signal		Total 20 dedicated inputs and general-purpose inputs		
Output signal		Total 20 dedicated outputs and general-purpose outputs		
Limit function		Speed limit, thrust limit, and movable range limit		
Protection function		Overload, overcurrent, overvoltage, sensor disconnection, memory error		
Built-in positioning function		Number of positioning points: 32, Number of speed settings: 32		
Support software (SHD2-UTL)		Parameter configuration, monitor display, program editing/configuration, saving data and transferring data to driver		
Ambient temperature		0 ～ 40℃ (with no condensation)		
Ambient humidity		80% relative humidity or under (with no condensation)		
Mass		0.9 kg		

Driver Dimensions

Unit [mm]



Driver Display Panel



POWER LED

Lights up when the power supply is turned on.

ALARM-0 LED
ALARM-1 LED
ALARM-2 LED

Lights up or flashes depending on the alarm factor.

SERVO LED

Lights up when the servo is turned on and goes off when an alarm occurs

CHARGE LED

Lights while the main power supply is charged

How to Place an Order

● Moving Part

SHM - 162 - 472

- Shaft diameter (ϕ16): 16
- No. of coil sets: 2
- Shaft length (L dimension): 472

● Driver Part

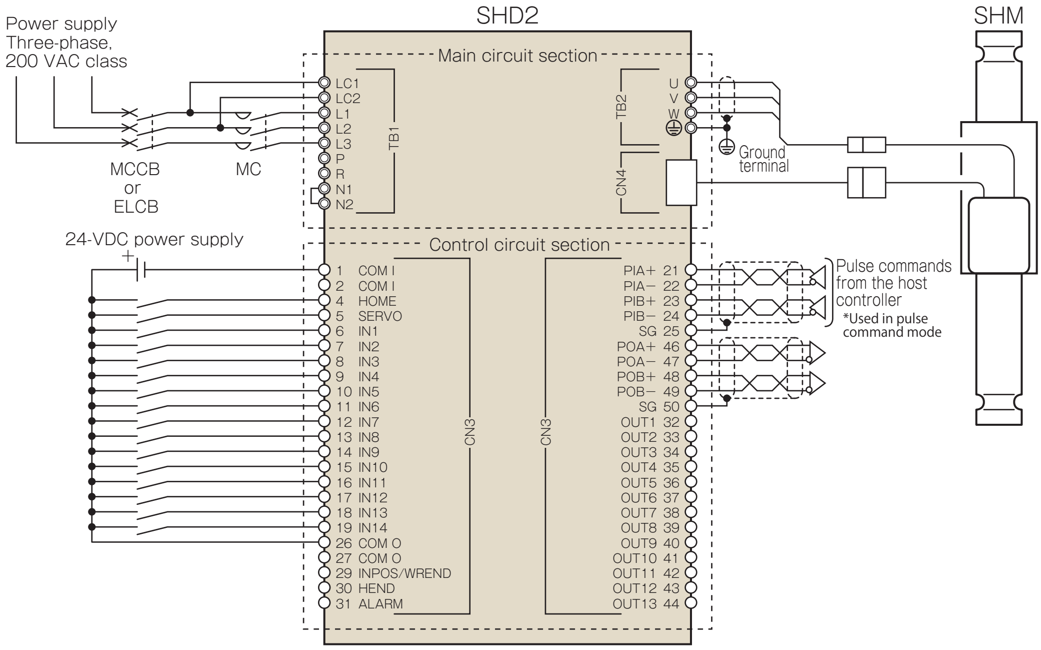
SHD2 - 06 - 162

- Max. instantaneous current 6.0 A peak: 06
- Shaft diameter of the corresponding moving part (ϕ16): 16
- No. of coil sets for the corresponding moving part: 2

*The moving part, shaft, and driver are finely adjusted as a set and can only be run in the combination put together at the time of shipment.

Rated Thrust: 11 N to 25 N

Basic Wiring Diagram



Input/Output Signal Connector Array (CN3)

Input Part

Pin no.	Terminal symbol	Signal name
1	COMI	Coupler input common
2	COMI	Coupler input common
3	NC	Not used
4	HOME	Origin return
5	SERVO	Servo ON
6 ～ 19	IN1 ～ IN14	General-purpose inputs 1 to 14
20	NC	Not used
21	PIA＋	Command pulse A input ＋
22	PIA－	Command pulse A input －
23	PIB＋	Command pulse B input ＋
24	PIB－	Command pulse B input －
25	SG	Signal ground

Arbitrary assignment in the general-purpose input assignment function (IN1 to IN14)
Start signal
Pause
Program reset/alarm clear
Point selection (1, 2, 4, 8, 16)
Point write
Emergency stop input
Gain switching
＋jog drive / －jog drive
Deviation counter clear input
Thrust limit selection (1, 2, 4, 8, 16)
Electronic gear switching
Operation mode selection

Output Part

Pin no.	Terminal symbol	Signal name
26	COMO	Coupler output common
27	COMO	Coupler output common
28	NC	Not used
29	INPOS	Positioning completion
30	HEND	Origin return completion
31	ALARM	Alarm
32 ～ 44	OUT1 ～ OUT13	General-purpose outputs 1 to 13
45	NC	Not used
46	POA＋	Command pulse A output ＋
47	POA－	Command pulse A output －
48	POB＋	Command pulse B output ＋
49	POB－	Command pulse B output －
50	SG	Signal ground

Arbitrary assignment in the general-purpose output assignment function (OUT1 to OUT13)
Alarm code output (1 to 3)
Ready output
Point completion output (1, 2, 4, 8, 16)
Point write completion
Output when thrust is limited
Zone output (0 to 7)
Zero speed
Moving
Overload alarm
Brake release output
Current operation mode

* Install the molded case circuit breaker (MCCB) or earth leakage circuit breaker (ELCB) (with overcurrent protection function) on the input side (primary side) of the driver for wiring protection.
Do not use a circuit breaker with a capacity greater than the recommended capacity. * Install an electromagnetic contactor (MC) if you want to isolate the driver from the power supply separate from MCCB or ELCB.
* Use a twisted wire for the control signal wire.
* Ground the shielded wire. * To prevent malfunction caused by noise, place the main circuit wire so that it is as far away as possible from the control signal wire, and never place the wires in the same duct.
* Be sure to refer to the instruction manual when you actually connect wires.

Parameters

Category	Name	Default	Unit	Description
Common	Control mode	Procon	—	Set the control mode of the driver [Procon] Program control [Pulse] Control by pulse command input
	Sensor selection	Built-in	—	Set the type of position sensor [Built-in] Built-in sensor of the moving part [Incremental combination] Combined use of the built-in sensor and external incremental encoder
	External sensor resolution	100000	nm	Set the resolution of the external encoder. Setting range: 0 to 100000
	Pulse output setting numerator	1	—	Set the number of pulses to output from the pulse output (CN3 46 to 49 pins). Setting range: 1 to 9999 Amount of movement for one output pulse = (feedback pulse electronic gear denominator / feedback pulse electronic gear numerator) x sensor resolution
	Pulse output setting denominator	1	—	
	Positioning completion range	100	(Pulse)	Set a value to determine the positioning completion output (deviation amount). Setting range: 1 to 40000000
	Positioning completion condition	Command & Deviation	—	Set the positioning determination condition [Command & Deviation] Determine that the positioning is completed when there is no command and the deviation amount is less than the set value [Command & Deviation + Zero Speed] Determine that the positioning is completed when there is no command, the deviation amount is less than the set value, and the speed is less than the lower limit of the zero speed range
	Allowable position deviation	1000	(Pulse)	Set a value to determine the allowable deviation error. Setting range: 0 to 40000000 "Deviation error" alarm occurs when this range is exceeded.
	Thrust limit	1000	%	Set this value when the user wants to reduce the maximum thrust. Setting range: 0 to 1000 100% is equivalent to the rated thrust of the motor * A value greater than the maximum thrust of the motor cannot be set.
	Movable limit +	30000	(Pulse)	Set this value to narrow the movable range. Setting range: -40000000 to 40000000
	Movable limit -	0	(Pulse)	
	Brake operation A delay time	0	ms	Set the time from when the brake release output is turned off to when the motor power is turned off in order to turn off the servo while the moving part is stopped. Setting range: 0 to 1000
	Brake operation B delay time	0	ms	Set the time from the detection of the off state of the servo on input signal to when the brake release output is turned off in order to turn off the servo while the moving part is moving. Setting range: 0 to 1000
	Brake operation switching value	1000	(Pulses/s)	Speed setting to determine whether to perform brake operation while the motor is stopped or in operation. Setting range: 0 to 40000000 * The brake operation is performed while the motor is stopped if the speed is less than the set value, and while in operation if the speed is the same or greater than the set value.
	Zero speed range	1000	(Pulses/s)	Set a value to determine the zero speed. Setting range: 0 to 40000000 * Zero speed is determined when the speed is less than the set value.
	Overload warning detection value	0	%	Set a value to determine the overload warning output. Setting range: 0 to 100 * When the load factor exceeds this value, the "overload warning output" turns on.
Origin return	Origin return method	Built-in Origin	—	Select the origin return method. [Built-in Origin] Turns around at the built-in origin and is completed at the reference position. [External Origin] Turns around at the built-in origin and is completed when leaving the external origin. [Combination Origin] Turns around when entering the external origin and is completed when leaving the external origin. [Mechanical End] Completed when detecting the mechanical end.
	External origin logic	Positive Logic	—	Select the logic of the external origin sensor. [Positive Logic] Origin signal turns on when entering the origin. [Negative Logic] Origin signal turns off when entering the origin.
	Origin return first speed	5000	(Pulses/s)	Origin limit detection drive speed when returning to origin. Setting range: 0 to 40000000 * Origin limit: Built-in origin, external origin, and mechanical end
	Origin return second speed	1000	(Pulses/s)	Origin zero position drive speed when returning to origin. Setting range: 0 to 40000000 * Zero position: Zero position, reference position, leaving the external origin
	Origin return acceleration/deceleration speed	100000	(Pulses/s2)	Origin return drive acceleration/deceleration speed. Setting range: 1 to 40000000
	Origin return offset	0	(Pulses/s)	Offset between the origin position and the absolute origin position of the motor. Setting range: -40000000 to 40000000 * Offset movement occurs after returning to origin
	Mechanical end origin detection thrust	0	%	Thrust to detect the mechanical end when selecting the mechanical end for the origin return method. Setting range: 0 to 1000 * Percentage of the rated thrust
	Mechanical end origin detection time	0	ms	Time to detect the mechanical end when selecting the mechanical end for the origin return method. Setting range: 0 to 1000

Rated Thrust: 11 N to 25 N

Parameters

Category	Name	Default	Unit	Description
Communication	COM1 communication baud rate	115200	bit/s	Set the COM1 communication baud rate. Communication method: RS-232C Setting values: [4800] [9600] [19200] [38400] [57600] [76800] [115200] * If you selected any of 57600 to 115200 for COM1, set one of 4800 to 38400 for COM2.
	COM2 communication baud rate	38400	bit/s	Set the COM2 communication baud rate. Communication method: RS485 Setting values: [4800] [9600] [19200] [38400] [57600] [76800] [115200] * If you selected any of 57600 to 115200 for COM2, set one of 4800 to 38400 for COM1.
	COM2 communication protocol	Standard	—	Select the COM2 communication protocol. Setting values: [Standard] [Touch Panel]
	COM2 communication latency	10	ms	Set the latency for the COM2 communication from receiving a command to responding to it. Setting range: 0 to 1000
	Communication station number	0	—	Set the communication station number of the driver. Setting range: 0 to 31 * Common to Standard and Touch Panel
Procon mode	Positioning determination time	100	ms	Set time to determine the positioning completion. Setting range: 0 to 1000 * No determination if 0 is set
Pulse mode	Command pulse input switching	2-pulse	—	Select the command pulse signal type Setting values: [2-pulse] [1-pulse] [2-phase 4 multiplication] [2-phase 2 multiplication]
Tuning 4 pcs for built-in sensor, 4 pcs for external encoder	Tuning method	Type 1	—	Select the gain tuning method [Type 1] Control mode 1 (normal) [Type 2] Control mode 2 [Type 3] Vibration suppression control mode
	Load mass estimation	Enable	—	Automatic estimation of the mass of the mechanism attached to the moving part. Setting values: [Enable] [Disable]
	Load mass	1.2	kg	Set the mass of the mechanism attached to the moving part. Setting range: 0.0 to 3276.7
	Responsiveness	100	rad/s	Parameter to determine the servo loop frequency. Setting range: 1 to 6000
	Servo stiffness	1.0	—	Parameter to adjust the servo loop frequency. Setting range: 0.1 to 10.0
	Following characteristic	1.0	—	Adjust the MFC response frequency. Setting range: 0.1 to 10.0
	Position FF gain	0	%	Position loop feed forward gain. Setting range: 0 to 100
	Speed proportional gain		—	Speed loop proportional gain (the default depends on the moving part)
	Speed integration gain		—	Speed loop integration gain (the default depends on the moving part)
	Notch filter 1 enable/disable	Disable	—	Notch filter function. Setting values: [Enable] [Disable]
	Notch filter 1 frequency	4000	Hz	Set the resonant frequency. Setting range: 50 to 4000
	Notch filter 1 Q-value	0.5	Hz	Set the notch filter width. Setting range: 0.5 to 5.0
	Notch filter 2 enable/disable	Disable	—	Notch filter function. Setting values: [Enable] [Disable]
	Notch filter 2 frequency	4000	Hz	Set the resonant frequency. Setting range: 50 to 4000
	Notch filter 2 Q-value	0.5	Hz	Set the notch filter width. Setting range: 0.5 to 5.0
	Low-pass filter enable/disable	Disable	—	Low-pass filter function. Setting values: [Enable] [Disable]
	Low-pass filter frequency	1000	Hz	Setting a larger value reduces noise generated from the motor. Setting range: 10 to 8000
	Vibration suppression control 1	1.0	—	Setting range: 0.1 to 1.0
	Vibration suppression control 2	1.01	—	Setting range: 1.00 to 2.00

Support Software Function

Main menu	Submenu	Function description
Status display	Input/output status	Used to view the input/output status of the CN3 I/O connector of the driver
	Measurement (waveform display)	Used to simultaneously display the waveforms of up to 3 items of the following: command speed, feedback speed, command thrust, speed deviation, position deviation, main power supply voltage, load factor, and mass.
	Alarm history	Used to view the current alarm and up to 8 alarm history records.
Program operation mode	Program	Create, edit, and save position data files. Upload/download position data to and from the driver.
	Speed	Create, edit, and save speed data files. Upload/download speed data to and from the driver.
	Macro settings	Create, edit, and save macro data files. Upload/download macro data to and from the driver.
	Pressing/thrust limits	Create, edit, and save pressing/thrust data files. Upload/download pressing/thrust data to and from the driver.
Input/output	Input/output settings	Used to configure the assignment of the input/output signals of the CN3 I/O connector of the driver to the input/output functions.
	Zone output	Configure the settings of the zone output.
Direct drive	Jog inching	Configure the jog inching settings.
	Electronic gear	Configure the command pulse electronic gear settings.
Settings	Parameter settings	Configure the settings of parameters that determine the driver operation.
	Tuning	Adjust the servo gain.
Communication line	Communication start	Establish a connection between the PC and the driver.
	Disconnection	Disconnect the connection between the PC and the driver.
	Communication settings	Configure the communication settings for the PC.

Display Screen

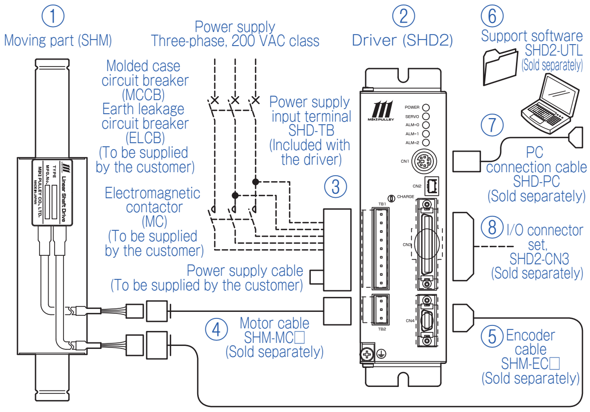
Operating Environment

Item	Minimum operating environment	Recommended operating environment
Processor	Intel Pentium 4 1.6 GHz processor or equivalent	Intel 2.4 GHz processor or equivalent
Memory	256 MB or more of free memory when the OS is started up	512 MB or more of free memory when the OS is started up
Hard disk space	10 MB or more	
Display resolution	SVGA (800 x 600 pixel) or higher	XGA (1024 x 768 pixel) or higher
Graphic	Graphic display capability with 16-bit color (32768 colors) or greater at the above resolution	Minimum operating environment plus 2D acceleration function available
OS	Windows XP (Pro/Home)/Service Pack 2 (32-bit version)	Windows XP (Pro/Home)/Service Pack 3 (32-bit version)
Communication port	RS-232C (USB-serial converter can be used)	
Others	Keyboard, mouse, and optical drive (for installation)	

MODELS
SHM-16+SHD2-06
SHM-25+SHD2-08
SHM-35+SHD-16

Rated Thrust: 28 N to 118 N

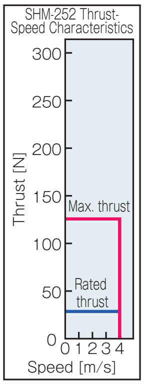
System Configuration

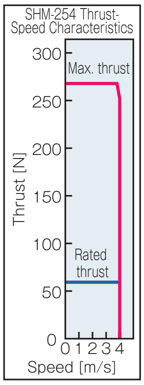


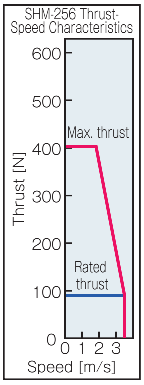
No.	Name	Description
①	Moving part	Consists of a moving part (coil) and shaft (magnet).
②	Driver	For operating the moving part.
③	Power supply input terminal	For connecting the power cable. (Included in the driver)
④	Motor cable	For connecting the driver and the motor of the moving part. (Sold separately)
⑤	Encoder cable	For connecting the driver and the encoder of the moving part. (Sold separately)
⑥	Support software	For configuring and changing the settings of the driver on a PC. (Sold separately)
⑦	PC connection cable	For connecting to a PC. (Sold separately)
⑧	I/O connector set	Connector for inputting/outputting command signals to the driver (Sold separately)

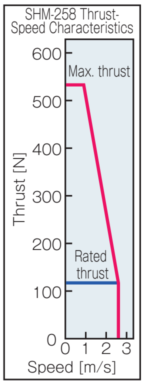
Moving Part Specifications

Model	SHM-252	SHM-254	SHM-256	SHM-258
Number of coil sets	2	4	6	8
Rated thrust	28 N	59 N	90 N	118 N
Max. thrust	126 N	267 N	403 N	532 N
Max. speed	4000 mm/s	4000 mm/s	3500 mm/s	2600 mm/s
Rated current	1.2 A rms			
Max. current	5.6 A rms			
Time rating	Continuous			
Ambient temperature	0 ～ 40 ℃			
Ambient humidity	80% relative humidity or under (with no condensation)			
Insulating resistance	500 VDC 10 M Ω or more			
Dielectric strength voltage	1,500 VAC for 1 minute			
Heat resistance class	Class F (coil part)			
Structure	Fully-closed, self-cooling			
Shaft unit mass	0.0037 kg/mm			
Moving part mass	0.70 kg	1.10 kg	1.60 kg	2.00 kg

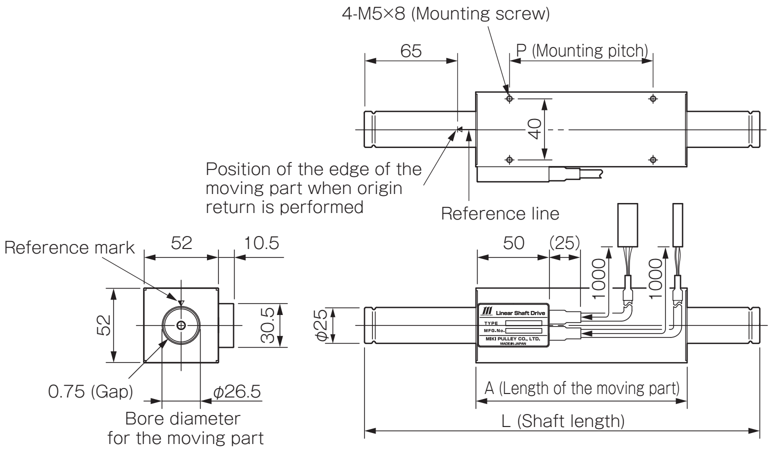

SHM-252 Thrust-Speed Characteristics


SHM-254 Thrust-Speed Characteristics


SHM-256 Thrust-Speed Characteristics


SHM-258 Thrust-Speed Characteristics

Moving Part Dimensions



Unit [mm]

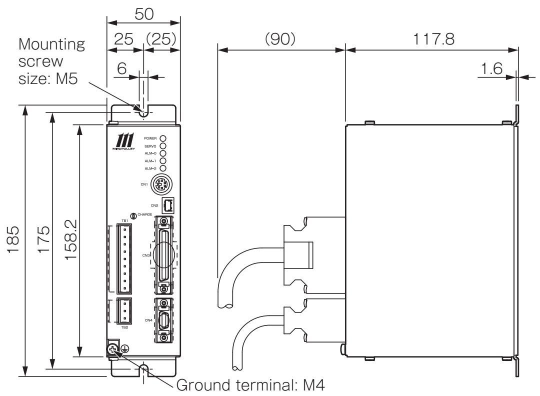
Model	A	P	Effective stroke length						
			L=472	L=600	L=728	L=856	L=984	L=1112	L=1240
SHM-252	98	60	273	401	529	657	785	913	1041
SHM-254	150	110	221	349	477	605	733	861	989
SHM-256	202	162	169	297	425	553	681	809	937
SHM-258	254	214	117	245	373	501	629	757	885

Driver Specifications

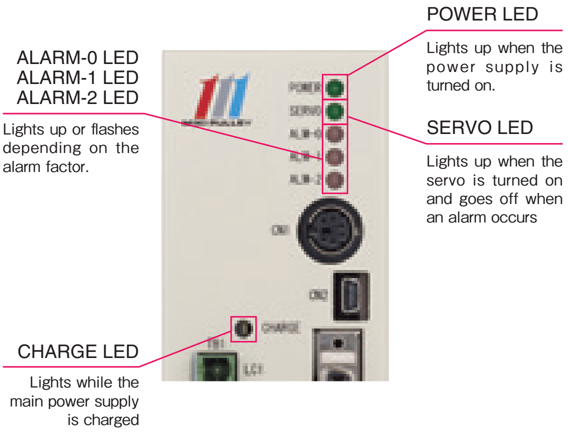
Model		SHD2-08-252	SHD2-08-254	SHD2-08-256	SHD2-08-258
Number of coil sets in moving part		2	4	6	8
Input voltage		Main power supply: Three-phase 200 VAC, Control power supply: Single-phase 200 VAC			
Input power supply range (common)		200 to 230 VAC +10 to -15%　50/60 Hz　±5%			
Rated continuous output current		1.22 A rms			
Max. current (limit)		5.6 A rms			
Max. instantaneous current (peak value)		8.0 A peak			
Power supply equipment capacity		0.9 kVA			
Position command pulse input	**Signal**	Line driver signal			
	Input method	Select one from 2-pulse, 1-pulse, and 2-phase pulse			
	Max. frequency	4 M pulses/s			
Input signal		Total 20 dedicated inputs and general-purpose inputs			
Output signal		Total 20 dedicated outputs and general-purpose outputs			
Limit function		Speed limit, thrust limit, and movable range limit			
Protection function		Overload, overcurrent, overvoltage, sensor disconnection, memory error			
Built-in positioning function		Number of positioning points: 32, Number of speed settings: 32			
Support software (SHD2-UTL)		Parameter configuration, monitor display, program editing/configuration, saving data and transferring data to driver			
Ambient temperature		0～40 ℃			
Ambient humidity		80% relative humidity or under (with no condensation)			
Mass		0.9 kg			

Driver Dimensions

Unit [mm]



Driver Display Panel



ALARM-0 LED
ALARM-1 LED
ALARM-2 LED

Lights up or flashes depending on the alarm factor.

POWER LED

Lights up when the power supply is turned on.

SERVO LED

Lights up when the servo is turned on and goes off when an alarm occurs

CHARGE LED

Lights while the main power supply is charged

How to Place an Order

Moving Part

SHM - 252 - 472

- Shaft diameter (φ25): 25
- No. of coil sets: 2
- Shaft length (L dimension): 472

Driver Part

SHD2 - 08 - 252

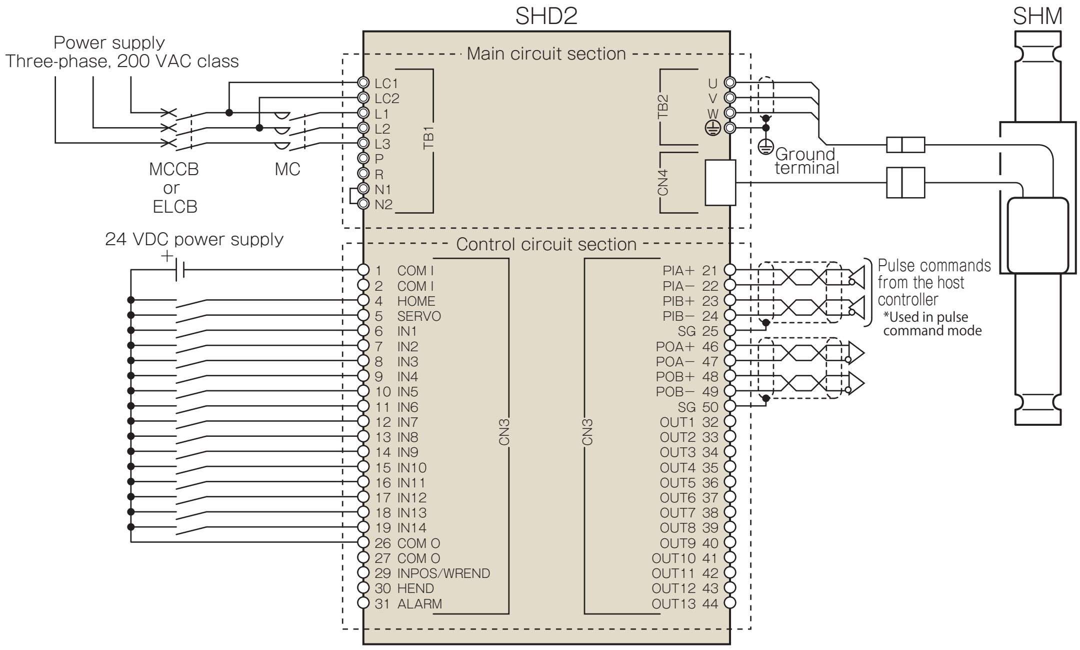
- Max. instantaneous current 8.0 A peak: 08
- Shaft diameter of the corresponding moving part (φ25): 25
- No. of coil sets for the corresponding moving part: 2

*The moving part, shaft, and driver are finely adjusted as a set and can only be run in the combination put together at the time of shipment.

MODELS
SHM-16+SHD2-06
SHM-25+SHD2-08
SHM-35+SHD-16

Rated Thrust: 28 N to 118 N

Basic Wiring Diagram



Input/Output Signal Connector Array (CN3)

Input Part

Pin no.	Terminal symbol	Signal name
1	COMI	Coupler input common
2	COMI	Coupler input common
3	NC	Not used
4	HOME	Origin return
5	SERVO	Servo ON
6 ～ 19	IN1 ～ IN14	General-purpose inputs 1 to 14
20	NC	Not used
21	PIA＋	Command pulse A input ＋
22	PIA－	Command pulse A input －
23	PIB＋	Command pulse B input ＋
24	PIB－	Command pulse B input －
25	SG	Signal ground

Arbitrary assignment in the general-purpose input assignment function (IN1 to IN14)
Start signal
Pause
Program reset/alarm clear
Point selection (1, 2, 4, 8, 16)
Point write
Emergency stop input
Gain switching
＋jog drive / －jog drive
Deviation counter clear input
Thrust limit selection (1, 2, 4, 8, 16)
Electronic gear switching
Operation mode selection

Output Part

Pin no.	Terminal symbol	Signal name
26	COMO	Coupler output common
27	COMO	Coupler output common
28	NC	Not used
29	INPOS	Positioning completion
30	HEND	Origin return completion
31	ALARM	Alarm
32 ～ 44	OUT1 ～ OUT13	General-purpose outputs 1 to 13
45	NC	Not used
46	POA＋	Command pulse A output ＋
47	POA－	Command pulse A output －
48	POB＋	Command pulse B output ＋
49	POB－	Command pulse B output －
50	SG	Signal ground

Arbitrary assignment in the general-purpose output assignment function (OUT1 to OUT3)
Alarm code output (1 to 3)
Ready output
Point completion output (1, 2, 4, 8, 16)
Point write completion
Output when thrust is limited
Zone output (0 to 7)
Zero speed
Moving
Overload alarm
Brake release output
Current operation mode

* Install the molded case circuit breaker (MCCB) or earth leakage circuit breaker (ELCB) (with overcurrent protection function) on the input side (primary side) of the driver for wiring protection. Do not use a circuit breaker with a capacity greater than the recommended capacity. * Install an electromagnetic contactor (MC) if you want to isolate the driver from the power supply separate from MCCB or ELCB.

* Use a twisted wire for the control signal wire.

* Ground the shielded wire. * To prevent malfunction caused by noise, place the main circuit wire so that it is as far away as possible from the control signal wire, and never place the wires in the same duct.

* Be sure to refer to the instruction manual when you actually connect wires.

Parameters

Category	Name	Default	Unit	Description
Common	Control mode	Procon	—	Set the control mode of the driver [Procon] Program control [Pulse] Control by pulse command input
	Sensor selection	Built-in	—	Set the type of position sensor [Built-in] Built-in sensor of the moving part [Incremental combination] Combined use of the built-in sensor and external incremental encoder
	External sensor resolution	100000	nm	Set the resolution of the external encoder. Setting range: 0 to 100000
	Pulse output setting numerator	1	—	Set the number of pulses to output from the pulse output (CN3 46 to 49 pins) Setting range: 1 to 9999 Amount of movement for one output pulse = (feedback pulse electronic gear denominator / feedback pulse electronic gear numerator) x sensor resolution
	Pulse output setting denominator	1	—	
	Positioning completion range	100	(Pulse)	Set a value to determine the positioning completion output (deviation amount). Setting range: 1 to 40000000
	Positioning completion condition	Command & Deviation	—	Set the positioning determination condition [Command & Deviation] Determine that the positioning is completed when there is no command and the deviation amount is less than the set value [Command & Deviation + Zero Speed] Determine that the positioning is completed when there is no command, the deviation amount is less than the set value, and the speed is less than the lower limit of the zero speed range
	Allowable position deviation	1000	(Pulse)	Set a value to determine the allowable deviation error. Setting range: 0 to 40000000 "Deviation error" alarm occurs when this range is exceeded.
	Thrust limit	1000	%	Set this value when the user wants to reduce the maximum thrust. Setting range: 0 to 1000 100% is equivalent to the rated thrust of the motor * A value greater than the maximum thrust of the motor cannot be set.
	Movable limit +	30000	(Pulse)	Set this value to narrow the movable range. Setting range: -40000000 to 40000000
	Movable limit −	0	(Pulse)	
	Brake operation A delay time	0	ms	Set the time from when the brake release output is turned off to when the motor power is turned off in order to turn off the servo while the moving part is stopped. Setting range: 0 to 1000
	Brake operation B delay time	0	ms	Set the time from the detection of the off state of the servo on input signal to when the brake release output is turned off in order to turn off the servo while the moving part is moving. Setting range: 0 to 1000
	Brake operation switching value	1000	(Pulses/s)	Speed setting to determine whether to perform brake operation while the motor is stopped or in operation. Setting range: 0 to 40000000 * The brake operation is performed while the motor is stopped if the speed is less than the set value, and while in operation if the speed is the same or greater than the set value.
	Zero speed range	1000	(Pulses/s)	Set a value to determine the zero speed. Setting range: 0 to 40000000 * Zero speed is determined when the speed is less than the set value.
	Overload warning detection value	0	%	Set a value to determine the overload warning output. Setting range: 0 to 100 * When the load factor exceeds this value, the "overload warning output" turns on.
Origin return	Origin return method	Built-in Origin	—	Select the origin return method. [Built-in Origin] Turns around at the built-in origin and is completed at the reference position. [External Origin] Turns around at the built-in origin and is completed when leaving the external origin. [Combination Origin] Turns around when entering the external origin and is completed when leaving the external origin. [Mechanical End] Completed when detecting the mechanical end.
	External origin logic	Positive Logic	—	Select the logic of the external origin sensor. [Positive Logic] Origin signal turns on when entering the origin. [Negative Logic] Origin signal turns off when entering the origin.
	Origin return first speed	5000	(Pulses/s)	Origin limit detection drive speed when returning to origin. Setting range: 0 to 40000000 * Origin limit: Built-in origin, external origin, and mechanical end
	Origin return second speed	1000	(Pulses/s)	Origin zero position drive speed when returning to origin. Setting range: 0 to 40000000 * Zero position: Zero position, reference position, leaving the external origin
	Origin return acceleration/ deceleration speed	100000	(Pulses/s2)	Origin return drive acceleration/deceleration speed. Setting range: 1 to 40000000
	Origin return offset	0	(Pulses/s)	Offset between the origin position and the absolute origin position of the motor. Setting range: -40000000 to 40000000 * Offset movement occurs after returning to origin
	Mechanical end origin detection thrust	0	%	Thrust to detect the mechanical end when selecting the mechanical end for the origin return method. Setting range: 0 to 1000 * Percentage of the rated thrust
	Mechanical end origin detection time	0	ms	Time to detect the mechanical end when selecting the mechanical end for the origin return method. Setting range: 0 to 1000

Rated Thrust: 28 N to 118 N

Parameters

Category	Name	Default	Unit	Description
Communication	COM1 communication baud rate	115200	bit/s	Set the COM1 communication baud rate, Communication method: RS-232C Setting values: [4800] [9600] [19200] [38400] [57600] [76800] [115200] * If you selected any of 57600 to 115200 for COM1, set one of 4800 to 38400 for COM2.
	COM2 communication baud rate	38400	bit/s	Set the COM2 communication baud rate, Communication method: RS485 Setting values: [4800] [9600] [19200] [38400] [57600] [76800] [115200] * If you selected any of 57600 to 115200 for COM2, set one of 4800 to 38400 for COM1.
	COM2 communication protocol	Standard	—	Select the COM2 communication protocol. Setting values: [Standard] [Touch Panel]
	COM2 communication latency	10	ms	Set the latency for the COM2 communication from receiving a command to responding to it. Setting range: 0 to 1000
	Communication station number	0	—	Set the communication station number of the driver. Setting range: 0 to 31 * Common to Standard and Touch Panel
Procon mode	Positioning determination time	100	ms	Set time to determine the positioning completion. Setting range: 0 to 1000 * No determination if 0 is set
Pulse mode	Command pulse input switching	2-pulse	—	Select the command pulse signal method Setting values: [2-pulse] [1-pulse] [2-phase 4 multiplication] [2-phase 2 multiplication]
Tuning **4 pcs for built-in sensor, 4 pcs for external encoder**	Tuning method	Type 1	—	Select the gain tuning method [Type 1] Control mode 1 (normal) [Type 2] Control mode 2 [Type 3] Vibration suppression control mode
	Load mass estimation	Enable	—	Automatic estimation of the mass of the mechanism attached to the moving part. Setting values: [Enable] [Disable]
	Load mass	1.2	kg	Set the mass of the mechanism attached to the moving part. Setting range: 0.0 to 3276.7
	Responsiveness	100	rad/s	Parameter to determine the servo loop frequency. Setting range: 1 to 6000
	Servo stiffness	1.0	—	Parameter to adjust the servo loop frequency. Setting range: 0.1 to 10.0
	Following characteristic	1.0	—	Adjust the MFC response frequency. Setting range: 0.1 to 10.0
	Position FF gain	0	%	Position loop feed forward gain. Setting range: 0 to 100
	Speed proportional gain		—	Speed loop proportional gain (the default depends on the moving part)
	Speed integration gain		—	Speed loop integration gain (the default depends on the moving part)
	Notch filter 1 enable/disable	Disable	—	Notch filter function. Setting values: [Enable] [Disable]
	Notch filter 1 frequency	4000	Hz	Set the resonant frequency. Setting range: 50 to 4000
	Notch filter 1 Q-value	0.5	Hz	Set the notch filter width. Setting range: 0.5 to 5.0
	Notch filter 2 enable/disable	Disable	—	Notch filter function. Setting values: [Enable] [Disable]
	Notch filter 2 frequency	4000	Hz	Set the resonant frequency. Setting range: 50 to 4000
	Notch filter 2 Q-value	0.5	Hz	Set the notch filter width. Setting range: 0.5 to 5.0
	Low-pass filter enable/disable	Disable	—	Low-pass filter function. Setting values: [Enable] [Disable]
	Low-pass filter frequency	1000	Hz	Setting a larger value reduces noise generated from the motor. Setting range: 10 to 8000
	Vibration suppression control 1	1.0	—	Setting range: 0.1 to 1.0
	Vibration suppression control 2	1.01	—	Setting range: 1.00 to 2.00

Support Software Function

Main menu	Submenu	Function description
Status display	Input/output status	Used to view the input/output status of the CN3 I/O connector of the driver
	Measurement (waveform display)	Used to simultaneously display the waveforms of up to 3 items of the following: command speed, feedback speed, command thrust, speed deviation, position deviation, main power supply voltage, load factor, and mass.
	Alarm history	Used to view the current alarm and up to 8 alarm history records.
Programme operation style	Program	Create, edit, and save position data files. Upload/download position data to and from the driver.
	Speed	Create, edit, and save speed data files. Upload/download speed data to and from the driver.
	Macro settings	Create, edit, and save macro data files. Upload/download macro data to and from the driver.
	Pressing/thrust limits	Create, edit, and save pressing/thrust data files. Upload/download pressing/thrust data to and from the driver.
Input/output	Input/output settings	Used to configure the assignment of the input/output signals of the CN3 I/O connector of the driver to the input/output functions.
	Zone output	Configure the settings of the zone output.
Direct drive	Jog inching	Configure the jog inching settings.
	Electronic gear	Configure the command pulse electronic gear settings.
Settings	Parameter settings	Configure the settings of parameters that determine the driver operation.
	Tuning	Adjust the servo gain.
Communication line	Communication start	Establish a connection between the PC and the driver.
	Disconnection	Disconnect the connection between the PC and the driver.
	Communication settings	Configure the communication settings for the PC.

Display Screen

Operating Environment

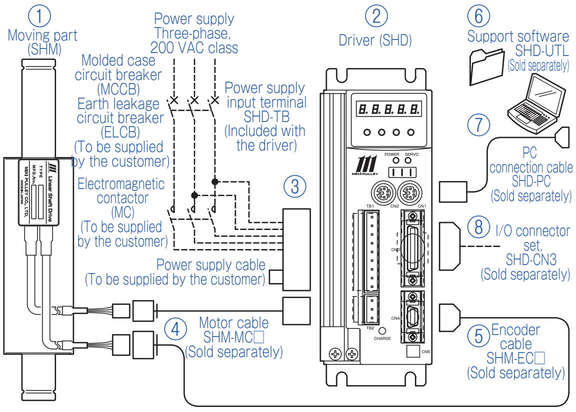
Item	Minimum operating environment	Recommended operating environment
Processor	Intel Pentium 4 1.6 GHz processor or equivalent	Intel 2.4 GHz processor or equivalent
Memory	256 MB or more of free memory when the OS is started up	512 MB or more of free memory when the OS is started up
Hard disk space	10 MB or more	
Display resolution	SVGA (800 x 600 pixel) or higher	XGA (1024 x 768 pixel) or higher
Graphic	Graphic display capability with 16-bit color (32768 colors) or greater at the above resolution	Minimum operating environment plus 2D acceleration function available
OS	Windows XP (Pro/Home)/Service Pack 2 (32-bit version)	Windows XP (Pro/Home)/Service Pack 3 (32-bit version)
Communication port	RS-232C (USB-serial converter can be used)	
Others	Keyboard, mouse, and optical drive (for installation)	

MODELS

SHM-16+SHD2-06
SHM-25+SHD2-08
SHM-35+SHD-16

Rated Thrust: 150 N

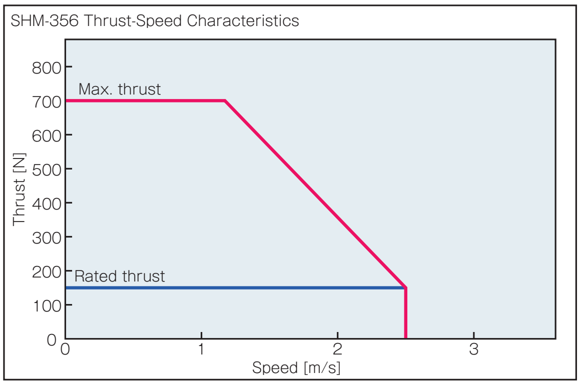
System Configuration



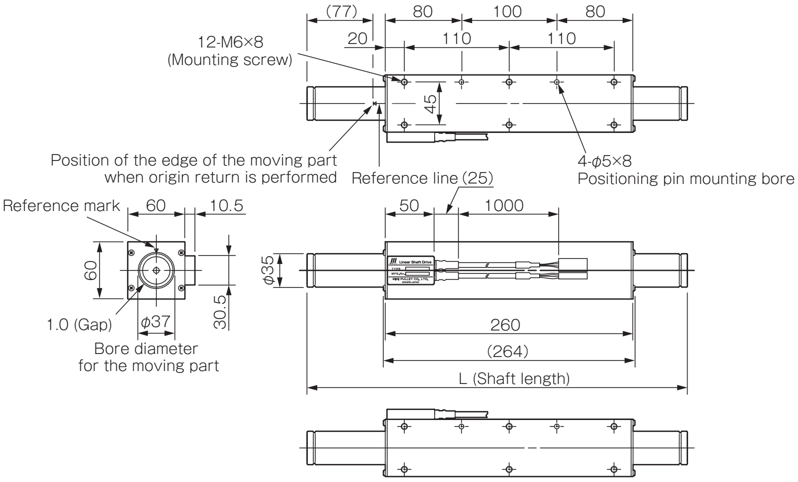
No.	Name	Description
①	Moving part	Consists of a moving part (coil) and shaft (magnet).
②	Driver	For operating the moving part.
③	Power supply input terminal	For connecting the power cable. (Included in the driver)
④	Motor cable	For connecting the driver and the motor of the moving part. (Sold separately)
⑤	Encoder cable	For connecting the driver and the encoder of the moving part. (Sold separately)
⑥	Support software	For configuring and changing the settings of the driver on a PC. (Sold separately)
⑦	PC connection cable	For connecting to a PC. (Sold separately)
⑧	I/O connector set	Connector for inputting/outputting command signals to the driver (Sold separately)

Moving Part Specifications

Model	SHM-356
Number of coil sets	6
Rated thrust	150 N
Max. thrust	700 N
Max. speed	2500 mm/s
Rated current	2.4 A rms
Max. current	11.3 A rms
Time rating	Continuous
Ambient temperature	0～40 ℃
Ambient humidity	80% relative humidity or under (With no condensation)
Insulating resistance	500 VDC 10 M Ω or more
Dielectric strength voltage	1,500 VAC for 1 minute
Heat resistance class	Class F (coil part)
Structure	Fully-closed, self-cooling
Shaft unit mass	0.0073 kg/mm
Moving part mass	2.0 kg



Moving Part Dimensions



Unit [mm]

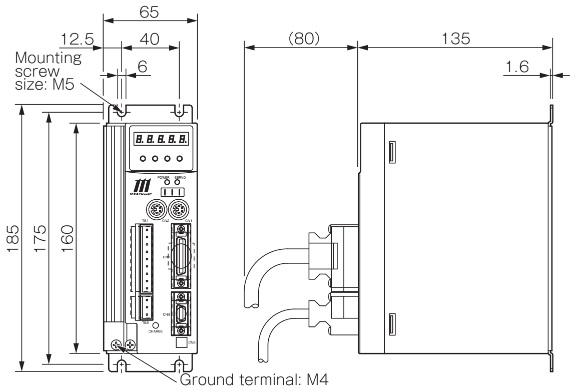
Model	Effective stroke length						
	L=610	L=780	L=950	L=1120	L=1290	L=1460	L=1630
SHM-356	233	403	573	743	913	1083	1253

Driver Specifications

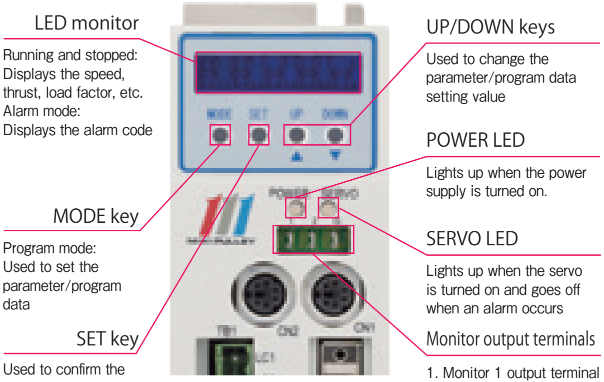
Model		SHD-16-356
Number of coil sets in moving part		6
Input voltage		Main power supply: Three-phase 200 VAC, Control power supply: Single-phase 200 VAC
Input power supply range (common)		200 to 230 VAC +10 to -15% 50/60 Hz ± 5%
Rated continuous output current		2.4 A rms
Max. current (limit)		11.3 A rms
Max. instantaneous current (peak value)		16.0 A peak
Power supply equipment capacity		1.6 kVA
Position command pulse input	Signal	Line driver signal
	Input method	Select one from 2-pulse, 1-pulse, and 2-phase pulse
	Max. frequency	4 M pulses/s
Input signal		Total 16 dedicated inputs and general-purpose inputs
Output signal		Total 16 dedicated outputs and general-purpose outputs
Monitor output		Operation status analog voltage output
Control function		Smoothing function, auto-tuning function
Limit function		Speed limit, thrust limit, and movable range limit
Built-in positioning function		Number of positioning points: 32, Number of speed settings: 10
Protection function		Overload, overcurrent, overvoltage, sensor disconnection, memory error
Support Software (SHD-UTL)		Parameter configuration, monitor display, program editing/configuration, saving data and transferring auto-tuning data to driver
Ambient temperature		0～40 ℃
Ambient humidity		80% relative humidity or under (with no condensation)
Mass		1.2 kg

Driver Dimensions

Unit: mm



Driver Display Panel



LED monitor

Running and stopped: Displays the speed, thrust, load factor, etc.
Alarm mode: Displays the alarm code

MODE key

Program mode: Used to set the parameter/program data

SET key

Used to confirm the parameter/program data setting value

UP/DOWN keys

Used to change the parameter/program data setting value

POWER LED

Lights up when the power supply is turned on.

SERVO LED

Lights up when the servo is turned on and goes off when an alarm occurs

Monitor output terminals

1. Monitor 1 output terminal
2. Monitor 2 output terminal
G: Monitor output GND terminal

How to Place an Order

Moving Part

SHM - 356 - 610

Shaft diameter (ϕ35)
No. of coil sets
Shaft length (L dimension)

Driver Part

SHD - 16 - 356

Max. instantaneous current 16.0 A peak: 16
Shaft diameter of the corresponding moving part (ϕ35)
No. of coil sets for the corresponding moving part

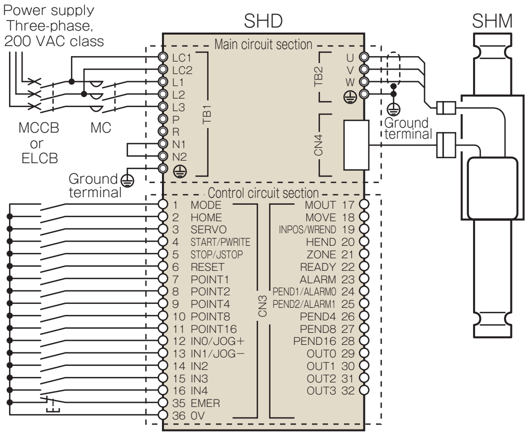
*The moving part, shaft, and driver are finely adjusted as a set and can only be run in the combination put together at the time of shipment.

MODELS
SHM-16+SHD2-06
SHM-25+SHD2-08
SHM-35+SHD-16

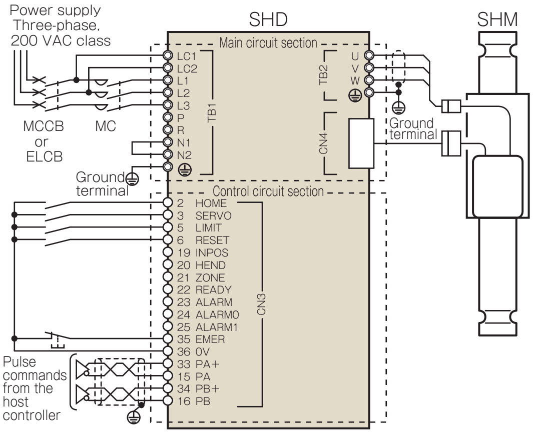
Rated Thrust: 150 N

Basic Wiring Diagram

Procon Mode (Built-in Positioning Function)



Pulse Control Mode



Input/Output Signal Connector Array (CN3)

Procon Mode (Built-in Positioning Function)

Pin no.	Terminal symbol	Signal name
1	MODE	Operation mode selection
2	HOME	Origin return
3	SERVO	Servo ON/OFF
4	START ／ PWRITE	Start command / Point write
5	STOP ／ JSTOP	Pause / Movement prohibited
6	RESET	Reset
7	POINT1	Point selection 1
8	POINT2	Point selection 2
9	POINT4	Point selection 4
10	POINT8	Point selection 8
11	POINT16	Point selection 16
12	IN0 ／ JOG＋	General-purpose input 0 / ＋ jog / ＋ inching
13	IN1 ／ JOG－	General-purpose input 1 / － jog / － inching
14	IN2 ／ JOG HI	General-purpose input 2 / High-speed jog
15	IN3	General-purpose input 3
16	IN4	General-purpose input 4
17	MOUT	Current operation mode
18	MOVE	Moving
19	INPOS ／ WREND	Positioning completion / Point write completion
20	HEND	Origin return completion
21	ZONE	Zone output
22	READY	Ready output
23	ALARM	Alarm output
24	PEND1 ／ ALARM0	Point completion 1 output / Alarm code 0 output
25	PEND2 ／ ALARM1	Point completion 2 output / Alarm code 1 output
26	PEND4	Point completion 4 output
27	PEND8	Point completion 8 output
28	PEND16	Point completion 16 output
29	OUT0	General-purpose output 0
30	OUT1	General-purpose output 1
31	OUT2	General-purpose output 2
32	OUT3	General-purpose output 3
33	—	Not used
34	—	Not used
35	EMER	Emergency stop input
36	0V	Input/output common

Pulse Control Mode

Pin no.	Terminal symbol	Signal name
1	—	Not used
2	HOME	Origin return
3	SERVO	Servo ON/OFF
4	—	Not used
5	LIMIT	Thrust limit
6	RESET	Reset
7	—	Not used
8	—	Not used
9	—	Not used
10	—	Not used
11	—	Not used
12	—	Not used
13	—	Not used
14	—	Not used
15	PA	Command pulse input A －
16	PB	Command pulse input B －
17	—	Not used
18	—	Not used
19	INPOS	Positioning completion
20	HEND	Origin return completion
21	ZONE	Zone output
22	READY	Ready output
23	ALARM	Alarm output
24	ALARM0	Alarm code 0 output
25	ALARM1	Alarm code 1 output
26	—	Not used
27	—	Not used
28	—	Not used
29	—	Not used
30	—	Not used
31	—	Not used
32	—	Not used
33	PA＋	Command pulse input A ＋
34	PB＋	Command pulse input B ＋
35	EMER	Emergency stop input
36	0V	Input/output common

* Install the molded case circuit breaker (MCCB) or earth leakage circuit breaker (ELCB) (with overcurrent protection function) on the input side (primary side) of the driver for wiring protection. Do not use a circuit breaker with a capacity greater than the recommended capacity.

* Install an electromagnetic contactor (MC) if you want to isolate the driver from the power supply separate from MCCB or ELCB. * Use a twisted wire for the control signal wire. * Ground the shielded wire.

* To prevent malfunction caused by noise, place the main circuit wire so that it is as far away as possible from the control signal wire, and never place the wires in the same duct.

* Be sure to refer to the instruction manual when you actually connect wires.

Parameters

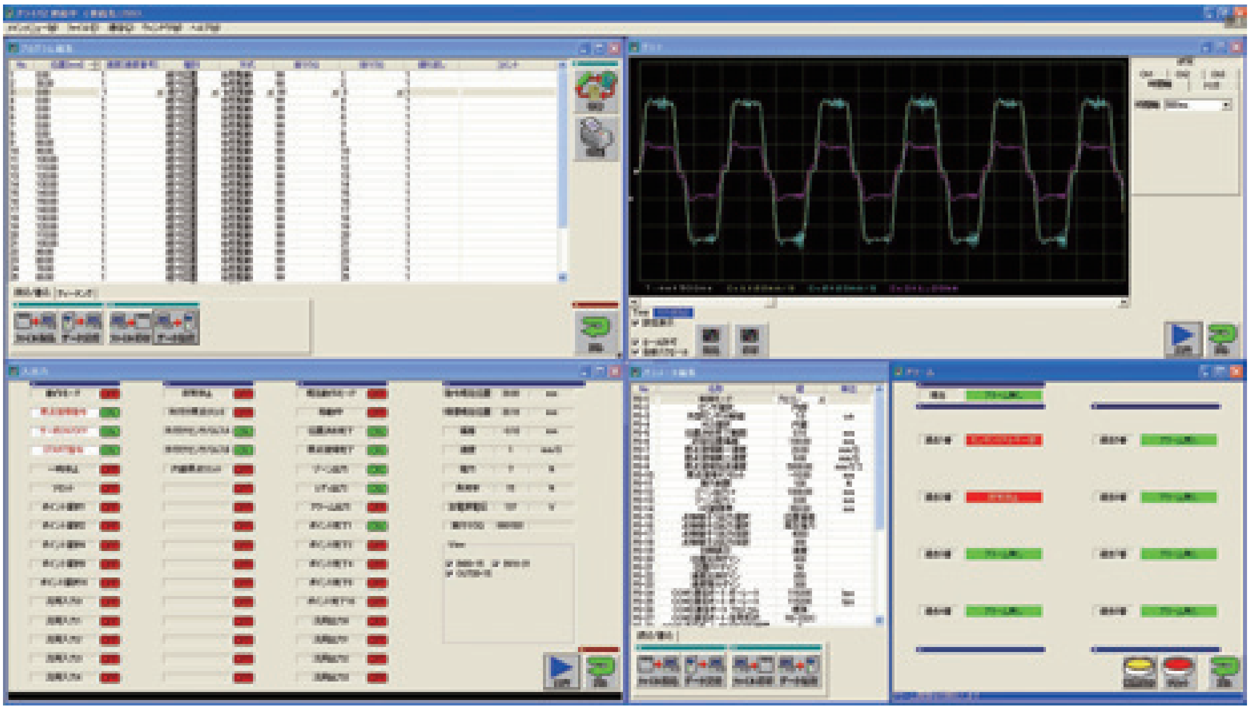
Name	Setting value	Unit	Description
Control mode	0: Procon	—	Set the control mode of the driver 0: Procon (Program control) 1: Pulse (Control by pulse command input)
Sensor selection	0: Internal	—	Set the type of the position sensor. 0: Internal, 1: External
External sensor resolution	10	0.1 μ m	Set the resolution of the external sensor. Setting range: 1 to 1000
HLS selection	0: Built-in	—	Select the type of the origin limit, 0: Built-in, 1: External positive logic, 2: External negative logic
Positioning completion range	50	(10 μ m)	Set a value to determine the positioning completion output. Setting range: 0 to 40000000
Allowable position deviation	1000	(10 μ m)	Set a value to determine the allowable deviation error. Setting range: 0 to 40000000
Origin return first speed	5000	(10 μ m／s)	Origin limit detection drive speed when returning to origin. Setting range: 1 to 40000000
Origin return second speed	1000	(10 μ m／s)	Origin zero position drive speed when returning to origin. Setting range: 1 to 40000000
Origin return accel./decel. speed	500000	(10 μ m／s^2)	Origin return drive acceleration/deceleration speed. Setting range: 1 to 40000000
Origin return offset	0	(10 μ m)	Set the offset amount between the origin position and the absolute origin position of the motor. Setting range: 0 to 40000000
Thrust limit	100	%	Set the thrust. Setting range: 0 to 1000
Zone output range ＋	1000	(10 μ m／s)	Set the position range for which to perform zone output. Setting range: -40000000 to 40000000 * When the current position is within this range, the zone output is on.
Zone output range －	0	(10 μ m／s)	
＋ Movable limit	30000	(10 μ m)	Set this value to narrow the movable range. Setting range: 0 to 40000000
Inspection terminal 1 output selection	1: Feedback speed	—	Set the output item for the inspection terminal 0: Command speed, 1: Feedback speed, 2: Command thrust, 3: Generated thrust, 4: Position deviation, 5: Main power supply voltage, 6: Load factor
Inspection terminal 2 output selection	3: Generated thrust	—	
Inspection terminal 1 output coefficient	100000	Selectable	Set the voltage coefficient to output to the inspection terminal. Setting range: 0 to 40000000
Inspection terminal 2 output coefficient	300	Selectable	Speed: (Pulse/s)/10 V, Thrust: %/10 V, Deviation: Pulse/10 V, Load factor: %/10 V, Intermediate DC voltage: V / 10V
Initial display	—	—	Set the status display item to be displayed on the 7-segment LED at power-on
Position proportional gain	1500	—	Set the proportional gain of the position amplifier. Setting range: 0 to 10000
Position FF gain	0	—	Set the feed forward gain of the position amplifier. Setting range: 0 to 100
Speed proportional gain	100	—	Set the proportional gain of the speed amplifier. Setting range: 0 to 10000
Speed integration gain	500	—	Set the integration gain of the speed amplifier. Setting range: 0 to 10000
CN1 communication speed	6:115200	bit/s	Set the communication speed 0: 4800 1: 9600 2: 19200 3: 38400 4: 57600 5: 76800 6: 115200
CN2 communication speed	6:115200	bit/s	
CN2 communication protocol	0: Standard	—	Select the communication protocol for CN2 communication. 0: Standard, 1: Touch Panel
CN2 communication signal type	0: RS-232C	—	Set the communication type for CN2 communication. 0: RS-232C 1: RS-485
CN2 communication RS-485 latency	10	ms	Set the latency from receiving a command to responding to it when using RS-485 for CN2 communication. Setting range: 0 to 1000
Communication station number	0	—	Set the communication station number of the driver when daisy-chaining multiple drivers via RS-485. Setting range: 0 to 127
Load mass	—	0.1kg	Set the load mass. Setting range: 0 to 3000 * The estimated result is set when selecting real-time tuning
Response characteristic	—	—	Set a response characteristic corresponding to the machine stiffness. Setting range: 0 to 300
Tuning type	2: Manual	—	Set the type of tuning 0: Real-time (Estimate the load mass and perform auto-tuning) 1: Mass setting (Perform tuning based on the set load mass) 2: Manual (Perform tuning based on the control gain value set manually)
Tuning operation	0: Disable	—	Set the tuning operation 0: Disable (Enable manual tuning) 1: Enable (Enable real-time tuning and mass setting tuning)
Smoothing	0: Disable	—	Change the control gain using a speed pattern 0: Disable (no change in the control gain using a speed pattern) 1: Small, 2: Intermediate, 3: Large (the rate of change in the gain can be selected), 4: Special
Low-speed jog operation	1000	(10 μ m／s)	Set the speed for low-speed jog operation and inching operation. Setting range: 1 to 40000000
High-speed jog operation	10000	(10 μ m／s)	Set the speed for high-speed jog operation and inching operation. Setting range: 1 to 40000000
Inching travel distance	10	(10 μ m)	Set the amount of movement for the inching operation. Setting range: 0 to 40000000
Jog / inching operation acceleration	100000	(10 μ m／s^2)	Set the acceleration/deceleration speed for the jog operation (low-speed/high-speed) and inching operation. Setting range: 1 to 1000000000
Pressing range	80	%	Set the range for which to perform pressing operation. Setting range: 0 to 100
Pressing speed	1000	(10 μ m／s)	Set the speed for the pressing operation. Setting range: 1 to 40000000
Positioning determination time	100	ms	Set the time to determine positioning completion. Setting range: 0 to 1000 * No determination if 0 is set
Command pulse input type	0: 2-pulse	—	Select the signal type of command pulse, 0: 2-pulse, 1: 1-pulse, 2: 2-phase 4-multiplication, 3: 2-phase 2-multiplication
Accel./decel. speed limit	0	ms	Set the acceleration/deceleration speed limit for the command pulse. Setting range: 0 to 10000
S-shaped accel./decel.	0	ms	Set this value to add S-shaped acceleration/deceleration to the command pulse, Setting range: 0 to 1000

Rated Thrust: 150 N

Support Software Function

Main menu	Submenu	Function description
Program editing	—	Create, edit, and save position data files. Upload/download position data to and from the driver.
Speed editing	—	Create, edit, and save speed data files. Upload/download speed data to and from the driver.
Parameter editing	—	Create, edit, and save parameter data files. Upload/download parameter data to and from the driver.
Macro editing	—	Create, edit, and save macro data files. Upload/download macro data to and from the driver.
Connection	—	Establish a connection between the PC and the driver.
Disconnection	—	Disconnect the connection between the PC and the driver.
Status display	Input/output	Used to view the input/output status of the CN3 I/O connector of the driver
	Flag	Used to view the internal flag status of the driver
	Waveform	Used to simultaneously display the waveforms of up to 3 items of the following: command speed, feedback speed, command thrust, generated thrust, position deviation, main power supply voltage, and load factor.
	Alarm	Used to view the current alarm and up to 8 alarm history records. Also used to erase history records and reset alarms.
Tuning	—	Used to configure the smoothing settings and select the tuning method.
File	—	Used to create files of program, speed, parameter, and macro data stored in the driver and save them to the PC. Also used to transfer files stored on the PC to the driver.
Settings	—	Configure the communication settings for the PC.
Help	—	Used to refer to the operation method of the support software.

Display Screen



Operating Environment

Item	Minimum operating environment	Recommended operating environment
Processor	Intel Pentium 4 1.6 GHz processor or equivalent	Intel 2.4 GHz processor or equivalent
Memory	128 MB or more of free memory when the OS is started up	512 MB or more of free memory when the OS is started up
Hard disk space	10 MB or more	
Display resolution	SVGA (800 x 600 pixel) or higher	XGA (1024 x 768 pixel) or higher
Graphic	Graphic display capability with 16-bit color (32768 colors) or greater at the above resolution	Minimum operating environment plus 2D acceleration function available
OS	Windows 2000(SP4)/Windows XP（SP2)	Windows XP (Pro/Home)/Service Pack 3 (32-bit version)
Communication port	RS-232C (USB-serial converter can be used)	
Others	Keyboard, mouse, and optical drive (for installation)	

Options (Separately Sold Items)

Motor Cable

For connecting the driver and the motor of the moving part.

Model	Cable length
SHM-MC050	500mm
SHM-MC100	1000mm
SHM-MC200	2000mm
SHM-MC300	3000mm

Encoder Cable

For connecting the driver and the encoder of the moving part.

Model	Cable length
SHM-EC050	500mm
SHM-EC100	1000mm
SHM-EC200	2000mm
SHM-EC300	3000mm

Support Software

For configuring and changing the settings of the driver on a PC. The support software varies depending on the driver.

Model	Applied driver		
	SHD2-06	SHD2-08	SHD-16
SHD2-UTL	●	●	
SHD-UTL			●

PC Connection Cable

For connecting the driver and the DOS/V PC.
Cable length 2000 mm
Model: SHD-PC

I/O Connector Set

Connector for inputting/outputting command signals to the I/O connector. The connector varies depending on the driver.

Model	Applied driver		
	SHD2-06	SHD2-08	SHD-16
SHD2-CN3	●	●	
SHD-CN3			●

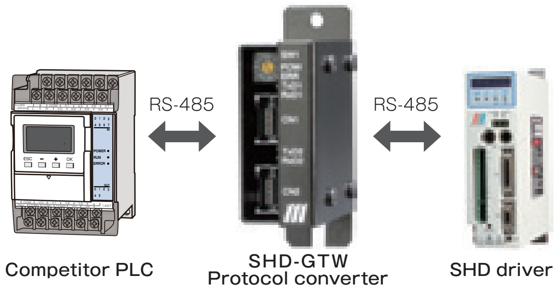
Various Connectors

If you will make the various cables yourself, the connectors in the following table can be used for them.

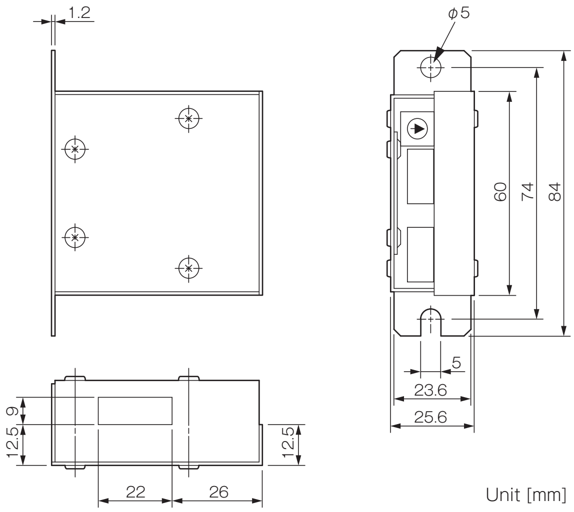
For power supply input terminal (TB1N)	FRONT MSTB 2,5 / 9-ST	Made by Phoenix Contact
For moving part output terminal (TB2N)	FRONT MSTB 2,5 / 3-ST	Made by Phoenix Contact
For driver communication connector (CN1)	E6-200J-100	Made by Chuo Musen Denki
For I/O connector (CN3) (SHD2)	10150-3000PE / 10350-52A0-008	Made by Sumitomo 3M
For I/O connector (CN3) (SHD)	10136-3000PE / 10336-52A0-008	Made by Sumitomo 3M
For sensor connector (CN4)	10114-3000PE / 10314-52A0-008	Made by Sumitomo 3M

Protocol Converter

Protocol converter for converting the parameters, position data, and speed data of the PLC (sequencer) to those of the linear shaft drive driver.
Standard support for the communication protocol of Mitsubishi PLC (type 4) and Omron PLC (host link mode) is available. (Support for other manufacturers is also available)



D90 execution flag	Set D91 to D95 and then set "1" to start transmitting and receiving data. (Up to 14 data sets can be continuously transmitted and received)
D91 command	Set the type of the command to execute. 0: Read, 1: Write, 2: Save to FLASH
D92 SHD station number	Set the station number of the linear shaft drive with which to communicate.
D93 PLC address	Set the address number of the memory area in the PLC for reading and writing data.
D94 SHD address	Set the address number of the memory area in the SHD.
D95 number of data sets	Set the number of data sets to transfer after the addresses set in D93 and D94.



Model: SHD-GTW

Linear Shaft Drive

Items Checked for Design Purposes

Selection Flow

(1) Preliminary selection of the moving part
Preliminarily select the applied moving part based on the moving speed, the mass of the workpiece, etc.

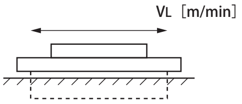
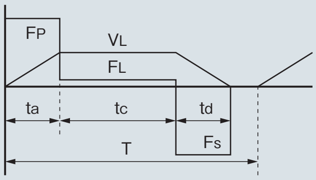
(2) Confirming the preliminary selection
Confirm that the preliminarily selected linear shaft drive meets the conditions.

(3) Selecting the shaft length
Select a shaft length that meets the operating stroke.

(4) Selecting the driver
Select a driver that fits to the selected moving part.

(5) Determining the peripheral devices
If necessary, determine the length of the separately sold motor cable and encoder cable and select them. Also determine whether or not the support software is required.

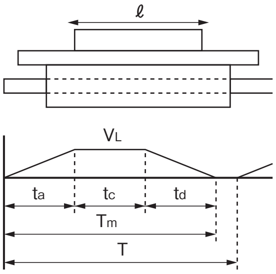
General Procedure to Select the Moving Part

Machine configuration	 Mass of the workpiece .... WW [kg] Mass of the table .... WT [kg] Mass of the movable element .... WM [kg] Coefficient of friction .... μ Acceleration .... α [m/s²]
Steady-state thrust L [N]	$F_L = (W_W + W_T + W_M) \times 9.8$
Running power Po [W]	$P_O = \frac{F_L \times V_L}{60}$
Thrust during acceleration Fp [N] **Thrust during deceleration Fs [N]** **Effective thrust Frms [N]**	$F_P = (W_W + W_T + W_M) \times \alpha + F_L$ $F_S = (W_W + W_T + W_M) \times \alpha - F_L$ $F_{rms} = \sqrt{\frac{F_P^2 \times t_a + F_L^2 \times t_c + F_S^2 \times t_d}{T}}$ 

Selection Example

Selection conditions

Operating stroke	ℓ =800mm
Transfer speed	V_L=120m/min
Mass of the workpiece	W_W=1kg
Mass of the table	W_T=2kg
Coefficient of friction	μ =0.2
Positioning time	T_m=0.5s
Acceleration and deceleration time	t_a,t_d=0.1s
Length of time for one cycle	T=1s



(1) Preliminary selection of the moving part

- ● Thrust under steady-state load **$F_L = 0.2 \times (1 + 2) \times 9.8 = 5.88$ N**
- ● Load acceleration thrust **$F_P = (1 + 2)$ x 120/60/0.1 + 5.88 ≒ 66 N**

Based on the load acceleration thrust, preliminarily select the SHM-254 whose maximum thrust is 267 [N].

- ● SHM-254 specifications

Rated thrust: 59N, Max. thrust: 267N, Moving part mass: 1.10kg
For other details, refer to P544 of this catalog.

(2) Confirming the preliminary selection

- ● Steady-state thrust **$F_L = 0.2 \times (1 + 2 + 1.1) \times 9.8 = 8.1$ N**
- ● Thrust during acceleration **$F_P = (1 + 2 + 1.1)$ x 120/60/0.1 + 8.1 ≒ 90.1 N**

Confirm that the thrust is less than the maximum one.

- ● Thrust during deceleration **$F_S = (1 + 2 + 1.1)$ x 120/60/0.1 - 8.1 ≒ 73.9 N**

Confirm that the thrust is less than the maximum one.

- ● Effective thrust

$$\mathbf{Frms} = \sqrt{\frac{90.1^2 \times 0.1 + 8.1^2 \times 0.3 + 74^2 \times 0.1}{1}}$$

$$= \sqrt{\frac{8118 \times 0.1 + 65.61 \times 0.3 + 5476 \times 0.1}{1}}$$

$$= \sqrt{\frac{811.8 + 19.68 + 547.6}{1}} = 37.14\text{N}$$

Confirm that the thrust is less than the rated one.

(3) Selecting the shaft length
Select a shaft length that meets the following stroke from the "effective stroke lengths" in Moving Part Dimensions.

Operating stroke (800 mm) < effective stroke length

If the effective stroke length for the SHM-254 is greater than 800 mm, select effective stroke 861 mm from P544 of this catalog. Since shaft length L is 1112 in this case, the model is as follows.

Selected moving part model: SHM-254-1112

(4) Selecting the driver
The moving part model is SHM-254-1112, and since the applied driver is determined by the shaft diameter and the number of coil sets, the driver model is as follows.

Selected driver model: SHD2-08-254

(5) Selecting the applied peripheral devices (sold separately)
If the driver is SHD2, the following support software is required.

Support software model: SHD2-UTL
PC connection cable model: SHD-PC

If the distance between the driver and the moving part is 2m, the required motor cable and encoder cable are as follows.

Motor cable model: SHM-MC200
Encoder cable model: SHM-EC200

* Other options such as an I/O connector set and protocol converter are also available. For details, check the page on options.

Handling the Moving Part

A powerful permanent magnet is placed in the shaft. If a magnetic material such as iron or a tool is near the moving part, the material may be attracted to the shaft. Be careful not to bring a watch or precision device close to the moving part. Doing so may damage it due to the influence of the magnet. In particular, do not assemble the moving part without using protective material.

Installing the Moving Part

Install the moving part in an indoor location where it will not be exposed to rainwater and direct sunlight, the ventilation is good, and there is very little moisture, dirt, and dust, and select an atmosphere where it will not be exposed to, for example, corrosive/flammable gases, cutting oil/oil mist, and iron powder/chips. Furthermore, install the moving part away from heat sources such as a furnace.

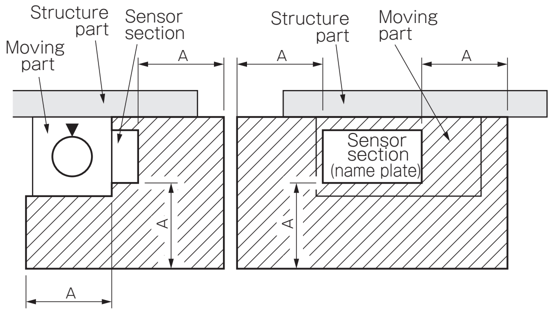
Note that if the moving part is used in a sealed environment, the temperature will increase and the life will be affected.

Item	Item
Ambient temperature	0 to 40℃ (no freezing)
Ambient humidity	80% RH or less (no condensation)
Storage temperature	-15 to 80℃ (no freezing)
Storage humidity	90% RH or less (no condensation)
Altitude	1000m or less
Vibration	24.5 m/s^2 (2.5G) or less
Impact	49 m/s^2 (5G) or less
Protective structure	IP65 (excluding the tip of the lead)

Mounting the Moving Part

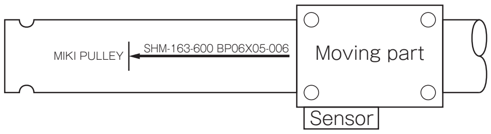
The moving part can be mounted both horizontally and vertically. Pay attention to the following points when you mount it.

- Do not use the moving part in an environment where the main body of the moving part and cable connection area are exposed to oil or water.
- Do not use the moving part while the cables are submerged in oil or water.
- When you mount the moving part vertically, place the cable outlet downward to prevent penetration of oil or water.
- Make sure that stress by bending or caused by its own mass is not applied to the cable outlet and connection area.
- Place the cable included with the moving part away in the cableveyor to minimize stress by bending.
- Provide the cable with as large a bend radius as possible. (The minimum bend radius is 55 mm.)
- Make sure that the center of the shaft and that of the moving part are aligned with each other. If not, the positioning accuracy decreases.
- Do not place metal or magnetic material within the range of dimension A from the sensor section (shaded area) in the figure below.
- Use non-magnetic screws to mount the moving part to the structure.
- Secure the moving part to the non-magnetic (e.g. aluminum) structure.



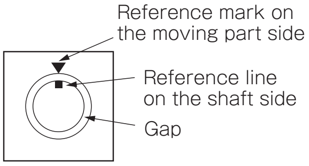
Moving part models	SHM-16☐	SHM-25☐	SHM-356
Dimension A [mm]	51.2	51.2	68

Mount the moving part to the shaft as shown in the figure below. If this relationship is reversed, malfunction may occur.



When you install the moving part, align the reference mark (▼) on the end plate of the moving part with the reference line on the shaft.

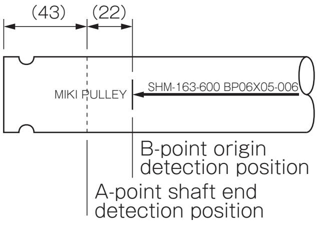
The misalignment tolerance between the mark and the line is ±5 degrees, and note that if the misalignment increases, the positioning accuracy decreases.



Origin Return Operation

When the moving part returns to the origin, it moves to the position about 43 mm from the shaft end on the origin side. Accordingly, install the clamp and stopper within 43 mm from the shaft end.

The origin is on the side of the MIKI PULLEY mark.
It is the return direction.
Note that the dimensions in parentheses are approximate. They vary in the range of about ±1 mm depending on the individual product.



Installing the Driver

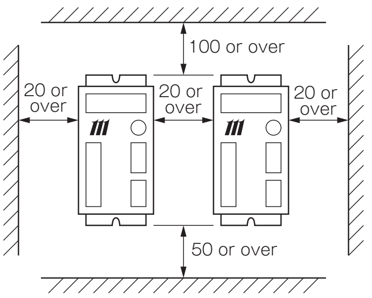
Install the driver in an indoor location where it will not be exposed to rainwater and direct sunlight, the ventilation is good, and there is very little moisture, dirt, and dust, and select an atmosphere where it will not be exposed to, for example, corrosive/flammable gases, cutting oil/oil mist, and iron powder/chips.

Item	Item
Ambient temperature	0 to 40℃ (no freezing)
Ambient humidity	80% RH or less (no condensation)
Storage temperature	-15 to 80℃ (no freezing)
Storage humidity	90% RH or less (no condensation)
Altitude	1000m or less
Vibration	5.9 m/s^2 (0.6G) or less, 10 to 60 Hz

Be sure to install the driver vertically so that the letters are eligible as shown in the figure below. Install the driver so that it is away from other devices and walls.

The above applies when multiple drivers are installed in a row. If you install multiple drivers on top of each other, put a partition plate between them to prevent heat generated by the driver in the lower row from being transmitted to the driver in the upper row. Provide a distance of 100 mm or more between the main body and the partition plate.

Note that it is recommended to install drivers in a place where the heat does not build up and to ventilate the place with a fan.



Unit [mm]

Overload Protection Equipment

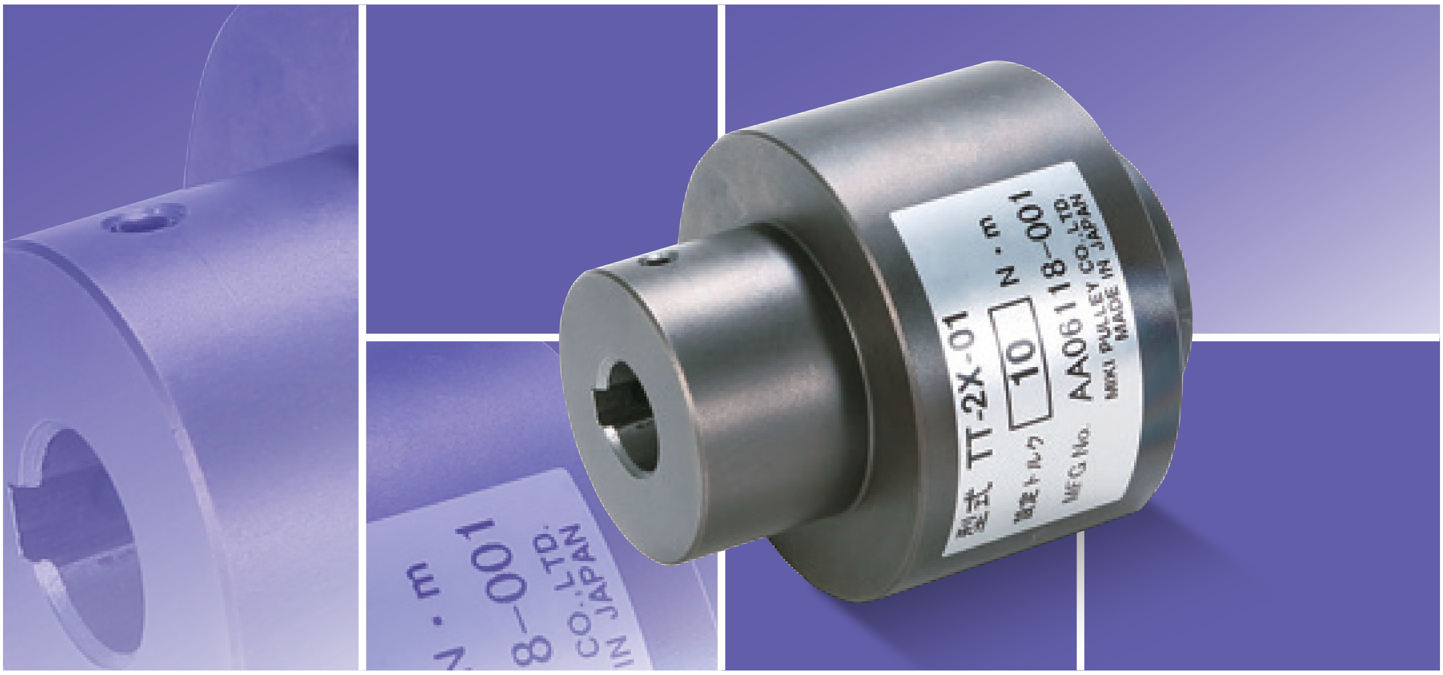
TORQUE LIMITERS

Application Semiconductor manufacturing equipment, textile machinery, printing machinery

Detecting an Overload Reliably and Taking Appropriate Action to Protect the Machine against Overload

This torque limiter detects an overload and disconnects the input side and the output side immediately to protect the machine. Because it is the one-position engagement type, when the overload is removed, the input and output are automatically connected with the same torque in the same indexing position. In contrast to the friction type, this type can be used even in adverse environments.

RoHS



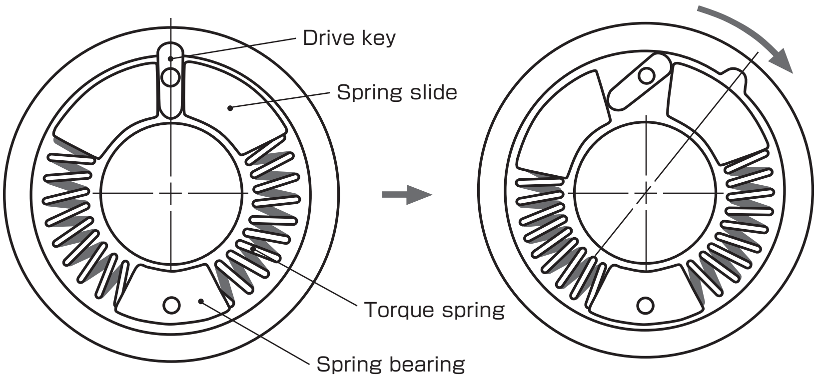


Figure A

Figure B

1. Normally the drive key is engaged with the groove of the housing to transmit torque. (Figure A)
2. If an overload is applied, the drive key is tilted against the force of the torque spring and disconnected from the groove of the housing to disconnect the input side and the output side. (Figure B)
3. When the input side and the output side are returned to the original indexing position after removing the overload, the operation can be restarted with the torque that was set originally.
4. The normal and reverse rotation torque can be changed by independently connecting normal and reverse rotation torque springs. (Please contact Miki Pulley for details.)

Available Models

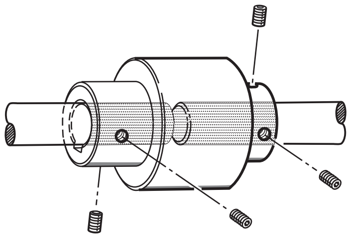
Series	Applications	Lineup
Torque Tender	Two-shaft butting type	TT-☐-01
	Through-shaft winding type	TT-☐-03

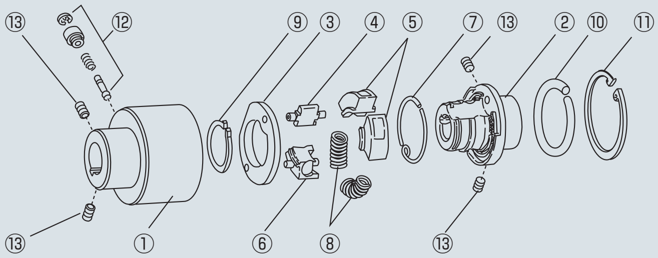
* Torque tender is the name of Miki Pulley's overload protection equipment

TT-☐-01 Types (Two-shaft Butting Type)

The two-shaft butting type is made by inserting two shafts from both ends (housing and hub) of the torque tender and securing them with set screws to transmit power and protect the machine against overload.
The two-shaft butting type can also be used as a flexible coupling.

- Set torque: 0.2 to 200 N · m
- Applied shaft diameter: 8 to 50 mm



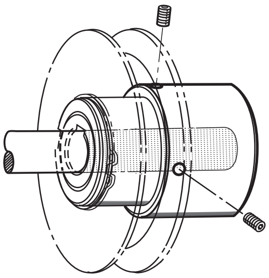


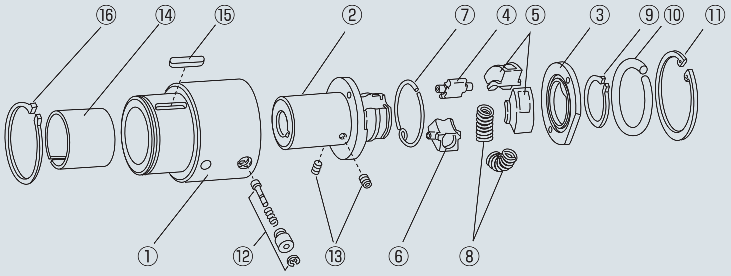
① Housing ② Hub ③ Hub ring ④ Drive key ⑤ Spring slide ⑥ Spring bearing ⑦ Reset spring ⑧ Torque spring ⑨ Stop ring ⑩ Stop ring washer ⑪ Stop ring ⑫ Signal pin (option) ⑬ Set screws (included)

TT-☐-03 Types (Winding Type)

The winding type is made by inserting the shaft into the inside (hub) of the torque tender and attaching a pulley, sprocket, or gear to the outside of the housing to transmit power and protect the machine against overload.
The shaft is designed to be secured at the center of the main unit so it can be attached even if its end is structured as a through-shaft.

- Set torque: 0.2 to 200 N · m
- Applied shaft diameter: 8 to 45 mm





① Housing ② Hub ③ Hub ring ④ Drive key ⑤ Spring slide ⑥ Spring bearing ⑦ Reset spring ⑧ Torque spring ⑨ Stop ring ⑩ Stop ring washer ⑪ Stop ring ⑫ Signal pin (option) ⑬ Set screws (included) ⑭ Oilless metal ⑮ Outer diameter key (included) ⑯ Stop ring (included)

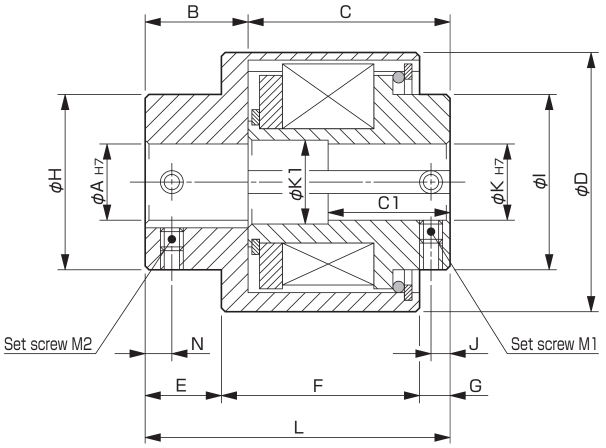
TT-□-01 Types

Specifications

Model	Size	Set torque value [N·m]									Misalignment		Max. rotation speed [min⁻¹]	Moment of inertia [kg·m²]	Mass [kg]
		Spring color									Parallel [mm]	Angular [°]			
		Colorless	Blue	Red	Yellow	White	Gray	Green	Brown	Colorless					
TT-1X-01	1X	0.2	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	0.2	0.5	1800	0.06×10^{-3}	0.3
TT-2-01	2	1	2	3	4	5	6	7	8	10	0.2	0.5	1800	0.26×10^{-3}	0.7
TT-2X-01	2X	2	3	5	8	10	12	15	18	20	0.2	0.5	1800	0.52×10^{-3}	1.0
TT-3-01	3	5	8	10	15	20	25	30	35	40	0.2	0.5	1800	1.23×10^{-3}	1.5
TT-3X-01	3X	10	16	20	30	40	50	60	70	80	0.2	0.5	1800	1.94×10^{-3}	2.7
TT-4X-01	4X	20	30	50	80	100	120	150	180	200	0.2	0.5	500	14.8×10^{-3}	6.3

* The set torque values in the table above are those when the rotation speed is 1500 min^{-1}. The operation torque varies depending on the operating rotation speed. Please check P563.
* If you need durability for the torque values in the ▨ area, select a larger size.

Dimensions



CAD

Unit [mm]

Size	Shaft bore dimensions in compliance with the new JIS standards	
	A	K
1X	10・11・12・14	10・11・12
2	11・12・14・15・16・18・19・20	11・12・14・15・16
2X	14・15・16・18・19・20・22・24	14・15・16・18・19
3	18・19・20・22・24・25・28・30	18・19・20・22・24・25
3X	18・19・20・22・24・25・28・30	18・19・20・22・24・25
4X	19・20・22・24・25・28・30・32 35・38・40・42・45・48・50	19・20・22・24・25・28・30 32・35・38・40・42・45

Unit [mm]

Size	Shaft bore dimensions in compliance with the old JIS standards	
	A	K
1X	8・10・11・12・14	8・10・11・12
2	11・12・14・15・16・18・19・20	11・12・14・15・16
2X	14・15・16・18・19・20・22・24	14・15・16・18・19・20
3	18・19・20・22・24・25・28・30	18・19・20・22・24・25
3X	18・19・20・22・24・25・28・30	18・19・20・22・24・25
4X	19・20・22・24・25・28・30・32 35・38・40・42・45・48・50	19・20・22・24・25・28・30 32・35・38・40・42・45

* There is no keyway for bore diameter ø8 mm.
* For the bore drilling standards, see P562.

Unit [mm]

Size	K1	B	C	C1	D	E	F	G	H	I	J	L	N	M1	M2
1X	12.5	20	30	23	42	15	30	5	25	22	3	50	6	2-M4	2-M4
2	16.5	25	41	32.5	55	20	35	11	35	32	5	66	7	2-M5	2-M5
2X	20.5	31	45	34	65	25	40	11	40	38	5	76	8	2-M5	2-M5
3	25.5	38	53	40	75	30	50	11	45	45	5	91	10	2-M6	2-M6
3X	25.5	36	85	41	75	30	80	11	45	45	6	121	10	2-M6	2-M6
4X	—	46	95	—	120	35	90	16	80	80	8	141	12	2-M10	2-M10

How to Place an Order

TT-2X-01-14N-19H-10NM-P

Size

Type
01: Two-shaft butting

Housing bore diameter (φA)

Key specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards

Option
Blank: None
P: Equipped with a signal pin

Set torque
*Contact Miki Pulley for assistance in changing the set torque for normal or reverse operation.

Key specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards

Hub bore diameter (φK)

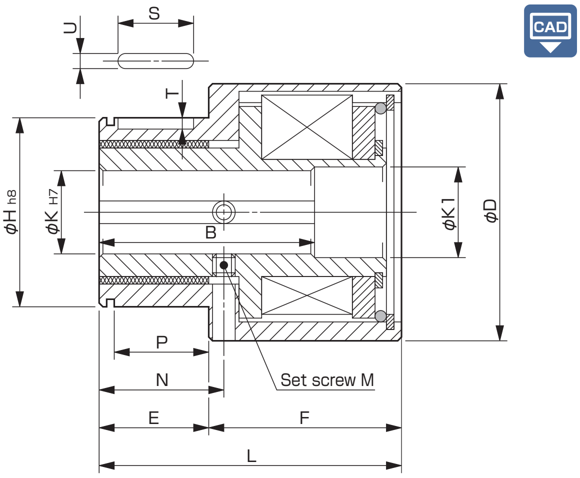
TT- ☐ -03 Types

Specifications

Type	Size	Set torque value [N·m]									Max. rotation speed [min⁻¹]	Moment of inertia [kg·m²]	Mass [kg]
		Spring color											
		Colorless	Blue	Red	Yellow	White	Gray	Green	Brown	Colorless			
TT-1X-03	1X	0.2	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	1800	0.09×10^{-3}	0.4
TT-2-03	2	1	2	3	4	5	6	7	8	10	1800	0.31×10^{-3}	0.8
TT-2X-03	2X	2	3	5	8	10	12	15	18	20	1800	0.66×10^{-3}	1.1
TT-3-03	3	5	8	10	15	20	25	30	35	40	1800	1.59×10^{-3}	1.7
TT-3X-03	3X	10	16	20	30	40	50	60	70	80	1800	2.43×10^{-3}	3.0
TT-4X-03	4X	20	30	50	80	100	120	150	180	200	500	15.8×10^{-3}	6.5

* The set torque values in the table above are those when the rotation speed is 1500 min⁻¹. The operation torque varies depending on the operating rotation speed. Please check P563.
* If you need durability for the torque values in the ▨ area, select a larger size.

Dimensions



Unit [mm]

Size	Shaft bore dimensions in compliance with the new JIS standards
	K
1X	10 • 11 • 12
2	11 • 12 • 14 • 15 • 16
2X	14 • 15 • 16 • 18 • 19
3	18 • 19 • 20 • 22 • 24 • 25
3X	18 • 19 • 20 • 22 • 24 • 25
4X	19 • 20 • 22 • 24 • 25 • 28 • 30 • 32 • 35 • 38 • 40 • 42 • 45

Unit [mm]

Size	Shaft bore dimensions in compliance with the old JIS standards
	K
1X	8 • 10 • 11 • 12
2	11 • 12 • 14 • 15 • 16
2X	14 • 15 • 16 • 18 • 19 • 20
3	18 • 19 • 20 • 22 • 24 • 25
3X	18 • 19 • 20 • 22 • 24 • 25
4X	19 • 20 • 22 • 24 • 25 • 28 • 30 • 32 • 35 • 38 • 40 • 42 • 45

* There is no keyway for bore diameter ø8 mm.
* For the bore drilling standards, see P562.

Unit [mm]

Size	K1	B	D	E	F	H	N	L	P	S	T	U	M
1X	12.5	34	42	20	35	30	25	55	16	14	2.5	4	2-M4
2	16.5	38	55	25	40	40	30	65	20	18	3	5	2-M5
2X	20.5	40	65	25	45	45	31	70	20	18	3	5	2-M5
3	25.5	52.5	75	35	55	60	45	90	30	28	4	7	2-M6
3X	25.5	75	75	35	90	60	45	125	30	28	4	7	2-M6
4X	46	100	120	50	90	85	57	140	45	40	4.5	12	2-M8

* The outer diameter key (old JIS class 2) and stop ring are included accessories.

How to Place an Order

TT-2X-03-19H-10NM-P

Size

Type
03: Winding

Hub bore diameter (φK)

Key specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards

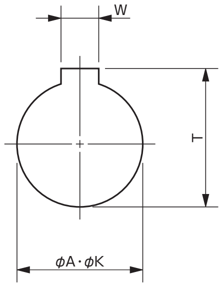
Set torque
*Contact Miki Pulley for assistance in changing the set torque
for normal or reverse operation.

Option
Blank: None
P: Equipped with a signal pin

Torque Limiters

Standard Hole-Drilling Standards

- The set screws are included with the product.
- For standard bore drilling dimensions other than those specified, please contact Miki Pulley.
  (A bore may not be able to be drilled for some hub sizes.)



Unit [mm]

Models compliant with the old JIS standards (class 2)				Models compliant with the new JIS standards				Models compliant with the new motor standards			
Nominal bore diameter	Bore diameter øA/øK	Keyway width W	Keyway height T	Nominal bore diameter	Bore diameter øA/øK	Keyway width W	Keyway height T	Nominal bore diameter	Bore diameter øA/øK	Keyway width W	Keyway height T
Tolerance	H7	E9	$^{+0.5}_{0}$	Tolerance	H7	H9	$^{+0.5}_{0}$	Tolerance	G7	H9	$^{+0.5}_{0}$
8	$8\ ^{+0.015}_{0}$	—	—	—	—	—	—	—	—	—	—
10	$10\ ^{+0.015}_{0}$	$4\ ^{+0.050}_{+0.020}$	11.5	10 H	$10\ ^{+0.015}_{0}$	$4\ ^{+0.030}_{0}$	11.8	—	—	—	—
11	$11\ ^{+0.018}_{0}$	$4\ ^{+0.050}_{+0.020}$	12.5	11 H	$11\ ^{+0.018}_{0}$	$4\ ^{+0.030}_{0}$	12.8	—	—	—	—
12	$12\ ^{+0.018}_{0}$	$4\ ^{+0.050}_{+0.020}$	13.5	12 H	$12\ ^{+0.018}_{0}$	$4\ ^{+0.030}_{0}$	13.8	—	—	—	—
14	$14\ ^{+0.018}_{0}$	$5\ ^{+0.050}_{+0.020}$	16.0	14 H	$14\ ^{+0.018}_{0}$	$5\ ^{+0.030}_{0}$	16.3	14 N	$14\ ^{+0.024}_{+0.006}$	$5\ ^{+0.030}_{0}$	16.0
15	$15\ ^{+0.018}_{0}$	$5\ ^{+0.050}_{+0.020}$	17.0	15 H	$15\ ^{+0.018}_{0}$	$5\ ^{+0.030}_{0}$	17.3	—	—	—	—
16	$16\ ^{+0.018}_{0}$	$5\ ^{+0.050}_{+0.020}$	18.0	16 H	$16\ ^{+0.018}_{0}$	$5\ ^{+0.030}_{0}$	18.3	—	—	—	—
18	$18\ ^{+0.018}_{0}$	$5\ ^{+0.050}_{+0.020}$	20.0	18 H	$18\ ^{+0.018}_{0}$	$6\ ^{+0.030}_{0}$	20.8	—	—	—	—
19	$19\ ^{+0.021}_{0}$	$5\ ^{+0.050}_{+0.020}$	21.0	19 H	$19\ ^{+0.021}_{0}$	$6\ ^{+0.030}_{0}$	21.8	19 N	$19\ ^{+0.028}_{+0.007}$	$6\ ^{+0.030}_{0}$	21.5
20	$20\ ^{+0.021}_{0}$	$5\ ^{+0.050}_{+0.020}$	22.0	20 H	$20\ ^{+0.021}_{0}$	$6\ ^{+0.030}_{0}$	22.8	—	—	—	—
22	$22\ ^{+0.021}_{0}$	$7\ ^{+0.061}_{+0.025}$	25.0	22 H	$22\ ^{+0.021}_{0}$	$6\ ^{+0.030}_{0}$	24.8	—	—	—	—
24	$24\ ^{+0.021}_{0}$	$7\ ^{+0.061}_{+0.025}$	27.0	24 H	$24\ ^{+0.021}_{0}$	$8\ ^{+0.036}_{0}$	27.3	24 N	$24\ ^{+0.028}_{+0.007}$	$8\ ^{+0.036}_{0}$	27.0
25	$25\ ^{+0.021}_{0}$	$7\ ^{+0.061}_{+0.025}$	28.0	25 H	$25\ ^{+0.021}_{0}$	$8\ ^{+0.036}_{0}$	28.3	—	—	—	—
28	$28\ ^{+0.021}_{0}$	$7\ ^{+0.061}_{+0.025}$	31.0	28 H	$28\ ^{+0.021}_{0}$	$8\ ^{+0.036}_{0}$	31.3	28 N	$28\ ^{+0.028}_{+0.007}$	$8\ ^{+0.036}_{0}$	31.0
30	$30\ ^{+0.021}_{0}$	$7\ ^{+0.061}_{+0.025}$	33.0	30 H	$30\ ^{+0.021}_{0}$	$8\ ^{+0.036}_{0}$	33.3	—	—	—	—
32	$32\ ^{+0.025}_{0}$	$10\ ^{+0.061}_{+0.025}$	35.5	32 H	$32\ ^{+0.025}_{0}$	$10\ ^{+0.036}_{0}$	35.3	—	—	—	—
35	$35\ ^{+0.025}_{0}$	$10\ ^{+0.061}_{+0.025}$	38.5	35 H	$35\ ^{+0.025}_{0}$	$10\ ^{+0.036}_{0}$	38.3	—	—	—	—
38	$38\ ^{+0.025}_{0}$	$10\ ^{+0.061}_{+0.025}$	41.5	38 H	$38\ ^{+0.025}_{0}$	$10\ ^{+0.036}_{0}$	41.3	38 N	$38\ ^{+0.034}_{+0.009}$	$10\ ^{+0.036}_{0}$	41.0
40	$40\ ^{+0.025}_{0}$	$10\ ^{+0.061}_{+0.025}$	43.5	40 H	$40\ ^{+0.025}_{0}$	$12\ ^{+0.043}_{0}$	43.3	—	—	—	—
42	$42\ ^{+0.025}_{0}$	$10\ ^{+0.061}_{+0.025}$	45.5	42 H	$42\ ^{+0.025}_{0}$	$12\ ^{+0.043}_{0}$	45.3	42 N	$42\ ^{+0.034}_{+0.009}$	$12\ ^{+0.043}_{0}$	45.0
45	$45\ ^{+0.025}_{0}$	$12\ ^{+0.075}_{+0.032}$	48.5	45 H	$45\ ^{+0.025}_{0}$	$14\ ^{+0.043}_{0}$	48.8	—	—	—	—
48	$48\ ^{+0.025}_{0}$	$12\ ^{+0.075}_{+0.032}$	51.5	48 H	$48\ ^{+0.025}_{0}$	$14\ ^{+0.043}_{0}$	51.8	48 N	$48\ ^{+0.034}_{+0.009}$	$14\ ^{+0.043}_{0}$	51.5
50	$50\ ^{+0.025}_{0}$	$12\ ^{+0.075}_{+0.032}$	53.5	50 H	$50\ ^{+0.025}_{0}$	$14\ ^{+0.043}_{0}$	53.8	—	—	—	—

Optional Signal Pin

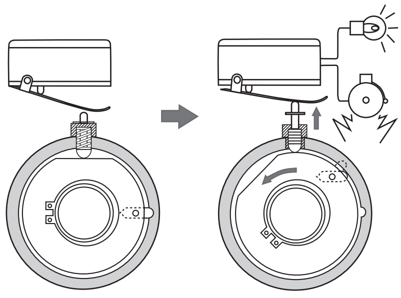
Unattended or remotely controlled machines and equipment require equipment that detects an overload and automatically switches off the power or sounds a warning alarm.

An overload can be detected by connecting the signal pin to the torque tender.

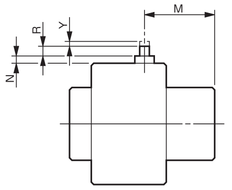
When an overload is detected, the input side and the output side are disconnected and the cam mechanism of the torque tender hub pushes the signal pin out in the radial direction. This can be used to switch off the power or sound a warning alarm.

Be sure to use the housing as the input side.

The standard product cannot be modified to connect the signal pin. If you need to connect the signal pin, add $\boxed{\text{- P}}$ to the end of the model when you order the product.



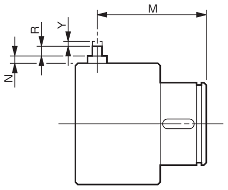
Size (TT-□-01-□-P)



Unit [mm]

Size	M	Y	R	N
1X	24	1.5	6.5	5.5
2	29	2.5	5	4.5
2X	36	2.5	5	4.5
3	43	2.5	5	4.5
3X	42	2.5	5	4.5
4X	55	2.5	5	2

Size (TT-□-03-□-P)



Unit [mm]

Size	M	Y	R	N
1X	47	1.5	6.5	5.5
2	56	2.5	5	4.5
2X	60	2.5	5	4.5
3	79	2.5	5	4.5
3X	114	2.5	5	4.5
4X	125	2.5	5	2

Items Checked for Design Purposes

Precautions for Use

1. Touching the product in operation with your hand or fingers may cause injury. Be sure to install a safety cover to prevent a hazard.
2. If the overload protection equipment is activated, the driving side and the driven side of the product are disconnected completely. Be sure to install a safety mechanism such as a safety brake to prevent a hazard.
3. The product is designed as overload protection equipment and is not designed as torque detection equipment. Never use it as torque detection equipment. Doing so may cause problems.
4. If the operation is continued while the overload protection mechanism is activated, the product may generate heat. If nothing is done, the product may be damaged and the equipment may be adversely affected. Be sure to install detection equipment, and if the overload protection mechanism is activated, immediately stop the operation of the equipment.
5. Do not use the product in a location where it may be exposed to corrosive gases and chemicals. The product is not waterproof so do not use it in a location where it may be exposed to water.
6. Do not use the product outside the operating temperature range of -40℃ and 120℃ .
7. All torque springs are inserted by us before delivery. If you want the set torque to be changed, please consult with our sales office. Do not disassemble and replace the spring.
8. Never use the product with a rotation speed other than the design one. If you use it with a rotation speed other than the design one, the driving side and the driven side will not be disconnected under a load under which you want to activate the overload protection mechanism, or will be disconnected under a load less than the one under which you want to activate the overload protection mechanism.
9. If the torque tender is activated by an overload, immediately stop the operation. Check to make sure that the main power of the equipment is switched off and then remove the cause for the overload on the driven side. When you connect the driving side and the driven side for recovery, manually rotate the driving side by applying a torque of more than 55% of the set torque at 1500 min^{-1} to the driven side.
Before restarting the operation, be sure to perform a start-up inspection and test run.
10. The mounting tolerance of the TT-□-01 type is 0.2 mm or less for the parallel misalignment and 0.5° or less for the angular deflection.
11. When you use an optional signal pin, pay attention to the following points.
   - * Make sure that the **housing is the input side**.
   - * Make sure that detection switches are installed in two positions away from each other at 120° or more in the rotation direction. An overload may not be detected with a single switch.
   - * The quality of the signal pin is good enough, but please install an additional detector other than the signal pin just in case.
12. There is backlash.

Selection

■ Determining the Operation Torque Value

Determine the operation torque value T of the torque tender based on the mechanical strength, load, and other conditions.
If the operation torque cannot be determined based on the above conditions, it can be calculated with an expression of the rated output of the drive unit and the rotation speed of the shaft to which the torque tender is connected.

$$T = K \times \frac{9550 \times P}{n}$$

T: Operation torque [N · m]
K: Service factor
P: Drive unit rated output [kW]
n: Torque tender rotation speed [min^{-1}]

■ Service Factor K

Directly connected to the motor	2.0 ～ 2.5
After changing speed	1.75 ～ 2.0
After deceleration	1.25 ～ 1.50
Rotation speed 25 min^{-1} or less	1.25

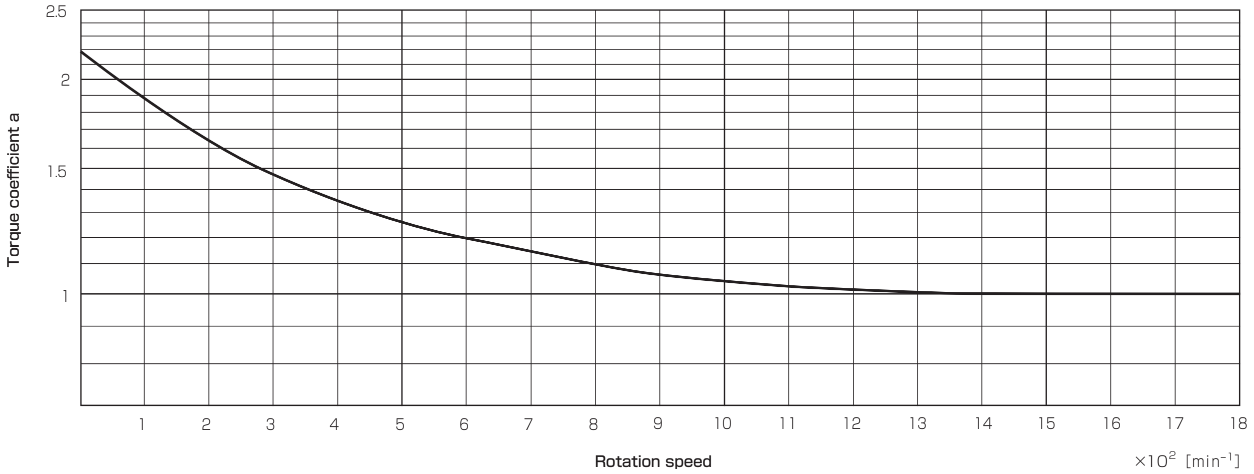
■ Selecting the Model and Set Torque

The operation torque changes as shown in the figure below as a result of the characteristics of the torque tender.
The set torque values of the torque tender are those when the rotation speed is 1500 min^{-1}. Accordingly, you need to read torque coefficient a at the rotation speed of the shaft to which the torque tender is connected from the figure below, and convert it to the set torque at 1500 min^{-1} using the following expression.

$$Ts = \frac{T}{a}$$

T: Operation torque [N · m]
a: Torque coefficient
Ts: Set torque at 1500 min^{-1} [N · m]

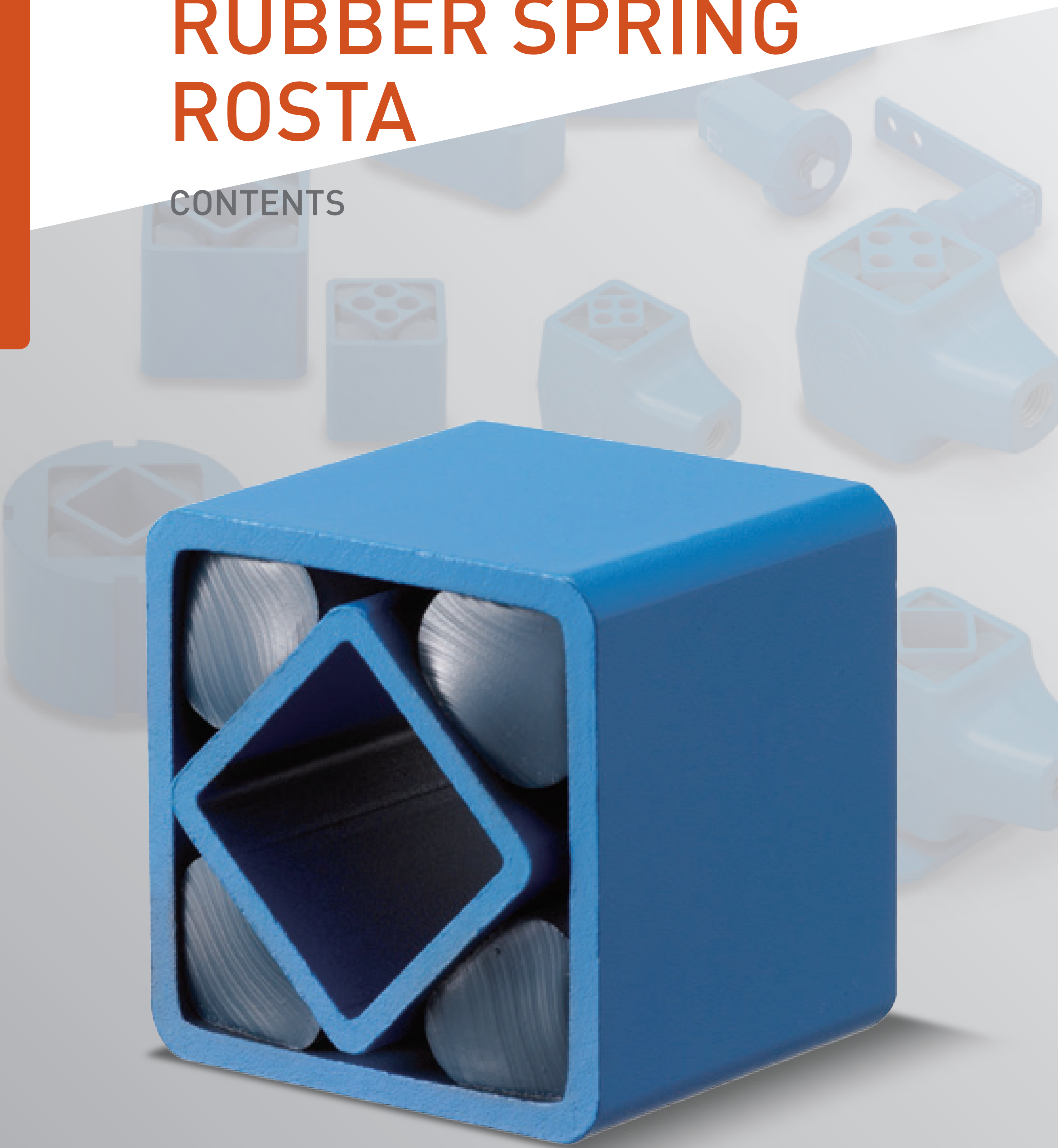
From the specification table, select the size whose set torque value is closest to Ts that was calculated with the expression above.



* Use size 4X at a rotation speed equal to or less than 500 min^{-1}.

RUBBER SPRING ROSTA

CONTENTS



＊ Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Stable Tension, Vibration Absorption, and Noise Reduction Are Provided

Features

Large Torsional Angle

ROSTA has a unique structure of rubber being compressed while rolling, allowing a torsional angle of up to ±30° .

Nonlinear Spring Characteristic

The spring characteristic in the vertical and horizontal directions can be used in addition to the torsional one.

Vibration and Impact Absorption

The use of an elastic natural rubber (NR) with damping performance provides an excellent anti-vibration effect.
The internal damping of the rubber provides a much greater damping effect than that of metallic materials.

High Durability

ROSTA has a simple structure and is light and compact. The rubber element is pre-compressed so it provides excellent durability also against variable and impact loads.

Maintenance-free

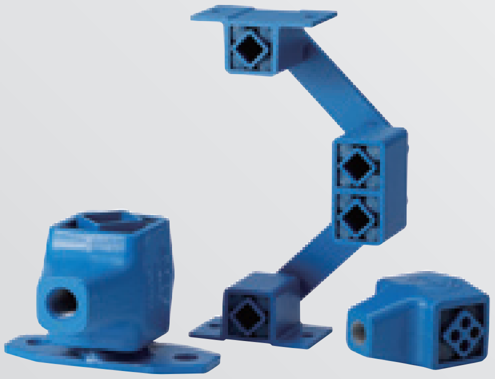
There is no contact of metal against metal so ROSTA has no wear parts. It is highly resistant to water and dust, and does not require routine maintenance.

» 568 SUSPENSION UNITS

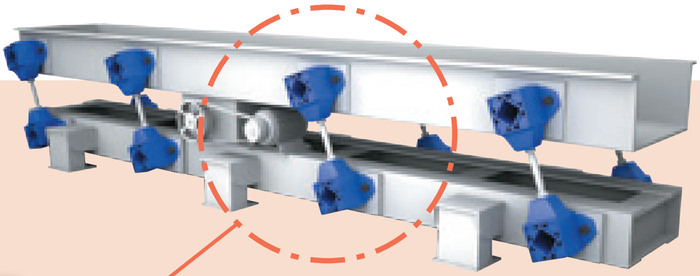
» 586 ANTI-VIBRATION MOUNTINGS

» 578 TENSIONERS

» 594 OSCILLATING MOUNTINGS

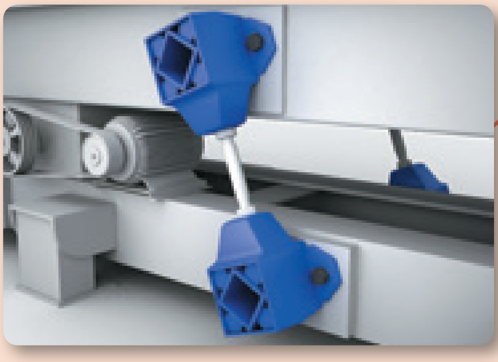


Applications

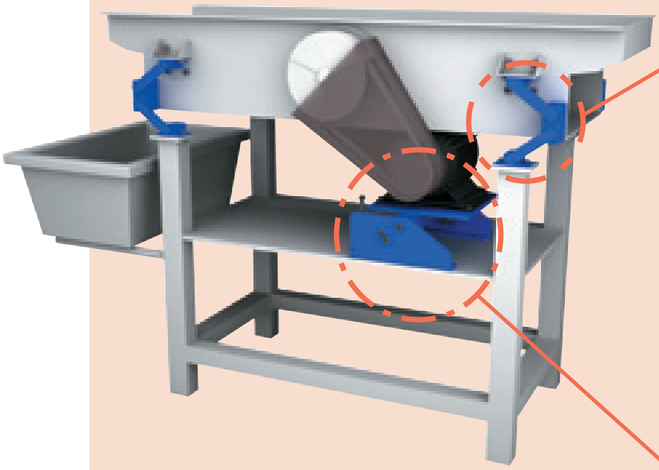


Product model AU

Employed device Vibration Conveyor



The ROSTA oscillating mounting AU model is used for a vibration conveyor.
The service life is longer than that of a metal disc and coil spring.



Product model AB

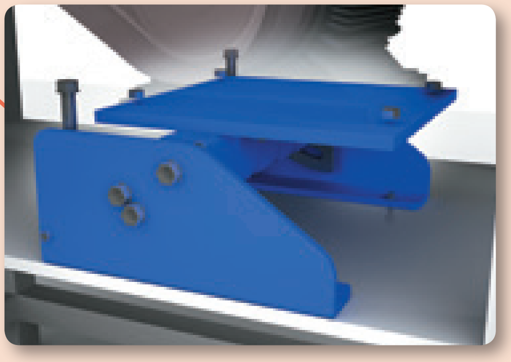
Employed device Vibration Screen

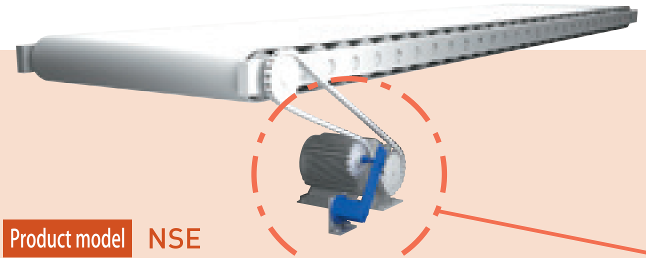
The AB model is used for a vibration screen.

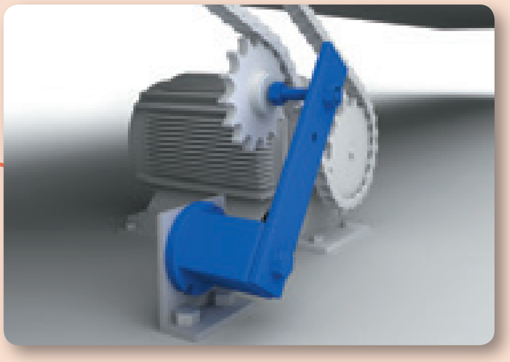
Product model DR-S

Employed device Motor Support Base

The DR-S model is used to support the oscillating motor for vibration screens.







Product model NSE

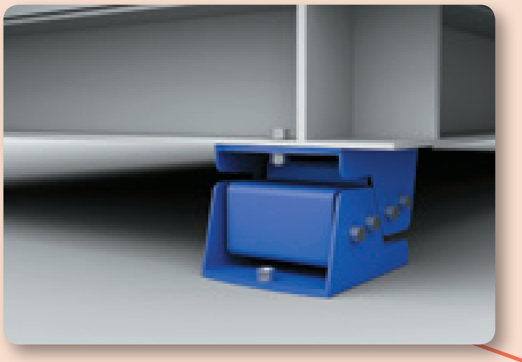
Employed device Conveyor

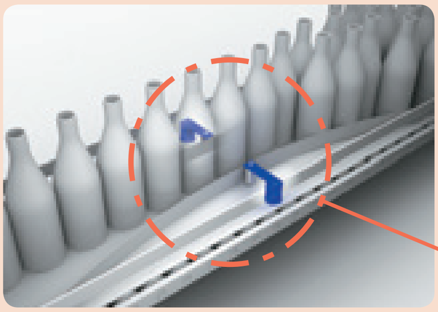
The ROSTA tensioner NSE model is used to absorb chain slack.

Product model ESL

Employed device Compressor

The anti-vibration mounting ESL model is used to dampen the vibration of a large compressor.

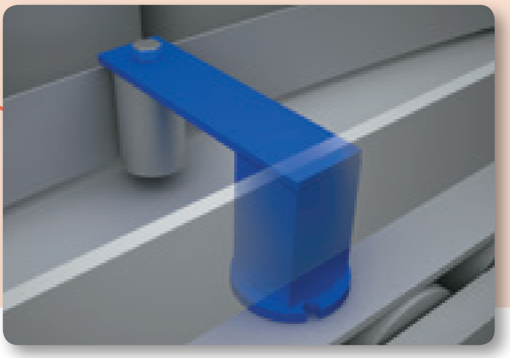




Product model RSE

Employed device Centering Device for Conveyor

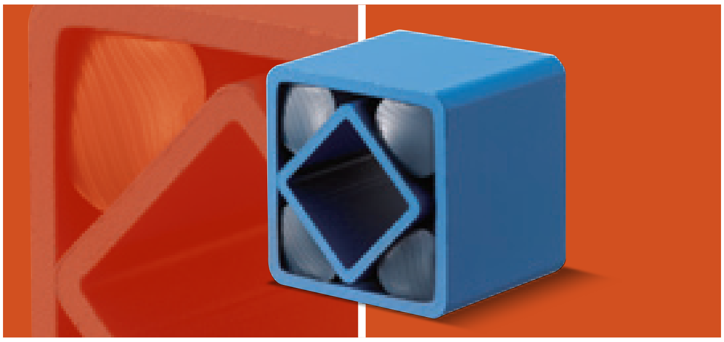
The tensioner RSE model is used for a bottle alignment conveyor.



SUSPENSION UNITS

Torsional torque	0 N・m to 2160 N・m
Torsional angle	0° to 30°（60°）
Operating temperature	-40℃ to 80℃

Multi-functional and Multi-purpose Suspension Units



A total of six types of suspension units with different shell and core shapes, materials, and mounting methods are available. The multi-purpose machine elements can be used freely in a wide range of applications, including industrial machines, conveying and transportation equipment, and playground and amusement equipment.

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Suspension Tensioner with Spring, Damper, and Bearing Functions

Spring Function

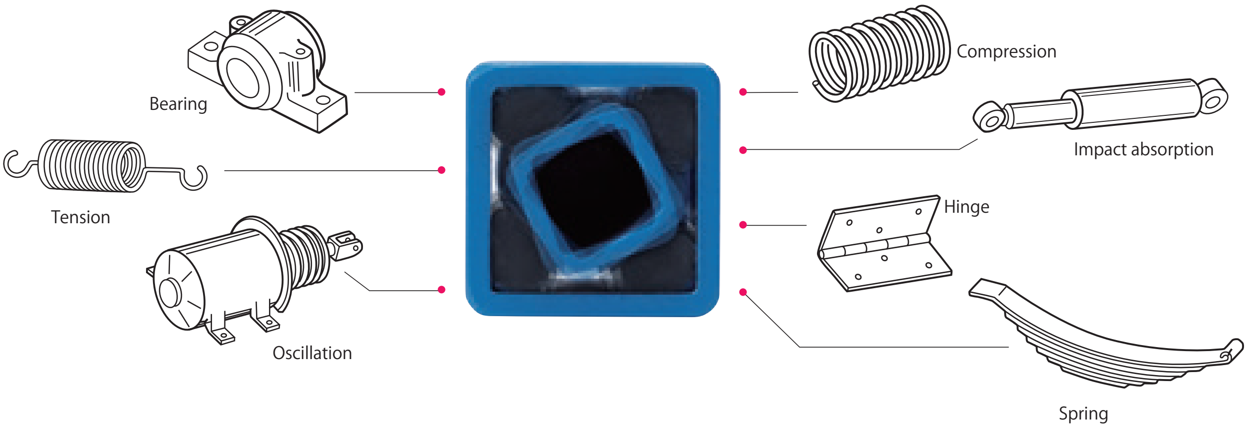
A torsional angle of up to ±30° can be tolerated. The spring characteristic is nonlinear and the torsional stiffness increases as the load increases. Furthermore, the torque characteristic is determined by the length of the ROSTA. Loads in all directions, specifically the tension, compression, and shearing loads can be supported.

Damper Function

The internal friction of a press-fitted cylindrical rubber is more than 1,000 times that of metallic materials (e.g. spring steel). Therefore, it is possible to stop vibrations caused by impacts or a decrease in amplitude resulting from resonance at an early stage. The unit can be used in a shock absorber, for vibration isolation, and anti-vibration support.

Bearing Function

A high frequency oscillating movement can be transmitted while absorbing vibrations. When normal bearings are used, the transmission of oscillating movement is poorer and the durability decreases if the amount of lubricating oil supply is insufficient. The bearing function of the ROSTA can be used maintenance-free as substitute for the ball bearings and needle bearings.

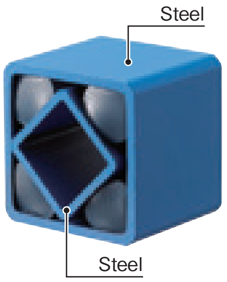


Available Models

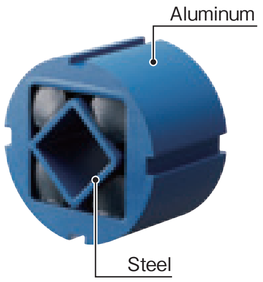
Series	Torsional angle	Shell material	Core material	Lineup
ROSTA SUSPENSION UNITS	Torsional angle 30°	Steel rectangular cylinder shell	Steel square hole core	DR-S
			Aluminum mounting hole core	DR-A
		Aluminum alloy cylinder shell	Steel square hole core	DK-S
			Aluminum mounting hole core	DK-A
	Torsional angle 60°	Steel rectangular cylinder shell	Steel square hole core	DO-S
			Aluminum mounting hole core	DO-A

Structure and Materials

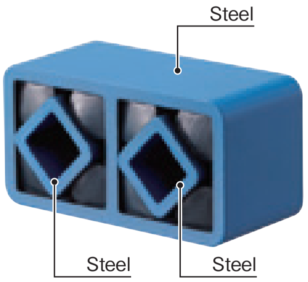
DR-S



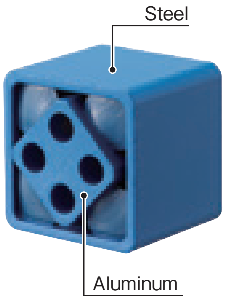
DK-S



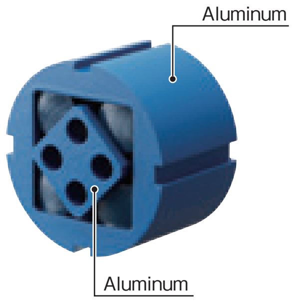
DO-S



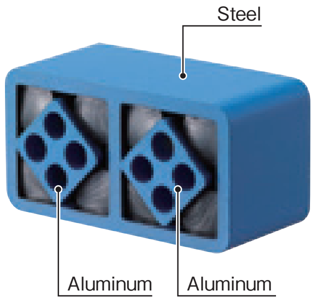
DR-A



DK-A



DO-A



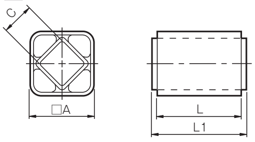
DR Models

Specifications

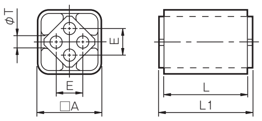
Size	Torque at torsional angle [N•m]						Mass [kg]
	5°	10°	15°	20°	25°	30°	
11 × 20	0.3	0.8	1.3	2.0	2.9	4.0	0.04
11 × 30	0.4	1.2	2.0	3.1	4.3	6.0	0.05
11 × 50	0.7	2.0	3.4	5.1	7.2	10.0	0.08
15 × 25	0.7	1.6	2.6	4.0	5.7	8.2	0.07
15 × 40	1.1	2.5	4.2	6.4	9.2	13.2	0.12
15 × 60	1.6	3.8	6.3	9.6	13.8	19.8	0.18
18 × 30	1.9	4.5	7.5	11.0	15.0	20.6	0.12
18 × 50	3.2	7.5	12.5	18.3	25.0	34.4	0.20
18 × 80	5.1	12.0	20.0	29.3	40.0	55.0	0.32
27 × 40	4.7	10.7	17.5	26.9	39.5	57.0	0.26
27 × 60	7.0	16.0	26.3	40.3	59.3	85.5	0.39
27 × 100	11.7	26.7	43.8	67.2	98.8	142.5	0.65
38 × 60	13.0	30.4	50.6	78.0	113.0	162.0	0.67
38 × 80	17.3	40.5	67.5	104.0	151.0	216.0	0.90
38 × 120	26.0	60.8	101.2	156.0	226.0	324.0	1.32
45 × 80-N	27.6	62.4	104.0	160.0	222.0	320.0	1.42
45 × 100-N	34.5	78.0	130.0	200.0	278.0	400.0	1.76
45 × 150-N	51.8	117.0	195.0	300.0	420.0	600.0	2.62
50 × 120-N	51.0	133.0	250.0	395.0	570.0	780.0	2.37
50 × 200-N	102.0	260.0	475.0	745.0	1070.0	1450.0	3.91
50 × 300-N	150.0	385.0	700.0	1100.0	1590.0	2160.0	5.80

Dimensions

■DR-S



■DR-A



Unit [mm]

Size		A	C	E	L	L1	$T^{+0.5}_{0}$
DR-S	DR-A						
11 × 20	–	20	$8^{+0.25}_{0}$	–	20	25	–
11 × 30	–				30	35	
11 × 50	–				50	55	
15 × 25	15 × 25	27	$11^{+0.25}_{0}$	10	25	30	5
15 × 40	15 × 40				40	45	
15 × 60	15 × 60				60	65	
18 × 30	18 × 30	32	$12^{+0.25}_{0}$	12	30	35	6
18 × 50	18 × 50				50	55	
18 × 80	18 × 80				80	85	
27 × 40	27 × 40	45	$22^{+0.25}_{0}$	20	40	45	8
27 × 60	27 × 60				60	65	
27 × 100	27 × 100				100	105	
38 × 60	38 × 60	60	$30^{+0.25}_{0}$	25	60	70	10
38 × 80	38 × 80				80	90	
38 × 120	38 × 120				120	130	
45 × 80-N	45 × 80-N	75	$35^{+0.4}_{0}$	35	80	90	12
45 × 100-N	45 × 100-N				100	110	
45 × 150-N	45 × 150-N				150	160	
50 × 120-N	50 × 120-N	80	$40^{+0.4}_{0}$	40	120	130	M12 × 40
50 × 200-N	50 × 200-N				200	210	
50 × 300-N	50 × 300-N				300	310	

* The BR model is applicable as the mounting clamp. (Refer to the options on P573)

How to Place an Order

DR - S - 11×20

Size

Type (Core material)
S: Steel A: Aluminum alloy

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

DK Models

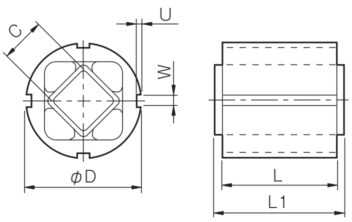
Specifications

Size	Torque at torsional angle [N•m]						Mass [kg]
	5°	10°	15°	20°	25°	30°	
11 × 20	0.3	0.8	1.3	2.0	2.9	4.0	0.03
11 × 30	0.4	1.2	2.0	3.1	4.3	6.0	0.05
11 × 50	0.7	2.0	3.4	5.1	7.2	10.0	0.07
15 × 25	0.7	1.6	2.6	4.0	5.7	8.2	0.06
15 × 40	1.1	2.5	4.2	6.4	9.2	13.2	0.10
15 × 60	1.6	3.8	6.3	9.6	13.8	19.8	0.14
18 × 30	1.9	4.5	7.5	11.0	15.0	20.6	0.13
18 × 50	3.2	7.5	12.5	18.3	25.0	34.4	0.20
18 × 80	5.1	12.0	20.0	29.3	40.0	55.0	0.33
27 × 40	4.7	10.7	17.5	26.9	39.5	57.0	0.27
27 × 60	7.0	16.0	26.3	40.3	59.3	85.5	0.40
27 × 100	11.7	26.7	43.8	67.2	98.8	142.5	0.66
38 × 60	13.0	30.4	50.6	78.0	113.0	162.0	0.72
38 × 80	17.3	40.5	67.5	104.0	151.0	216.0	0.94
38 × 120	26.0	60.8	101.2	156.0	226.0	324.0	1.37
45 × 80	27.6	62.4	104.0	160.0	222.0	320.0	1.35
45 × 100	34.5	78.0	130.0	200.0	278.0	400.0	1.65
45 × 150	51.8	117.0	195.0	300.0	420.0	600.0	2.44

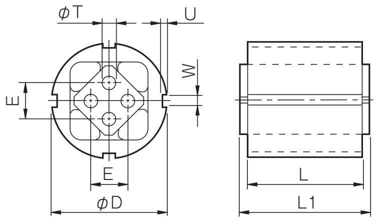
* The sizes 45 × 80, 45 × 100, and 45 × 150 are made to order.

Dimensions

■DK-S



■DK-A



Unit [mm]

Size		C	D	E	L	L1	$T^{+0.5}_{0}$	U	W
DK-S	DK-A								
11 × 20	—	$8^{+0.25}_{0}$	$28^{+0.5}_{+0.1}$	—	20	25	—	2.5	4
11 × 30	—				30	35			
11 × 50	—				50	55			
15 × 25	15 × 25	$11^{+0.25}_{0}$	$36^{+0.5}_{+0.1}$	10	25	30	5	2.5	5
15 × 40	15 × 40				40	45			
15 × 60	15 × 60				60	65			
18 × 30	18 × 30	$12^{+0.25}_{0}$	$45^{+0.6}_{+0.1}$	12	30	35	6	2.5	5
18 × 50	18 × 50				50	55			
18 × 80	18 × 80				80	85			
27 × 40	27 × 40	$22^{+0.25}_{0}$	$62^{+0.7}_{+0.1}$	20	40	45	8	3	6
27 × 60	27 × 60				60	65			
27 × 100	27 × 100				100	105			
38 × 60	38 × 60	$30^{+0.25}_{0}$	$80^{+0.8}_{+0.1}$	25	60	70	10	3.5	7
38 × 80	38 × 80				80	90			
38 × 120	38 × 120				120	130			
45 × 80	45 × 80	$35^{+0.25}_{0}$	$95^{+1.0}_{+0.1}$	35	80	90	12	4	8
45 × 100	45 × 100				100	110			
45 × 150	45 × 150				150	160			

* The BK model is applicable as the mounting clamp. (Refer to the options on P573)

How to Place an Order

DK - S - 11×20

Size

Type (Core material)
S: Steel A: Aluminum alloy

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

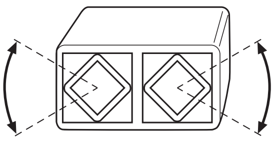
DO Models

Made to order

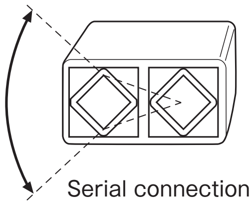
Specifications

Size	Torque at torsional angle [N•m]						Mass [kg]
	5° [10°]	10° [20°]	15° [30°]	20° [40°]	25° [50°]	30° [60°]	
15 × 25	0.7	1.6	2.6	4.0	5.7	8.2	0.07
15 × 40	1.1	2.5	4.2	6.4	9.2	13.2	0.10
15 × 60	1.6	3.8	6.3	9.6	13.8	19.8	0.15
18 × 30	1.9	4.5	7.5	11.0	15.0	20.6	0.12
18 × 50	3.2	7.5	12.5	18.3	25.0	34.4	0.20
18 × 80	5.1	12.0	20.0	29.3	40.0	55.0	0.30
27 × 40	4.7	10.7	17.5	26.9	39.5	57.0	0.32
27 × 60	7.0	16.0	26.3	40.3	59.3	85.5	0.47
27 × 100	11.7	26.7	43.8	67.2	98.8	142.5	0.78
38 × 60	13.0	30.4	50.6	78.0	113.0	162.0	0.87
38 × 80	17.3	40.5	67.5	104.0	151.0	216.0	1.15
38 × 120	26.0	60.8	101.2	156.0	226.0	324.0	1.68

* The angles in parentheses are the values when the DO model is used in serial connection.



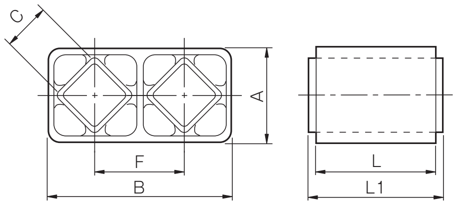
Parallel connection



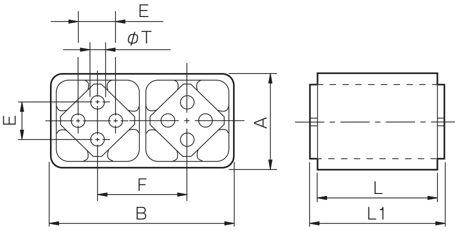
Serial connection

Dimensions

■DO-S



■DO-A



Unit [mm]

Size		A	B	C	E	F	L	L1	$T^{+0.5}_{0}$
DO-S	DO-A								
15 × 25	15 × 25	28	53.5	$11^{+0.25}_{0}$	10	25.5	25	30	5
15 × 40	15 × 40						40	45	
15 × 60	15 × 60						60	65	
18 × 30	18 × 30	34	65	$12^{+0.25}_{0}$	12	31	30	35	6
18 × 50	18 × 50						50	55	
18 × 80	18 × 80						80	85	
27 × 40	27 × 40	47	91	$22^{+0.25}_{0}$	20	44	40	45	8
27 × 60	27 × 60						60	65	
27 × 100	27 × 100						100	105	
38 × 60	38 × 60	63	123	$30^{+0.25}_{0}$	25	60	60	70	10
38 × 80	38 × 80						80	90	
38 × 120	38 × 120						120	130	

* For large dimensions other than the above, please contact Miki Pulley.

How to Place an Order

DO - S - 15×25

Size

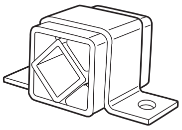
Type (Core material)
S: Steel A: Aluminum alloy

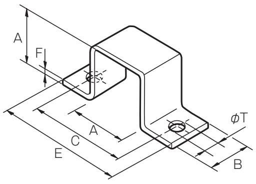
* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Optional Clamps and Brackets

Clamp BR Models

■ Bracket for DR



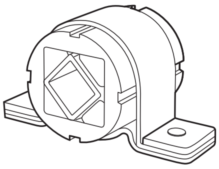


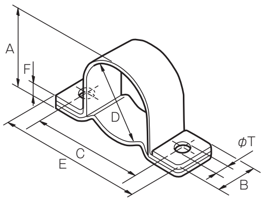
Unit [mm]

Model	Applied unit	A	B	C	E	F	T	Mass [kg]
BR-11	DR-□-11	20	20	37	50	2	6	0.03
BR-15	DR-□-15	27	25	50	65	2	7	0.04
BR-18	DR-□-18	32	30	60	80	2.5	9	0.08
BR-27	DR-□-27	45	35	80	105	3	11	0.15
BR-38	DR-□-38	60	40	100	125	4	13	0.27
BR-45-N	DR-□-45(-N)	75	45	120	150	5	13	0.48
BR-50-N	DR-□-50(-N)	80	50	135	175	6	18	0.71

Clamp BK Models

■ Bracket for DK



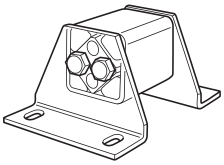


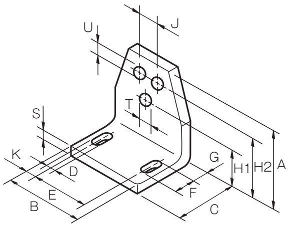
Unit [mm]

Model	Applied unit	A	B	C	D	E	F	T	Mass [kg]
BK-11	DK-□-11	31	20	45	28	60	6	6.5	0.04
BK-15	DK-□-15	40	25	55	36	75	7	6.5	0.09
BK-18	DK-□-18	49	30	68	45	90	8	8.5	0.14
BK-27	DK-□-27	67	35	92	62	125	10	10.5	0.29
BK-38	DK-□-38	86	40	115	80	150	11	12.5	0.45
BK-45	DK-□-45	103	45	130	95	165	14	12.5	0.74

Bracket WS/WD Models

■ Bracket for DR, DK, and DO-A





Unit [mm]

Model	Applied unit	A	B	C	D	E	F	G	H1	H2	J	K	S	T	U	Mass [kg]
WS-11/ WD-15	DR,DK,DO-A-15	46	45	30	7	30	13	11.5	27	35	10	7.5	4	6.5	5.5	0.08
WS-15/ WD-18	DR,DK,DO-A-18	58	55	32	7	40	13	13.5	34	44	12	7.5	5	8.5	6.5	0.15
WS-18/ WD-27	DR,DK,DO-A-27	74	70	38	9.5	50	15.5	16.5	43	55	20	10	6	10.5	8.5	0.28
WS-27/ WD-38	DR,DK,DO-A-38	98	90	52	11.5	65	21.5	21	57	75	25	12.5	8	12.5	10.5	0.70
WS-38/ WD-45	DR,DK,DO-A-45	116	110	55	14	80	24	21	66	85	35	15	8	16.5	12.5	0.90
WS-45/ WD-50	DR,DK,DO-A-50	140	140	66	18	100	30	26	80	110	40	20	10	20.5	12.5	1.80

DR/DK/DO Models

Items Checked for Design Purposes

Selection

The following shows the conditions necessary for selection.

Required load	: F [N]
Arm length	: L [m]

Obtain the required torque (T) from the required load (F) and arm length (L).

$$T = F \times L \qquad [\mathrm{N{\bullet}m}]$$

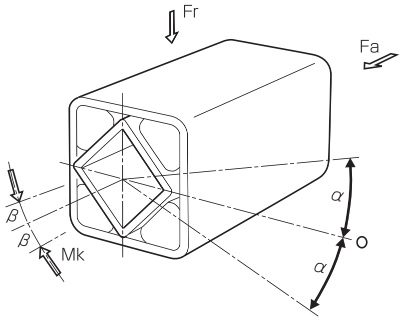
Refer to the relation between the torsional angle and torque of the suspension unit (refer to the specifications table of each model) and select the model whose torsional torque at the set angle of 10 to 20° matches the required torque.

T ≦ torque at a torsional angle of 10 to 20° of ROSTA

The set angle of the mounted ROSTA is 10 to 20°. If necessary, check that the load and moment in each direction are within the allowable load range of the relevant sizes shown on P575.

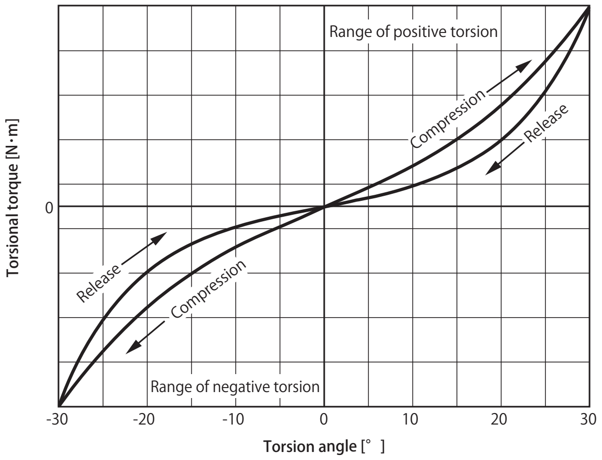
Motion

The ROSTA rubber suspension is basically designed to be able to be used as a torsion spring. The spring characteristic is nonlinear. Consider the loads in the radial and axial directions, and bending moment. (Refer to the allowable load in each direction on P575.)



Spring Characteristic

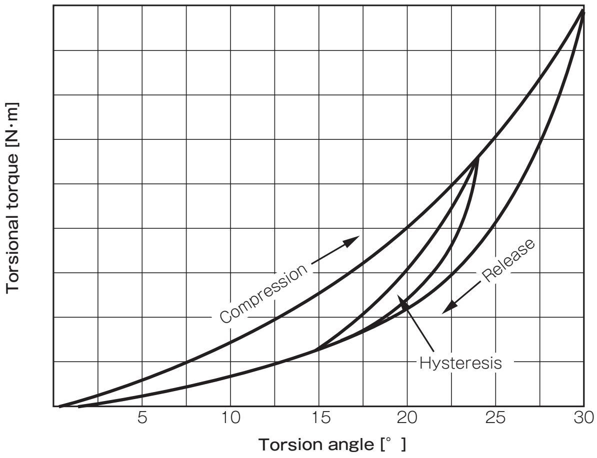
ROSTA with a unique structure has the nonlinear spring characteristic that the load increases nonlinearly as positive and negative torsion is applied.



Damping Characteristic

The area surrounded by the torsional angle and torque curves after compression and release shows the lost energy. This area is the lost part of the vibration energy, which is called damping.

The damping varies depending on the temperature, amplitude, and load. The damping of the rubber is normally 15% to 20%.



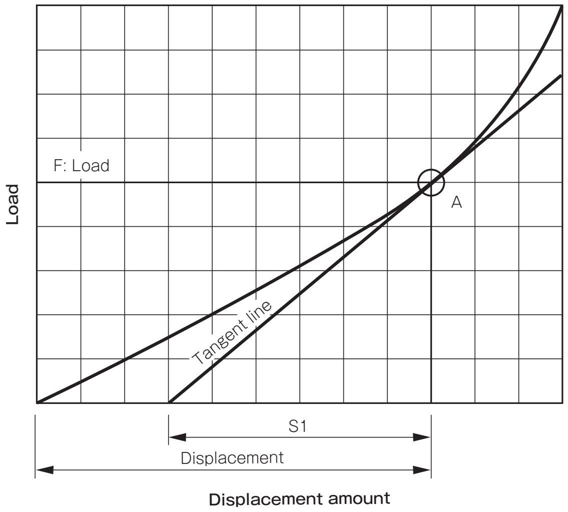
Natural Frequency (for Up-and-down Motion)

The natural frequency can easily be obtained from the following figure. The natural frequency (ne) can be obtained by obtaining the static deflection of the horizontal axis (S1) from the tangent at the point (A) with a load (F) of the mounted ROSTA.

$$ne = \frac{949}{\sqrt{S1}}\ \mathrm{min}^{-1}$$

Example: S1 = 50 mm

$$ne = \frac{949}{\sqrt{50}} = 134\ \mathrm{min}^{-1}$$

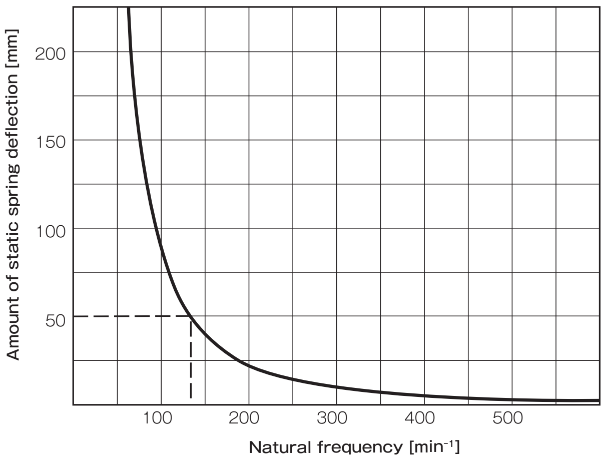


Relation between Natural Frequency and Deflection (for Up-and-down Motion)

Only the natural frequency of the up-and-down motion can easily be obtained from the static spring deflection under the mass of the machine.

This relation is shown in the figure below. For example, the natural frequency is 134 min^{-1} if the spring displacement is 50 mm.

Spring deflection 1 mm ≒ 960 min^{-1}
10 mm ≒ 300 min^{-1}
50 mm ≒ 134 min^{-1}
100 mm ≒ 96 min^{-1}

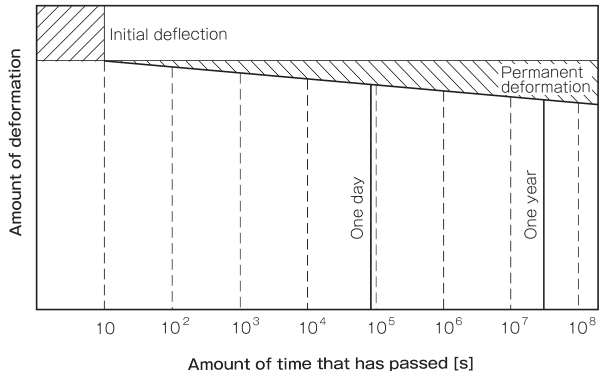


Permanent Deformation (Strain)

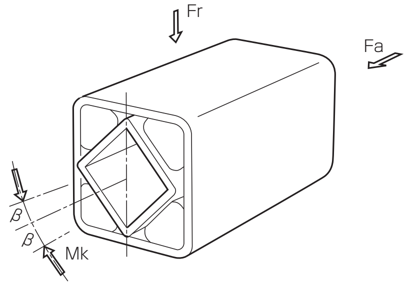
Rubber materials deform permanently over time when a load is always applied.

As shown in the figure below, the permanent deformation of rubber materials is generally expressed using the normal scale on the vertical axis for the deformation and the logarithmic scale on the horizontal axis for the time. The figure shows that the rubber deforms to some degree initially and thereafter the change is smaller.

For ROSTA, the deformation is 3 to 5° as torsional angle.

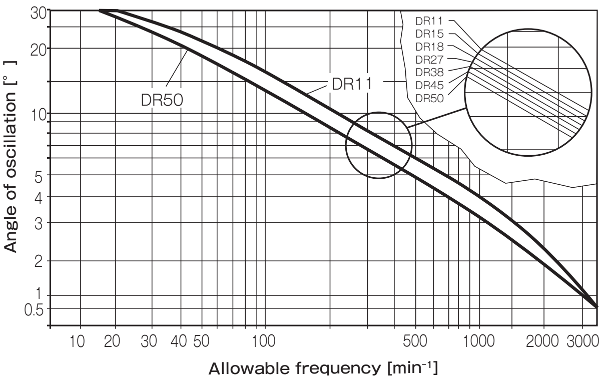


Allowable Load in Each Direction



Size	Radial direction Fr		Axial direction Fa		Bending moment Mk [β = 1°] [N·m]
	Displacement [mm]	Load [N]	Displacement [mm]	Load [N]	
11 × 20	0.25	200	0.25	60	0.4
30	0.25	340	0.25	80	1.1
50	0.25	600	0.25	150	5.6
15 × 25	0.25	200	0.25	70	0.6
40	0.25	300	0.25	100	2.0
60	0.25	500	0.25	160	5.5
18 × 30	0.25	400	0.25	80	1.6
50	0.25	700	0.25	160	7.0
80	0.25	1000	0.25	300	28.0
27 × 40	0.5	800	0.5	200	3.8
60	0.5	1300	0.5	300	11.5
100	0.5	2400	0.5	600	48.0
38 × 60	0.5	1500	0.5	300	11.4
80	0.5	2000	0.5	500	24.7
120	0.5	3000	0.5	600	76.0
45 × 80	0.5	1900	0.5	560	28.0
100	0.5	3000	0.5	700	54.0
150	0.5	4800	0.5	1000	140.0
50 × 120	0.5	2800	0.5	800	80.0
200	0.5	6300	0.5	1100	250.0
300	0.5	8600	0.5	2200	1200.0

Allowable Frequency

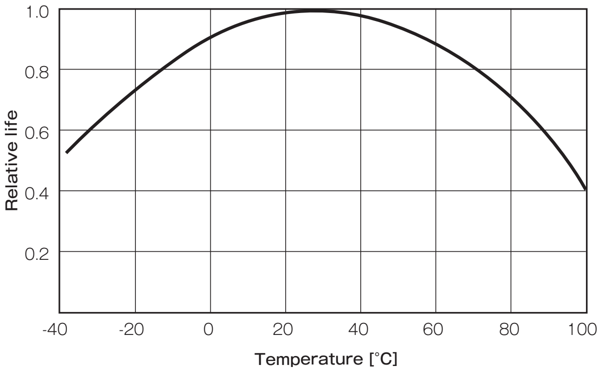


DR/DK/DO Models

Items Checked for Design Purposes

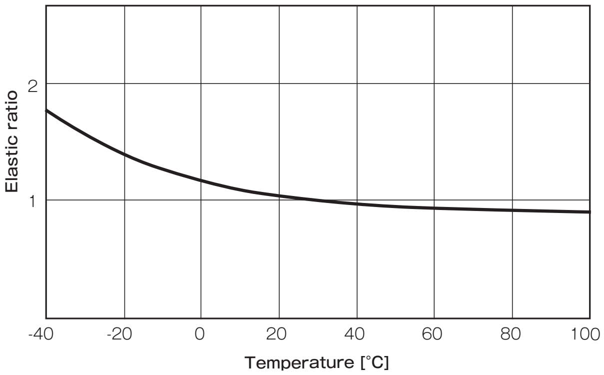
Relation Between Rubber Life and Ambient Temperature

The rubber life varies depending on the ambient temperature.
The following figure shows the estimated life at each ambient temperature using 20 to 30℃ as the reference.



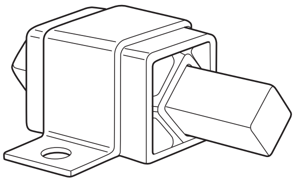
Relation Between Rubber Elastic Modulus and Ambient Temperature

The rubber elastic modulus (spring characteristic) varies depending on the ambient temperature.
The following figure shows the elastic ratio (spring characteristic change ratio) at each ambient temperature using 25℃ as the reference.



Precautions for Mounting and Handling

● If a lever arm is to be inserted into the core of the DR-S, DK-S, and DO-S suspension units, make sure the length of the lever arm is more than three times the dimension C in the dimensional drawing of each model. For size 18 or less, the lever or similar can be mounted directly using a penetrating bolt. (Fixed by friction)



If a square bar is used for the core, the square bar shall be provided with a chamfer of C1 or more.

● The core of the DR-A, DK-A, and DO-A suspension units is provided with four holes. If a lever arm or similar is to be mounted to the core, pass the bolt through two diagonal holes to fix it. Furthermore, the holes can be tapped to mount the lever arm. In this case, the effective screw length ℓ shall be 1.5 x M (nominal screw diameter) or more.

● Load applied to the suspension unit from each direction shall be within the range shown on P575.

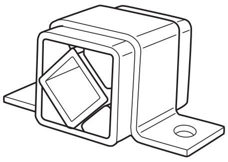
● When the lever arm is to be mounted to the suspension unit, make sure its load is applied to the suspension unit.

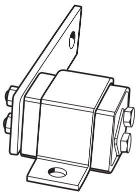
● The allowable torsional angle is up to ±30°, but select a model with torsional angle of about ±20°.

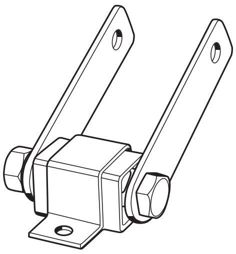
● The rubber spring characteristic is ±20%.

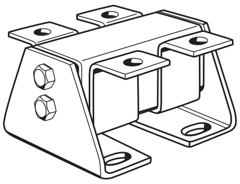
Mounting Examples

DR-A, DR-S

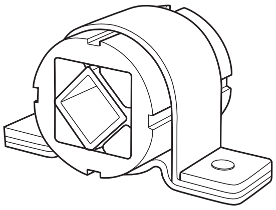


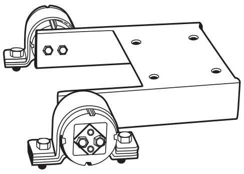


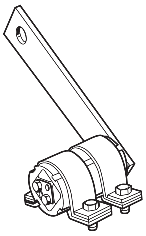


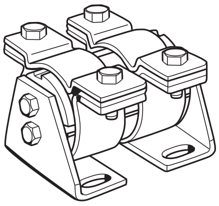


DK-A, DK-S

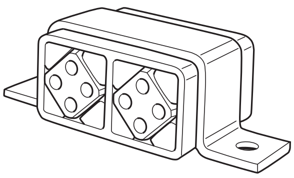


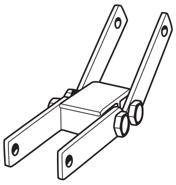


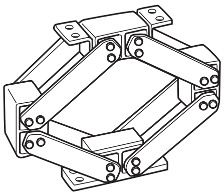


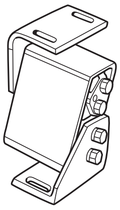


DO-A, DO-S

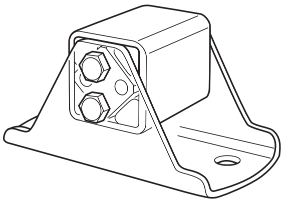


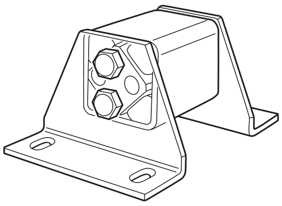


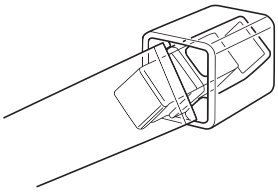


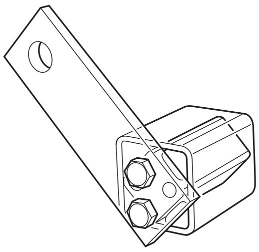


DR-A, DR-S









TENSIONERS

Load range	0 N to 2600 N
Torsional angle	0° to 30°
Operating temperature	-40℃ to 80℃

Proper Belt Tension Is Maintained, and Chain Slack, Vibrations, and Impacts Are Automatically Absorbed

The tensioner basically consists of the ROSTA suspension unit and an arm pre-mounted to its core, and the shell is flange-shaped. It can be mounted with just one center bolt, and can maintain the proper belt tension and absorb the chain slack. It can be easily mounted to a conveyor belt scraper, pressure roller, or other equipment.

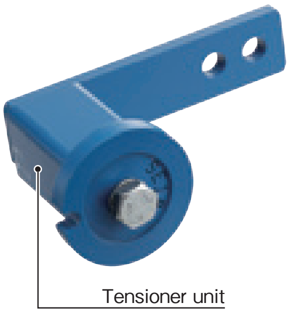
* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Available Models

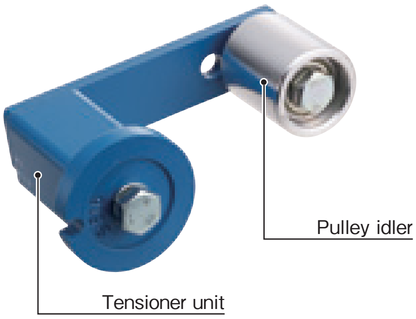
Series	Application	Lineup
TENSIONERS	General-purpose tensioner	SE
	Belt tensioner	RSE
	Chain tensioner	NSE

Structure

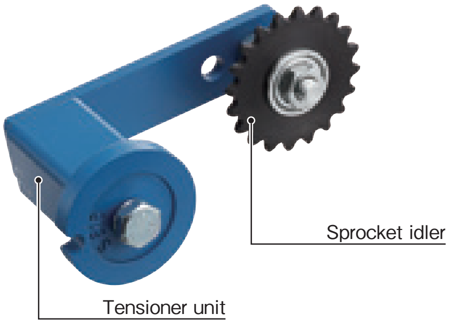
SE Model



RSE Model



NSE Model



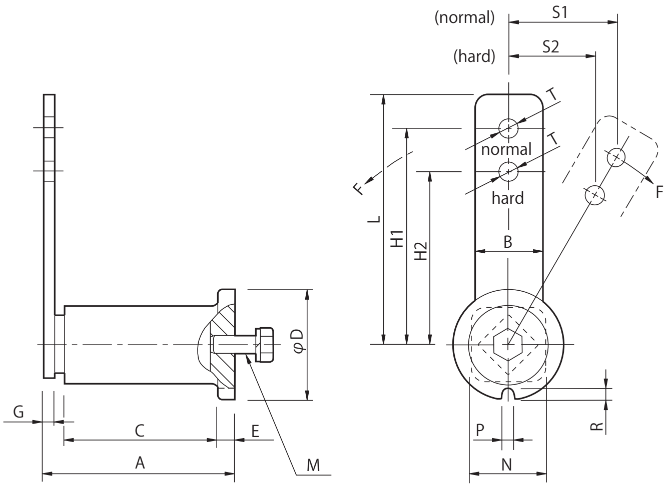
SE Models

Specifications

Model	Load range F [N]	Max. displacement S1 [mm]	Max. displacement S2 [mm]	Mass [kg]
SE-11	0 ~ 80	40	30	0.20
SE-15	0 ~ 135	50	40	0.40
SE-18	0 ~ 350	50	40	0.60
SE-27	0 ~ 800	65	50	1.70
SE-38	0 ~ 1500	87	70	3.55
SE-45	0 ~ 2600	112	90	6.40

* The load range is for the normal position.
Hard position load range ≒ 1.25 x normal position load range

Dimensions



Unit [mm]

Model	A	B	C	D	E	G	H1	H2	L	N	P	R	T	M
SE-11	51	20	36	35	6	5	80	60	90	22	8	5	8.5	M6 × 20
SE-15	64	25	48	45	8	5	100	80	112.5	30	8.5	6	10.5	M8 × 25
SE-18	79	30	58.5	58	10.5	7	100	80	115	35	8.5	8	10.5	M10 × 30
SE-27	108	50	80	78	15	8	130	100	155	52	10.5	10	12.5	M12 × 40
SE-38	140	60	107	95	15	10	175	140	205	66	12.5	12	20.5	M16 × 40
SE-45	200	70	160	115	18	12	225	180	260	80	12.5	12	20.5	M20 × 50

How to Place an Order

SE - 15
Size

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

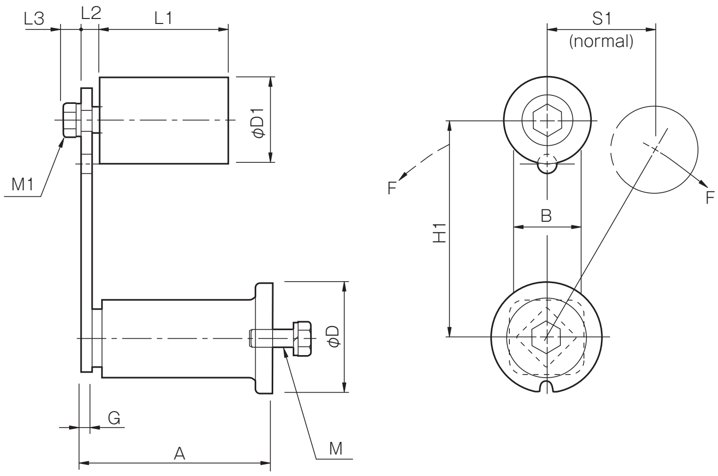
RSE Models

Specifications

Model	Load range F [N]	Max. displacement S1 [mm]	Max. displacement S2 [mm]	Compatible belt	Max. rotation speed [min^{-1}]	Mass [kg]
RSE-11	0 ～ 80	40	30	A	8000	0.25
RSE-15	0 ～ 135	50	40	B	8000	0.60
RSE-18	0 ～ 350	50	40	B	8000	0.80
RSE-27	0 ～ 800	65	50	C	6000	2.15
RSE-38	0 ～ 1500	87	70	—	5000	4.75
RSE-45	0 ～ 2600	112	90	—	4500	8.30

* The load range is for the normal position.
Hard position load range ≒ 1.25 x normal position load range

Dimensions



Unit [mm]

Model	A	B	D	D1	G	H1	L1	L2	L3	M	M1
RSE-11	51	20	35	30	5	80	35	8	8	M6 × 20	M8 × 45
RSE-15	64	25	45	40	5	100	45	11	11	M8 × 25	M10 × 60
RSE-18	79	30	58	40	7	100	45	13	9	M10 × 30	M10 × 60
RSE-27	108	50	78	60	8	130	60	14	11	M12 × 40	M12 × 75
RSE-38	140	60	95	80	10	175	90	18	17	M16 × 40	M20 × 100
RSE-45	200	70	115	90	12	225	135	22	17	M20 × 50	M20 × 140

* For the detailed dimensions of the tensioner section, refer to the dimension table of the SE model.
* For details on the pulley idler, refer to the options on P583.

How to Place an Order

RSE - 15
Size

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

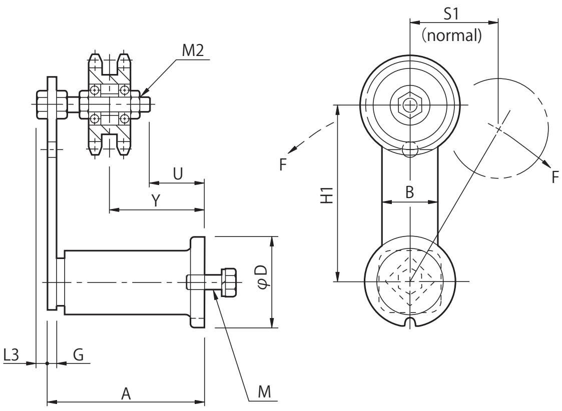
NSE Models

Specifications

Model		Load range F [N]	Max. displacement S1 [mm]	Max. displacement S2 [mm]	Compatible chain	Mass [kg]
NSE-15	-35S	0 ~ 135	50	40	35	0.55
	-35D					0.70
NSE-18	-35S	0 ~ 350	50	40	35	0.75
	-35D					0.90
	-40S				40	0.83
	-40D					1.1
NSE-27	-50S	0 ~ 800	65	50	50	2.1
	-50D					2.5
	-60S				60	2.2
	-60D					2.8
NSE-38	-80S	0 ~ 1500	87	70	80	4.5
	-80D					5.4
NSE-45	-100S	0 ~ 2600	112	90	100	7.5
	-100D					9.4
	-120S				120	8.5
	-120D					10.9

* The load range is for the normal position.
Hard position load range ≒ 1.25 x normal position load range

Dimensions



Unit [mm]

Model		A	B	D	G	H1	L3	U	Adjustable range of Y	M	M2
NSE-15	-35S	64	25	45	5	100	7	9	19-41	M8 × 25	M10 × 55
	-35D								24-37		
NSE-18	-35S	79	30	58	7	100	7	24	35-54	M10 × 30	M10 × 55
	-35D								39-50		
	-40S								35-54		
	-40D								39-50		
NSE-27	-50S	108	50	78	8	130	8	28	41-79	M12 × 40	M12 × 80
	-50D								47-73		
	-60S								41-79		
	-60D								47-73		
NSE-38	-80S	140	60	95	10	175	13	40	60-97	M16 × 40	M20 × 100
	-80D								67-90		
NSE-45	-100S	200	70	115	12	225	13	70	90-155	M20 × 50	M20 × 130
	-100D								108-136		
	-120S								90-155		
	-120D								116-129		

* For the detailed dimensions of the tensioner section, refer to the dimension table of the SE model.
* Symbol S at the end of size applies for single row of sprocket and D for double rows of sprocket.
* For details on the sprocket idler, refer to the options on P583.

How to Place an Order

NSE - 15 - 35S

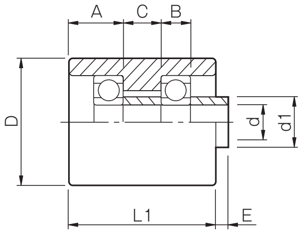
Size

Nominal sprocket diameter

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Optional Idlers and Brackets

Pulley Idler RA Models



Unit [mm]

Model	Applied tensioner	A	B	C	D	d	d1	E	L1	Bearing
RA-11	RSE-11	13	7	9	30	8	12	3	35	608 ZZ
RA-15/18	RSE-15/18	16	9	13	40	10	15	6	45	6200 ZZ
RA-27	RSE-27	22	12	16	60	12	18	6	60	6301 ZZ
RA-38	RSE-38	39	15	22	80	20	28	8	90	6304 ZZ
RA-45	RSE-45	48	15	60	90	20	28	10	135	6304 ZZ

* Bolt and nut for locking the pulley idler are included.
* Materials: Aluminum alloy

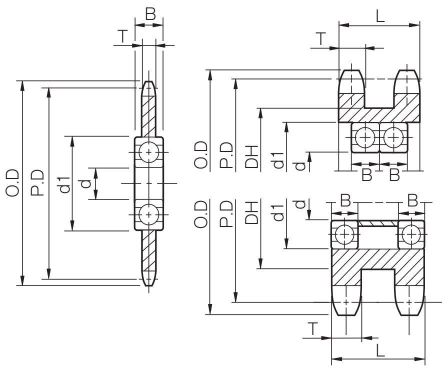
How to Place an Order

RA - 11
Size

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Sprocket Idler N Models

N-15-35D~N-38-80D



N-45-100D,120D

S: Single-row

D: Double-row

Unit [mm]

Model		Applied tensioner	O.D	P.D	B	DH	d	d1	L	T	Number of teeth	Bearing
N-15	-35S	NSE-15-35S	66	60.89	9	—	10	30	—	4.4	20	6200 ZZ
		NSE-18-35S										
	-35D	NSE-15-35D				50			14.4	4.3		
		NSE-18-35D										
N-18	-40S	NSE-18-40S	75	69.12	9	—	10	30	—	7.3	17	6200 ZZ
	-40D	NSE-18-40D				54			21.5	7.1		
N-27	-50S	NSE-27-50S	89	81.37	12	—	12	37	—	8.9	16	6301 ZZ
	-50D	NSE-27-50D				63			26.8	8.7		
	-60S	NSE-27-60S	95	85.61	12	—	12	37	—	11.9	14	6301 ZZ
	-60D	NSE-27-60D				64			34.5	11.7		
N-38	-80S	NSE-38-80S	108	98.14	15	—	20	52	—	15.0	12	6304 ZZ
	-80D	NSE-38-80D				69			43.9	14.6		
N-45	-100S	NSE-45-100S	127	112.70	15	—	20	52	—	18.0	11	6304 ZZ
	-100D	NSE-45-100D				76			53.4	17.6		
	-120S	NSE-45-120S	140	123.30	15	—	20	52	—	24.0	10	6304 ZZ
	-120D	NSE-45-120D				78			68.9	23.5		

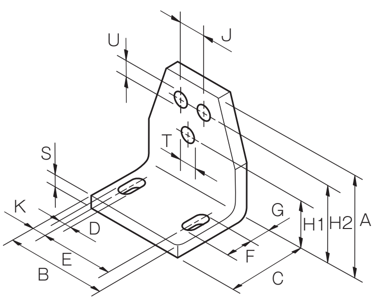
* Bolt and nut for locking the sprocket idler are included.
* Symbol S at the end of size applies for single row of sprocket and D for double rows of sprocket.

How to Place an Order

N - 15 - 35S
Nominal sprocket diameter
Size

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Bracket WS/WD Models



Unit [mm]

Model	Applied tensioner	A	B	C	D	E	F	G	H1	H2	J	K	S	T	U
WS-11/ WD-15	SE,RSE-11	46	45	30	7	30	13	11.5	27	35	10	7.5	4	6.5	5.5
WS-15/ WD-18	SE,RSE,NSE-15	58	55	32	7	40	13	13.5	34	44	12	7.5	5	8.5	6.5
WS-18/ WD-27	SE,RSE,NSE-18	74	70	38	9.5	50	15.5	16.5	43	55	20	10	6	10.5	8.5
WS-27/ WD-38	SE,RSE,NSE-27	98	90	52	11.5	65	21.5	21	57	75	25	12.5	8	12.5	10.5
WS-38/ WD-45	SE,RSE,NSE-38	116	110	55	14	80	24	21	66	85	35	15	8	16.5	12.5
WS-45/ WD-50	SE,RSE,NSE-45	140	140	66	18	100	30	26	80	110	40	20	10	20.5	12.5

How to Place an Order

WS - 11/WD - 15
Size Size

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

SE/RSE/NSE Models

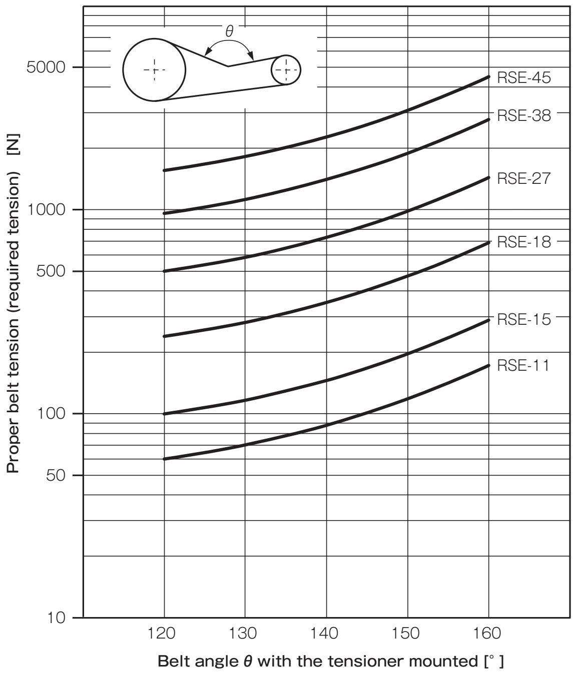
Items Checked for Design Purposes

Selection

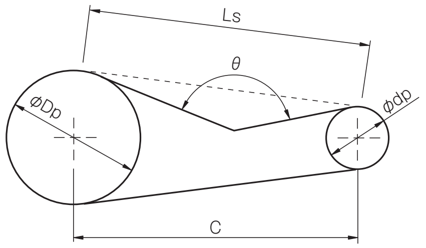
RSE model

Clarify the belt size, proper belt tension (required tension), and belt's deflection angle θ, and use the following simple selection graph to select the size from the intersection of the belt size or proper tension and the belt's deflection angle θ. The proper tension varies depending on the number of belts.

When the ROSTA mounting angle is 15°



Reference



Dp: Large pulley diameter
dp: Small pulley diameter
C: Distance between shafts
Lb: Belt length
T0: Proper belt tension

Belt length: $Le = 2C + \frac{\pi(Dp+dp)}{2} + \frac{(Dp-dp)^2}{4C}$

Span length: $Ls = \sqrt{C^2 - \frac{(Dp-dp)^2}{4}}$

Amount of deflection in the belt: $L = Lb - Le$

Belt angle: $\theta = 2\sin^{-1}\cdot\frac{Ls}{(Ls+L)}$

Set tensioner load: $F = T0\cdot\cos(\frac{\theta}{2})$

NSE model

For chain transmission, the power is transmitted by engagement of the sprocket, so a large initial tension does not need to be applied to the chain itself. Accordingly, it is sufficient for the chain tensioner to provide just a little tension to remove the chain slack.

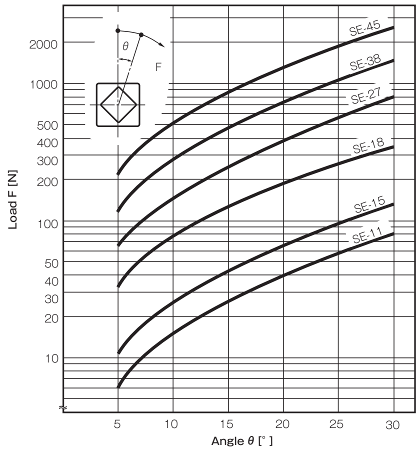
Select the tensioner size matching the chain size from the following table. In this case, make sure the set angle of the tensioner is 10 to 15°.

If the chain is long, consider the mass of the chain itself.

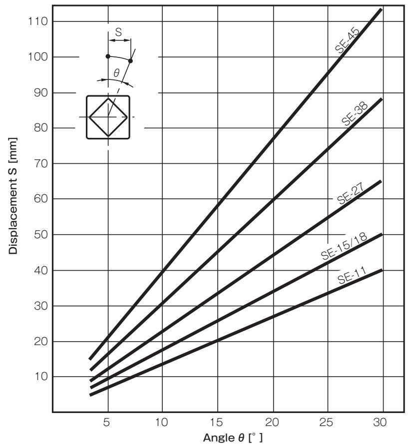
Chain size	NSE size
35S	NSE-15-35S
35S	NSE-18-35S
35D	NSE-15-35D
35D	NSE-18-35D
40S	NSE-18-40S
40D	NSE-18-40D
50S	NSE-27-50S
50D	NSE-27-50D
60S	NSE-27-60S
60D	NSE-27-60D
80S	NSE-38-80S
80D	NSE-38-80D
100S	NSE-45-100S
100D	NSE-45-100D
120S	NSE-45-120S
120D	NSE-45-120D

Spring Characteristic

Torsional angle - load curve



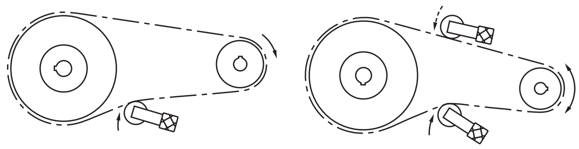
Torsional angle - displacement conversion



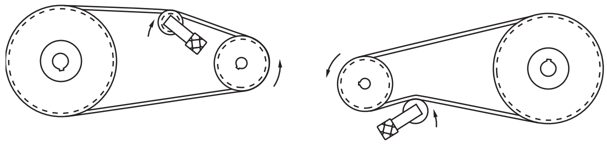
* The spring characteristic is for the normal position.

Idler Setting

- Always set the idler on the slack side of the chain or belt. For forward/reverse rotation, set the idler on both sides.



- If tension is applied from the outside of the chain or belt, set the idler on the side of the smaller sprocket (pulley). If tension is applied from the inside, set the idler on the side of the larger sprocket (pulley).



- Set the chain tensioner so that three or more teeth of the sprocket idler are engaged into the chain.
- If a large tension is applied to the chain or belt, the life of the chain or belt as well as that of the bearing will decrease significantly. Be sure to provide a suitable amount of slack. Set the angle to about 10° to 15° .
- If tension is applied from the inside of the V-belt, use a V-pulley idler. Use a timing idler for a timing belt.
- The strength class of the bolts for locking the tensioner and idler is 8.8, so tighten the bolts to the following tightening torque.

■ Bolt for locking the tensioner

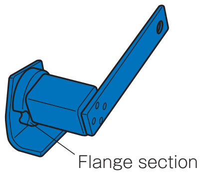
Model	Nominal diameter of bolt × Length	Proper tightening torque [N・m]
SE,RSE-11	M6 × 20	10
SE,RSE,NSE-15	M8 × 25	25
SE,RSE,NSE-18	M10 × 30	50
SE,RSE,NSE-27	M12 × 40	90
SE,RSE,NSE-38	M16 × 40	210
SE,RSE,NSE-45	M20 × 50	410

■ Bolt for locking the idler

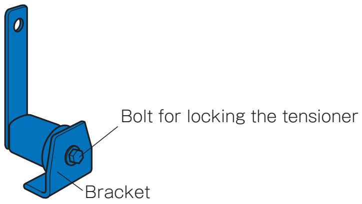
Model	Nominal diameter of bolt × Length	Proper tightening torque [N・m]
RSE-11	M8 × 45	20
RSE,NSE-15	M10 × 60,55	20
RSE,NSE-18	M10 × 60,55	20
RSE,NSE-27	M12 × 75,80	35
RSE,NSE-38	M20 × 100,100	160
RSE,NSE-45	M20 × 140,130	160

Mounting

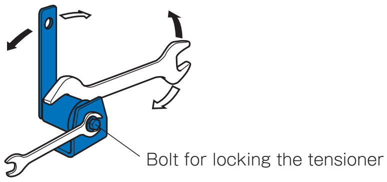
- Align the positioning notch in the flange section of the ROSTA tensioner with the specified position. Mounting is easier if a mark that corresponds to the notch is added to the support plate or similar for mounting the ROSTA tensioner beforehand. This notch can also be used as a whirl-stop.



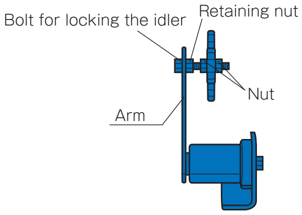
- Mount the ROSTA tensioner to the machine using the supplied bolt for locking the tensioner. In this case, check the strength of the mounting section of the machine and make sure the mounting surface is flat. If the ROSTA tensioner cannot be mounted directly to the machine, use a bracket (WS/WD model).



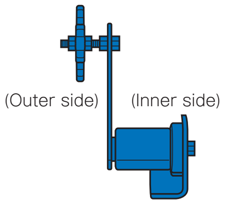
- Hold the shell of the ROSTA tensioner with a spanner and tighten the supplied bolt for locking the tensioner to fix the ROSTA tensioner. If you want to use the ROSTA tensioner at near its maximum allowable angle, tighten the bolt to the specified torque using a torque wrench.



- Mount the sprocket idler to the ROSTA tensioner. First, fix the bolt for locking the idler to the arm with the retaining nut. Adjust the sprocket idler within the specified mounting range (Y dimension in the catalog), align it with the travel line of the chain, and fix it with 2 nuts.



- Always set the idler to the inside of the arm. If the idler must be set to the outside of the arm, set it as close to the arm as possible. In this case, the maximum allowable torsional angle is ±15° .



* Natural rubber (NR) is not resistant enough to oil and grease, so do not allow any oil to contact NR.

ANTI-VIBRATION MOUNTINGS

Operating load range	200 N to 8000 N
Operating temperature	-40℃ to 80℃

Effective and Excellent Absorption and Isolation of Machine Vibration

The ROSTA anti-vibration mounting precisely captures elements such as oscillation, shock, and vibration, and effectively absorbs and isolates vibration. It tolerates loads from any direction, such as vertical, horizontal and lateral loads, and can be mounted in any direction, such as on the floor, ceiling, and wall.

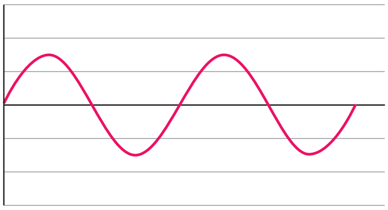
* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Available Models

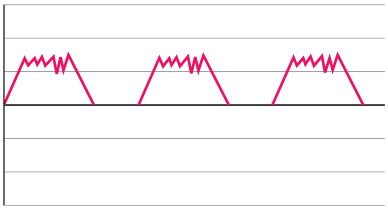
Series	Natural frequency	Lineup
ANTI-VIBRATION MOUNTINGS	For intermediate frequency (natural frequency 3.5 to 8.2 Hz)	ESL
	For high frequency (natural frequency 12 to 30 Hz)	V

Vibration Elements

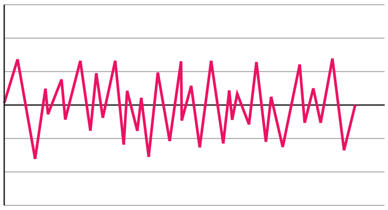
Oscillations



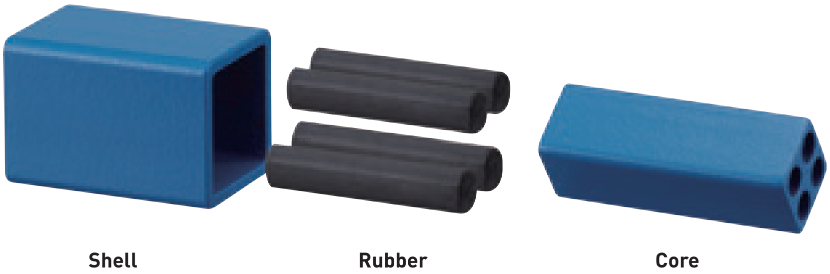
Shocks or impacts



Vibrations



Structure

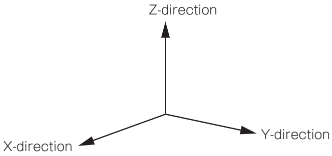


ESL Model

V Model

ESL Models

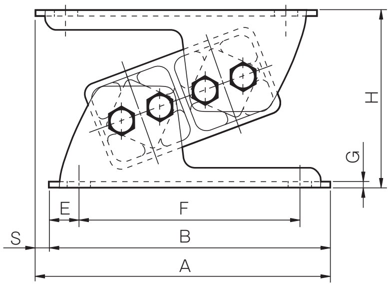
Specifications

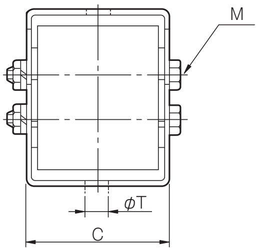


Model	Operating load range [N] Z-direction	Max. allowable load [N]		Natural frequency [Hz]	Mass [kg]
		X-direction	Y-direction		
ESL-15	200-550	110	1100	5.8 ~ 8.2	0.4
ESL-18	450-1250	250	2500	5.0 ~ 7.5	0.6
ESL-27	700-2000	400	4000	4.5 ~ 6.2	1.3
ESL-38	1300-3800	760	7600	4.0 ~ 5.5	3.4
ESL-45	2200-6000	1200	12000	3.5 ~ 5.0	5.3

* ESL-38 and -45 are made to order.

Dimensions

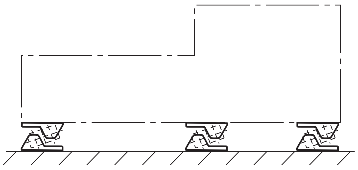


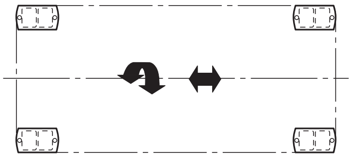


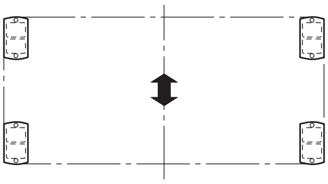
Unit [mm]

Model	H under no load	H under max. load	A	B	C	E	F	G	S	T	M
ESL-15	54	43	91	85	49	10	65	2	5.5	7	M5
ESL-18	65	51	111	105	60	12.5	80	2.5	5.5	9.5	M6
ESL-27	88	68	148	140	71	15	110	3	8	11.5	M8
ESL-38	117	91	182	175	98	17.5	140	4	7	14	M10
ESL-45	143	110	234.5	220	120	25	170	5	14.5	18	M12

Mounting and Vibration Direction







* Set the anti-vibration mounting ESL model so that all mounting directions are parallel to each other and the mounting direction is the same as the vibration direction.

How to Place an Order

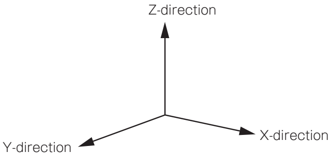
ESL - **15**

Size

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

V Models

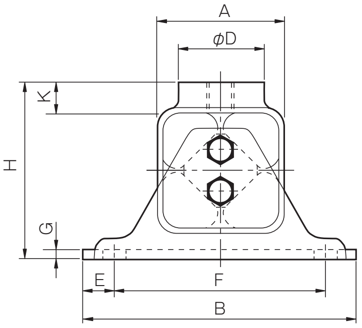
Specifications

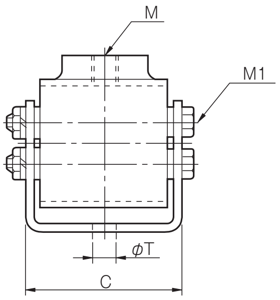


Model	Operating load range [N] Z- and X-directions	Max. allowable load [N] Y-direction	Natural frequency [Hz]	Mass [kg]
V-15	300-800	80	23 ～ 30	0.3
V-18	600-1600	160	15 ～ 25	0.7
V-27	1300-3000	300	20 ～ 28	1.3
V-38-N	2600-5000	500	12 ～ 14	2.7
V-45	4500-8000	800	12 ～ 15	4.6

* The V-38 and -45 are made to order.

Dimensions

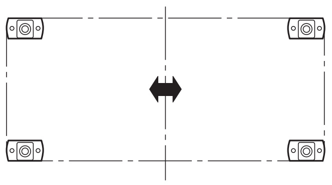


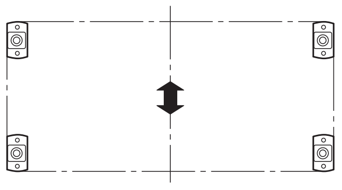


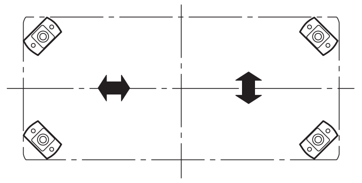
Unit [mm]

Model	A	B	C	D	E	F	G	H	K	M1	T	M
V-15	32	80	51	20	12.5	55	3	49	10	M5	9.5	M10
V-18	45	100	62	30	12.5	75	3.5	66	13	M6	9.5	M10
V-27	60	130	73	40	15	100	4	84	14.5	M8	11.5	M12
V-38-N	75	155	100	45	17.5	120	5	105	17.5	M10	14	M16
V-45	88	190	122	60	25	140	6	127	22.5	M12	18	M20

Mounting and Vibration Direction







* Set the anti-vibration mounting V model so that all mounting directions are parallel to each other and the mounting direction is the same as the vibration direction. If the vibration directions are not uniform, set the anti-vibration mounting at an angle of about 45° as shown in the rightmost figure above. The vibration directions are X- and Z-directions only.

How to Place an Order

V - 15
Size

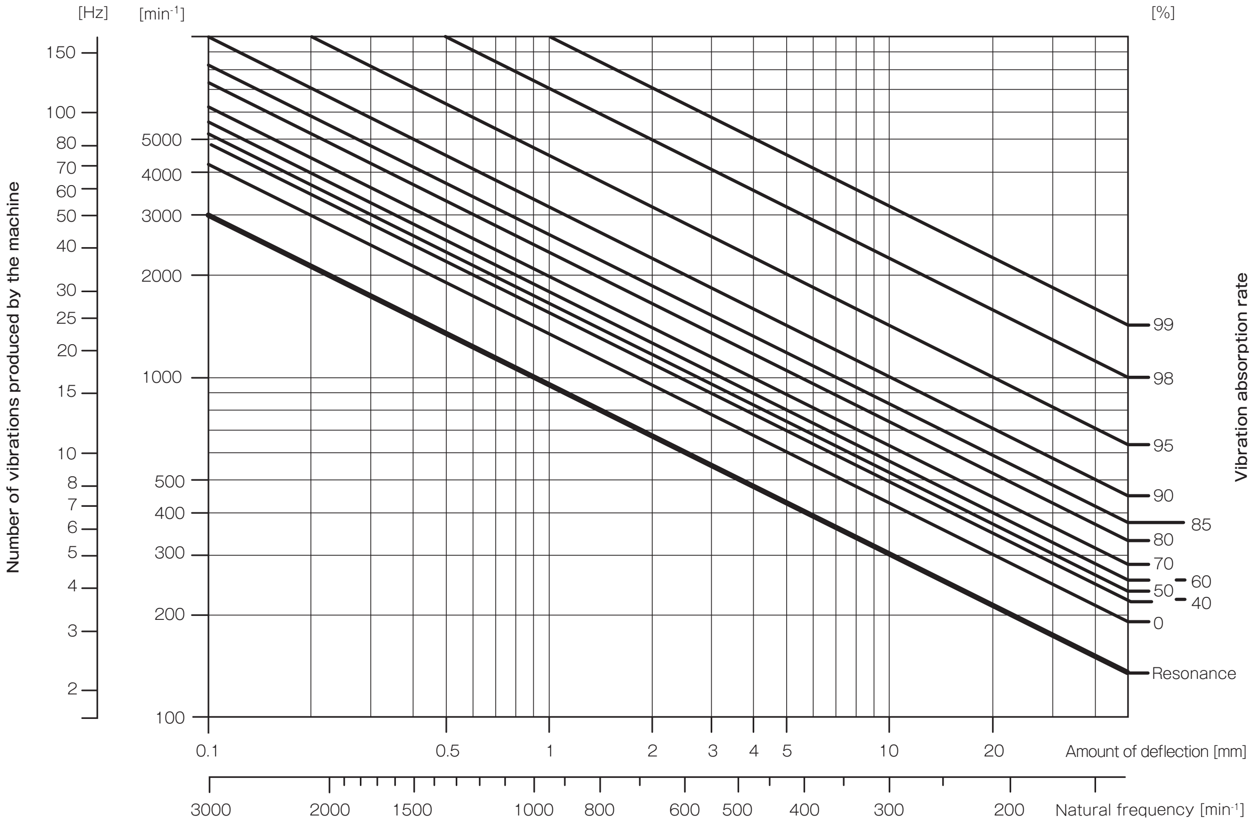
* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

ESL/V Models

Items Checked for Design Purposes

Selection

Select the model using the following simple selection graph and by referring to the selection example described below.



The following shows the conditions necessary for selection.
Total compressor mass: 1,800 [kg]
Compressor frequency: 900 [min^{-1}]
Number of supports: 6
Required vibration absorption rate: 87 [%]

Obtain the load (F) per anti-vibration mounting.

F = total mass × gravitational acceleration / number of supports
= 1800 × 9.8/6 = 2940 [N]

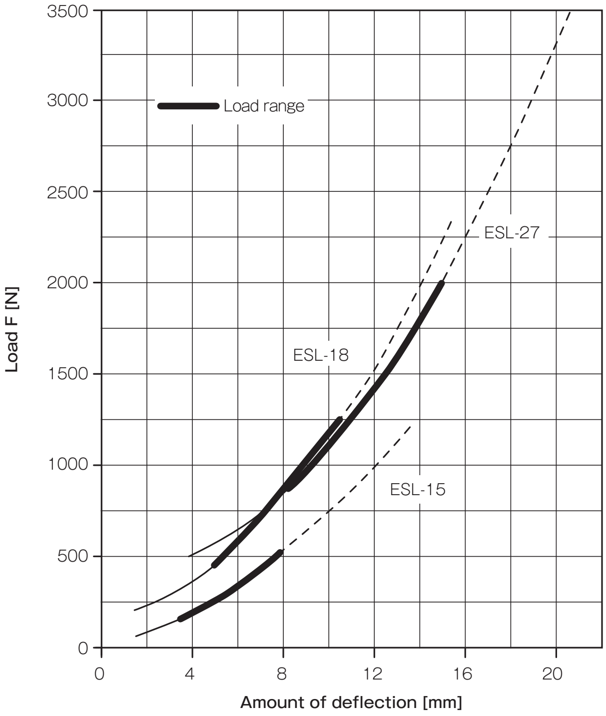
If the required vibration absorption rate is 87%, the frequency ratio (U) is 3 according to the machine vibration graph on P592, and the required natural frequency (fe) can be calculated by the following equation.

fe = compressor frequency / frequency ratio
= 900 / 3
= 300 [min^{-1}] → 5 [Hz]

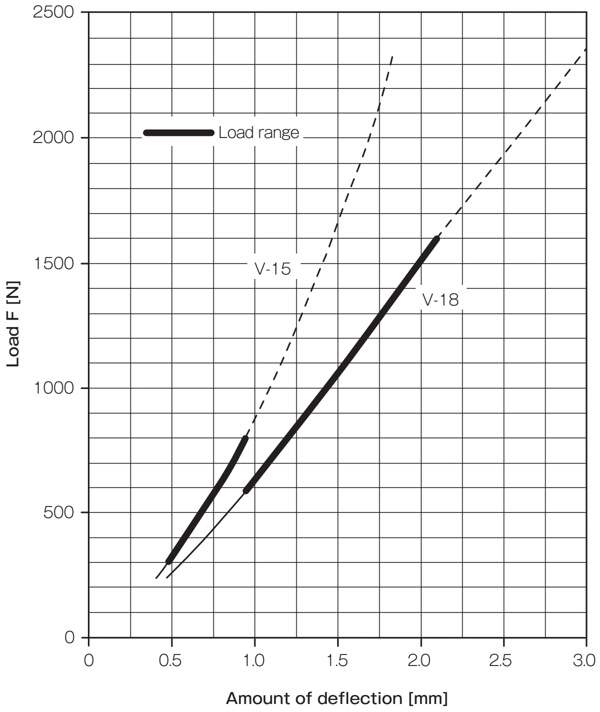
The static spring deflection at a natural frequency of 300 [min^{-1}] is 10 [mm] or more according to the simple selection graph above.
To meet the allowable load per mounting of 2940 [N] or more and the spring deflection of about 10 [mm] or more, you need to select and use six ESL-38 anti-vibration mountings according to the spring characteristic graph on P591.

Spring Characteristics

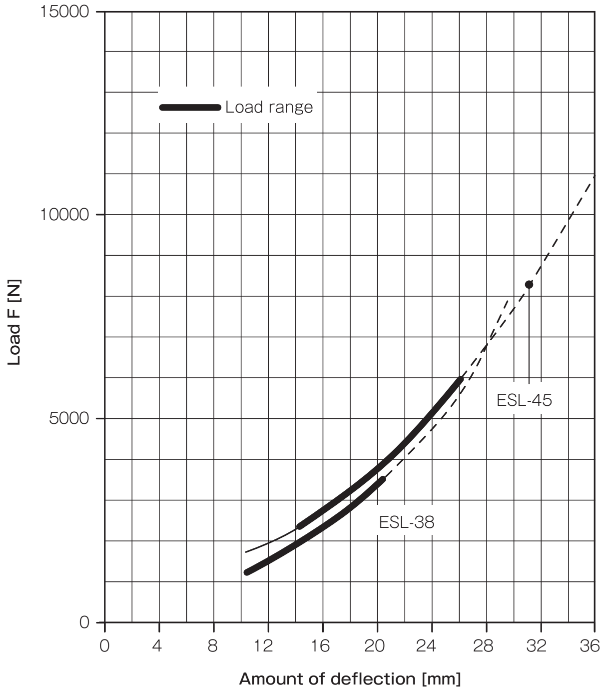
■ Compression direction spring characteristics ESL-15, -18 and -27



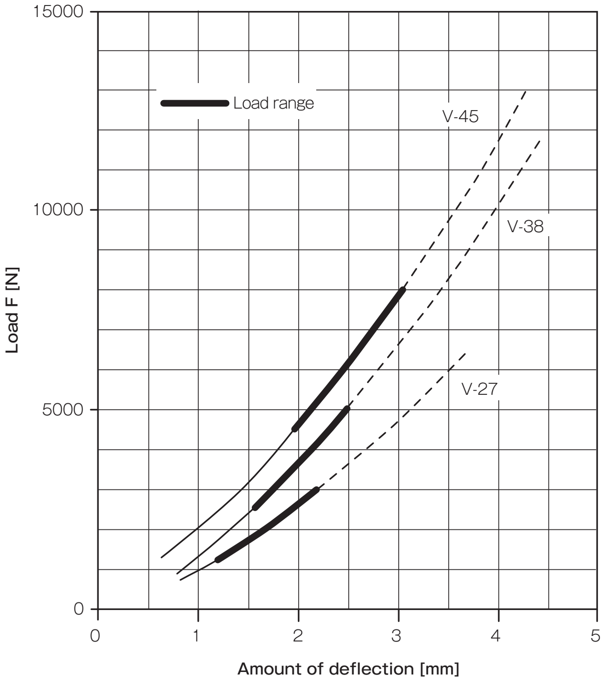
■ Compression direction spring characteristics V-15 and -18



■ Compression direction spring characteristics ESL-38, -45 and -50



■ Compression direction spring characteristics V-27, -38 and -45

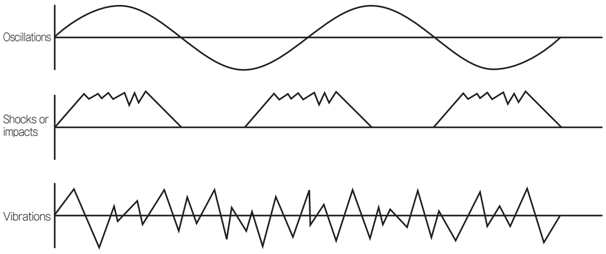


ESL/V Models

Items Checked for Design Purposes

Vibration Absorption and Noise

There are mainly three types of vibrations as shown in the figure below.



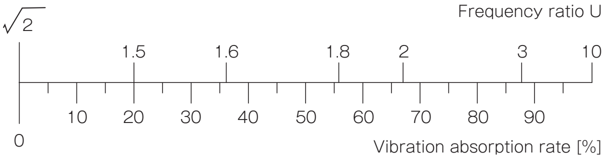
Overdamping is effective particularly in vibration isolation. Underdamping is effective in vibration adsorption.

$$\text{Overdamping} = \frac{\text{Frequency produced by the machine}}{\text{Natural frequency}} \geqq 1$$

$$\text{Underdamping} = \frac{\text{Frequency produced by the machine}}{\text{Natural frequency}} \leqq 1$$

Machine Vibration

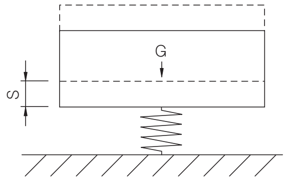
The most important thing to isolate vibration is to make sure that the ratio of the frequency of the machine to the natural frequency is $\sqrt{2}$ or more. The following figure shows a graph of that ratio and vibration absorption rate.



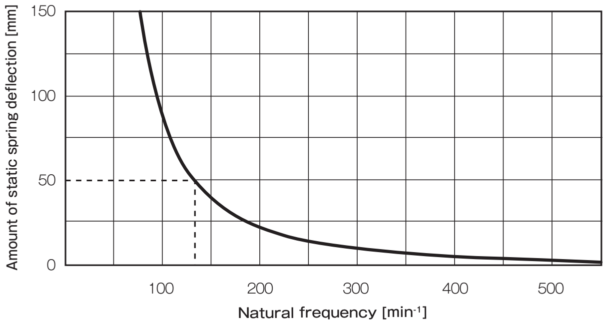
$$U = \frac{\text{Frequency produced by the machine}}{\text{Natural frequency of the machine when it is equipped with anti-vibration supports}}$$

Natural Frequency and Resonance

For vertical vibration, the natural frequency (fe) generally can be obtained easily from the figure below by obtaining the static spring deflection (S) under the mass of the machine. However, this is the static characteristic, and the actual dynamic characteristic is slightly higher.



$$fe\ [\mathrm{min}^{-1}] = \frac{949}{\sqrt{S}\ [mm]}$$



If the static stiffness of the anti-vibration rubber is known, the natural frequency (fe) can be obtained by the following equation.

$$fe\ [Hz] = \frac{1}{2\pi}\sqrt{\frac{1000 \cdot K}{M}}$$

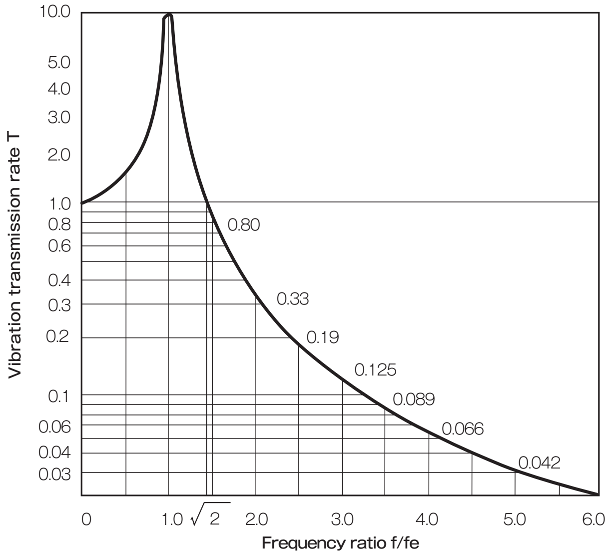
K: Stiffness [N/mm]
M: Machine mass [kg]

If the force transmitted to the base when a machine is provided with an anti-vibration support is F and the force without an anti-vibration support is F_0, the vibration transmission rate (T) is expressed by the following equation.

$$T = \frac{F}{F_0} = \left| \frac{1}{1-U^2} \right|$$

$$U = \frac{f}{fe} = \frac{\text{Frequency produced by the machine}}{\text{Natural frequency of the machine when it is equipped with anti-vibration supports}}$$

The following figure shows a graph of the above equation. The vibration transmission rate (T) is determined by the frequency ratio, specifically the ratio of the frequency of the machine (f) to the natural frequency (fe).



Relation between Frequency Ratio and Anti-vibration Effect

Frequency ratio	Vibration transmission rate	Vibration state	Anti-vibration state
f ／ fe＝0	T＝1	F_0＝F	There is no anti-vibration effect
f ／ fe＝1	T→∞	F0＜F→∞	Resonance
f ／ fe＝√2	T＝1	F_0＝F	There is no anti-vibration effect
f ／ fe＞√2	T＜1	F_0＞F	There is an anti-vibration effect

* If f/fe is 2 to 3, an anti-vibration effect generally can be obtained.

OSCILLATING MOUNTINGS

Operating load range	100 N to 10000 N
Operating temperature	-40℃ to 80℃

Oscillating Motion Can Be Transmitted Reliably and Vibration and Noise Can Be Absorbed Simultaneously

These mounting and drive head for oscillating drive are used in equipment, such as a vibration conveyor and vibration screening machine. Three models are available. In particular, the AB model has a great vibration absorption effect and can also be used as a low frequency anti-vibration mounting (at a natural frequency of 2 to 4 Hz). Since the horizontal stiffness is higher than a coil spring and the amplitude of oscillation at the resonance point is small, the horizontal oscillation can be prevented.

RoHS

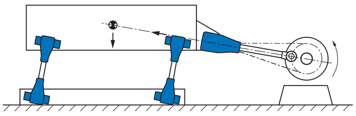
* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Available Models

Series	Vibration excitation method	Type	Lineup
OSCILLATING MOUNTINGS	Crank motion type vibration excitation	Mounting	AU
		Drive head	RST
	Vibration motor type vibration excitation	Mounting	AB

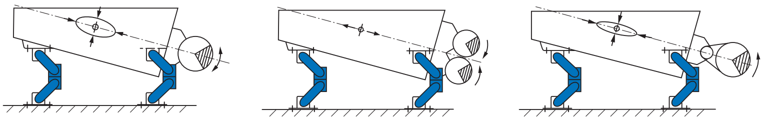
Vibration Excitation Method

■ Crank motion



AU/RST models

■ Vibration motor



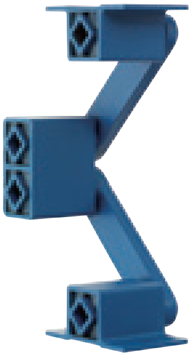
AB model

Structure

AU model

RST model

AB model



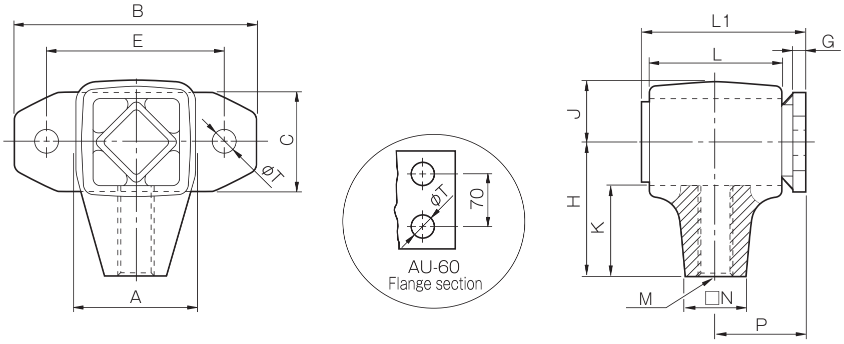
AU Models

Specifications

Model	Max. allowable load F [N]	Allowable frequency at ± 5° [min^{-1}]	Dynamic torsional stiffness [N·m/°]	Mass [kg]
AU-15-R,L	100	640	0.44	0.19
AU-18-R,L	200	600	1.32	0.34
AU-27-R,L	400	560	2.60	0.65
AU-38-R,L	800	530	6.70	1.55
AU-45-R,L	1600	500	11.60	2.55
AU-50-R,L	2500	470	20.40	6.70
AU-60-R,L	5000	440	38.20	15.70

* The allowable frequency at ± 5° [min^{-1}] is that at an oscillation angle of ± 5° .
* The allowable frequency is determined by the oscillation angle. For details, refer to the allowable frequency on P575.
* The dynamic torsional stiffness is data when the oscillation angle is ± 5° and the frequency is 300 to 600 min^{-1}.
* The AU-60R and -60L are made to order.

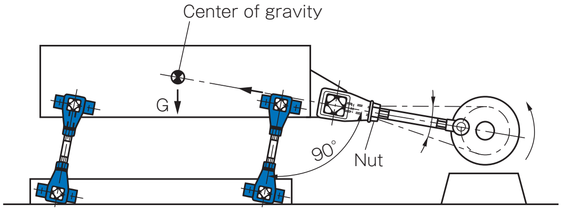
Dimensions



Unit [mm]

Model	A	B	C	E	G	H	J	K	L	L1	N	P	T	M
AU-15-R,L	33	70	25	50	4	40	17	29	40	50	20	28	2-φ7	M10
AU-18-R,L	39	85	35	60	5	45	20	31.5	50	62	22	34	2-φ9.5	M12
AU-27-R,L	54	110	45	80	5	60	27	40.5	60	73	28	40	2-φ11.5	M16
AU-38-R,L	74	140	60	100	6	80	37	53	80	95	42	52	2-φ14	M20
AU-45-R,L	89	180	70	130	8	100	44	67	100	120	48	66	2-φ18	M24
AU-50-R,L	93	190	80	140	10	105	47	70	120	145	60	80	2-φ18	M36
AU-60-R,L	116	230	120	180	15	130	59	85	200	233	80	128	4-φ18	M42

Mounting and Vibration Direction



How to Place an Order

AU - 18 - R

Direction of screw tightening — R: Right-hand screw / L: Left-hand screw

Size

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

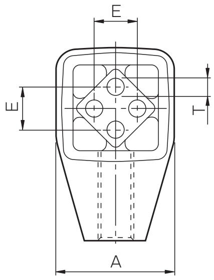
RST Models

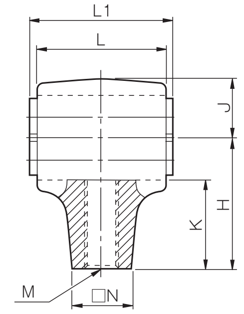
Specifications

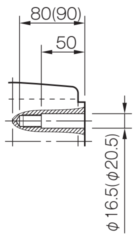
Model	Max. allowable acceleration force F [N]	Allowable frequency at ± 5° [min⁻¹]	Mass [kg]
RST-18-R,L	400	600	0.19
RST-27-R,L	1000	560	0.42
RST-38-R,L	2000	530	1.05
RST-45-R,L	3500	500	1.83
RST-50-R,L	6000	470	5.50
RST-60-N-R,L	13000	440	15.6
RST-80-N-R	27000	380	36.7

* The allowable frequency at ± 5° [min⁻¹] is that at an oscillation angle of ± 5° .
* The allowable torsional angle is ± 5° .
* The RST-60-N-R, RST-60-N-L and RST-80-N-R are made to order.

Dimensions





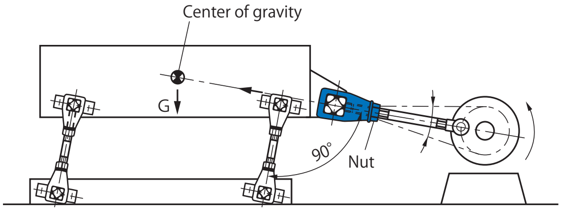


RST-60 and -80
Mounting hole dimension T
cross-sectional details
Dimensions in parentheses are for RST-80.

Unit [mm]

Model	A	E	H	J	K	L	L1	N	T	M
RST-18-R,L	39	12	45	20	31.5	50	55	22	$\phi 6^{+0.5}_{0}$	M12
RST-27-R,L	54	20	60	27	40.5	60	65	28	$\phi 8^{+0.5}_{0}$	M16
RST-38-R,L	74	25	80	37	53	80	90	42	$\phi 10^{+0.5}_{0}$	M20
RST-45-R,L	89	35	100	44	67	100	110	48	$\phi 12^{+0.5}_{0}$	M24
RST-50-R,L	93	40	105	47	70	120	130	60	M12 × 40	M36
RST-60-N-R,L	117	45	130	59	85	200	210	80	M16	M42
RST-80-N-R	150	60	160	77	100	300	310	90	M20	M52

Mounting and Vibration Direction



How to Place an Order

RST - 18 - R

- 18: Size
- R: Direction of screw tightening — R: Right-hand screw, L: Left-hand screw

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

AU/RST Models

Items Checked for Design Purposes

Selection

■ Oscillating mounting AU model

The following shows the conditions necessary for selection.
Total mass of trough and material of vibration conveyor: M=500 [kg]
Number of supports (4 or more): S=10

Select the size based on the load applied to one ROSTA unit and the maximum allowable load (F) on P596.

$$M \times g / S \leqq F$$

g: Gravitational acceleration (9.8 [m/s^2])

$$M \times g / S = 500 \times 9.8 / 10$$
$$= 490 \text{ [N] } \leqq F$$

Based on the above, select the AU-38 whose maximum allowable load (F) is 800 [N].
Since the number of supports is 10, a total of 20 units are needed because two AU-38 units are used in the upper and lower parts.

■ Oscillating mounting RST model

The following shows the conditions necessary for selection.

Rod end's rotation speed : $n = 150$ [min^{-1}]
Rod end's radius : 20 [mm]
Supported object's mass : $M = 150$ [kg]

Obtain the acceleration force applied to the ROSTA and then select the model based on the maximum allowable acceleration force (F) on P597.

Obtain the rod end's peripheral speed V [mm/s] with the next equation.

$$V = \frac{2 \cdot R \cdot \pi \cdot n}{60}$$

$$= \frac{2 \times 20 \times 3.14 \times 150}{60} = 314 \text{ [mm/s]}$$

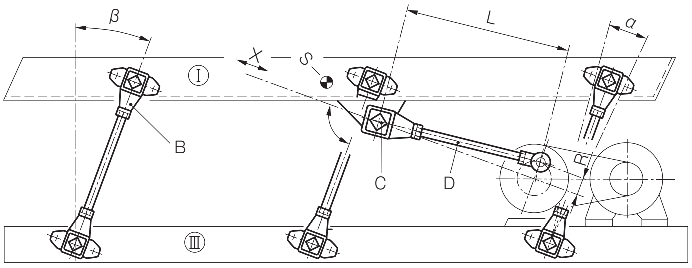
Obtain the acceleration force (F_0 [N]) applied to the ROSTA with the following equation.

$$F_0 = \frac{V^2}{R} \cdot \frac{M}{1000} \leqq F$$

$$= \frac{314^2}{20} \cdot \frac{150}{1000} = 739 \text{ [N]} \leqq F$$

Based on the above, select the RST-27 whose maximum allowable acceleration force (F) is 1000 [N].

General Model Diagram of a Crank Motion Type Vibration Excitation Method



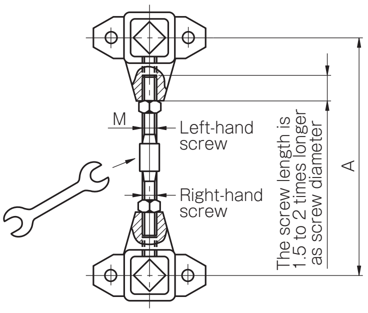
B : ROSTA oscillating mounting AU model
C : ROSTA oscillating drive head RST model
D : Connecting rod
L : Length of crank arm
R : Eccentricity (amplitude)
S : Center of gravity of trough
X : Oscillation (excitation) direction
α : Oscillation angle max. 10° (± 5°)
β : Oscillating mounting's mounting angle (10 to 30°)
Ⅰ: Trough
Ⅲ: Frame

Vibration conveyor and vibration screening machine

The figure above shows the simplest type of a vibration conveyor to which the ROSTA oscillating mounting and oscillating drive head are mounted. Ⅰ shows a part of the vibration conveyor called a trough that conveys materials. A set of two ROSTA oscillating mounting AU units support the trough at four points. Meanwhile, the oscillation movement from the excitation part is transmitted by the ROSTA oscillating drive head RST.

Design precautions for vibration conveyors

- The trough length of vibration conveyors and screening machines is about 12 to 15 m or less.
- The mounting angle of the oscillating mounting AU is about 10 to 30° . (The angle varies depending on the conveyed material.)
- The number of supports is determined by the total weight of the conveyor and material, as well as the stiffness of the channel. Make sure the stiffness of the frame and the floor is as high as possible.
- The oscillating mounting can be used for both the stationary type and hanging type vibration conveyor or screening machine.
- The connecting rod can be adjusted by using a right-hand or left-hand screw.



- Make sure the length of the support parts of the oscillating mounting AU is the same.
- Make sure the excitation direction of the oscillating drive head RST is directed to the center of gravity of the conveyor or a little forward of the center of gravity, plus crosses the oscillating mounting AU's support shaft at an angle of 90° .
- Make sure the ratio of the crank movement's eccentricity (R) to the connecting rod's length (L) is as small as possible. (R/L<0.1)
- Set the rotation speed and eccentricity so that the acceleration force applied to the vibration conveyor is 1.6 g or less.
  In general, the appropriate rotation speed and eccentricity are 300 to 600 min^{-1} and 20 to 40 mm, respectively. If the acceleration force exceeds 2.5 g, it may affect the floor and building. It is recommended to provide a counter weight. Please contact us for details.

Oscillating mounting AU

- Use the device within the allowable load range. (Refer to P596)
- The allowable frequency is based on the torsional angle ± 5° .
- Right-hand and left-hand screws are available for the main unit's screw parts. The screw's effective tightening length is 1.5 times of the screw diameter.

Oscillating drive head RST

- Use the device within the allowable acceleration force range. (Refer to P597)
- The allowable frequency is based on the torsional angle ± 5° .
- Right-hand and left-hand screws are available for the main unit's screw parts. The screw's effective tightening length is 1.5 times of the screw diameter.

AB Models

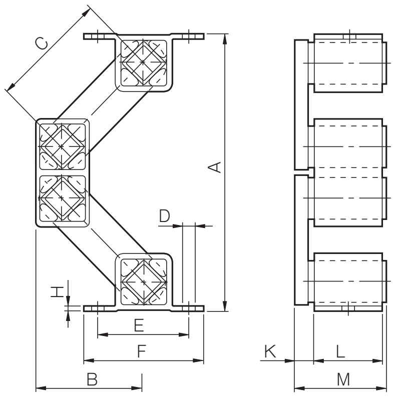
Specifications

Model	Operating load range [N]	Dynamic stiffness [N/mm]		Mass [kg]
		Vertical direction	Horizontal direction	
AB-15-N	50-160	10	6	0.51
AB-18-N	120-300	18	14	1.15
AB-27-N	250-800	40	25	2.20
AB-38-N	600-1600	60	30	5.10
AB-45-N	1200-3000	100	50	11.50
AB-50-N	2500-6000	190	85	20.80
AB-50-N-2	4200-10000	320	140	32.20

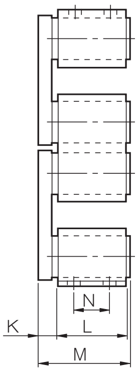
* The dynamic stiffness is data when the frequency is 960 min^{-1} and the amplitude is 8 mm under the rated load.

Dimensions

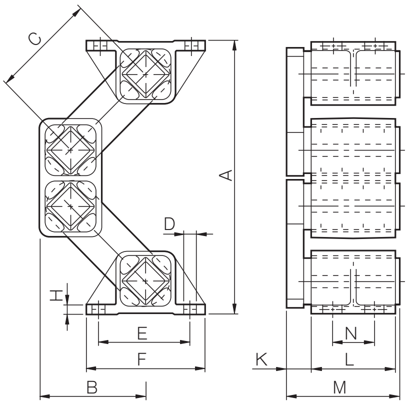
■AB-15 to 27-N



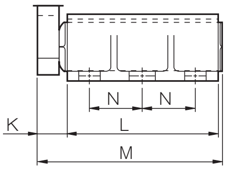
■AB-38-N



■AB-45 to 50-N



■AB-50-N-2



Unit [mm]

Model	A under no load	A under max. load	B under no load	B under max. load	C	D	E	F	H	K	L	M	N
AB-15-N	169	115	71	89	80	7	50	65	3	10	40	52	—
AB-18-N	208	154	88	107	100	9	60	80	3.5	14	50	67	—
AB-27-N	235	170	94	116	100	11	80	105	4.5	17	60	80	—
AB-38-N	305	225	120	147	125	13	100	125	6	21	80	104	40
AB-45-N	353	257	141	172	140	13 × 26	115	145	8	28	100	132	58.5
AB-50-N	380	277	150	184	150	17 × 27	130	170	12	35	120	160	60
AB-50-N-2	380	277	150	184	150	17 × 27	130	170	12	40	200	245	70

How to Place an Order

AB - 15 - N（—2）

Size

* Depending on your location and such, we may not be able to sell you our products.
Please contact us for details.

Items Checked for Design Purposes

Selection

The following shows the conditions necessary for selection.

Machine : Vibration screening machine
Machine mass : 600 [kg]
Number of supports : 4
Vibration motor rotation speed : 1500 [min^{-1}]

Load per set of oscillating mounting (W):

W = machine mass × gravitational acceleration / number of supports

= 600 × 9.8 / 4 = 1470 [N]

Based on the above, select AB-38-N whose operating load range per set is 600 to 1600 [N].

The frequency generated by the vibration motor (f):

f = vibration motor rotation speed / 60

= 1500 / 60 = 25 [Hz]

If AB-38-N is set, the deflection under the load of 1470 [N] is about 65 mm from the spring characteristic graph in the figure on the right. Based on this value and the natural frequency (fe) equation on P593, the natural frequency is as follows.

$$fe = \frac{949}{\sqrt{S}}$$

$$= \frac{949}{\sqrt{65}} ≒ 118\ [\mathrm{min}^{-1}] ≒ 1.97\ [\mathrm{Hz}]$$

Accordingly, the frequency ratio (f/fe) is as follows.

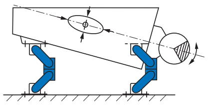
f/fe = 25 / 1.97 ≒ 12.7

Based on the item on the machine vibration on P592, the anti-vibration effect is 90% or more.

Mounting

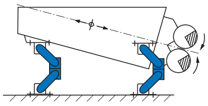
■ Vibration excitation by one vibration motor

The motion of the screen caused by vibration excitation by one vibration motor is circular vibration. Mount the vibration motor so that its mounting center is directed toward the center of gravity of the screen and at an angle of 20° to 25° from the vertical direction.



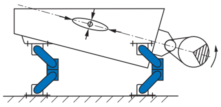
■ Vibration excitation by two vibration motors

The motion of the screen caused by vibration excitation by two vibration motors is linear vibration. The rotation directions of the vibration motors are reversed to each other. Mount the two vibration motors so that their mounting center is directed toward the center of gravity of the screen and at an angle of 20° to 25° from the vertical direction.



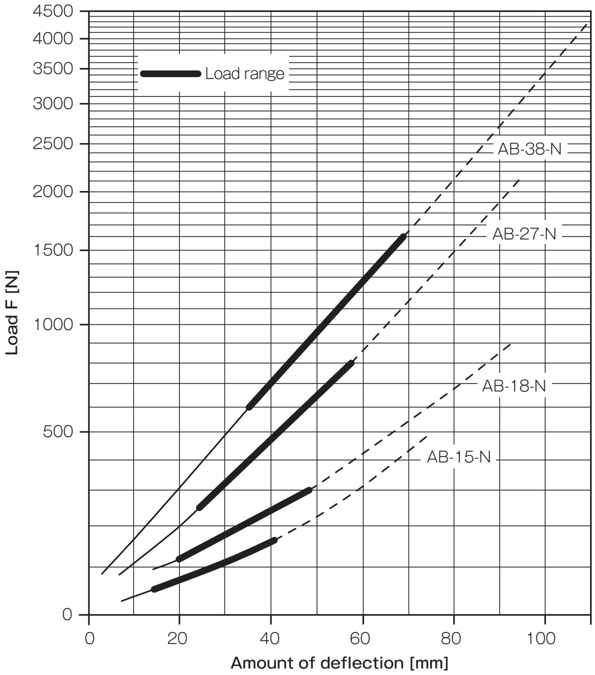
■ Vibration excitation by two vibration motors

The motion of the screen by vibration excitation by the vibration motor mounted to the pivot base is nearly linear vibration. Vibration excitation by the pivot base is effective for a small screen or similar. Mount the vibration motor so that its mounting center is directed toward the center of gravity of the screen and at an angle of 20 ° to 25 ° from the vertical direction.

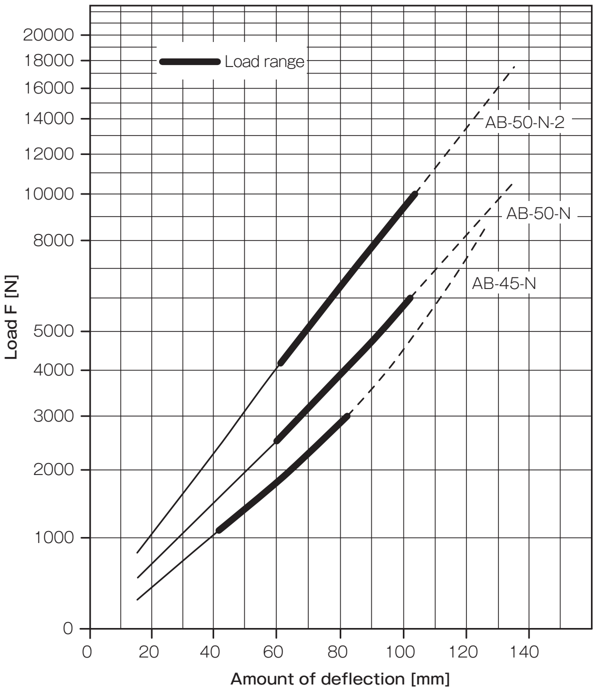


Spring Characteristic

■ Compression direction spring characteristics AB-15-N, -18-N, -27-N and -38-N



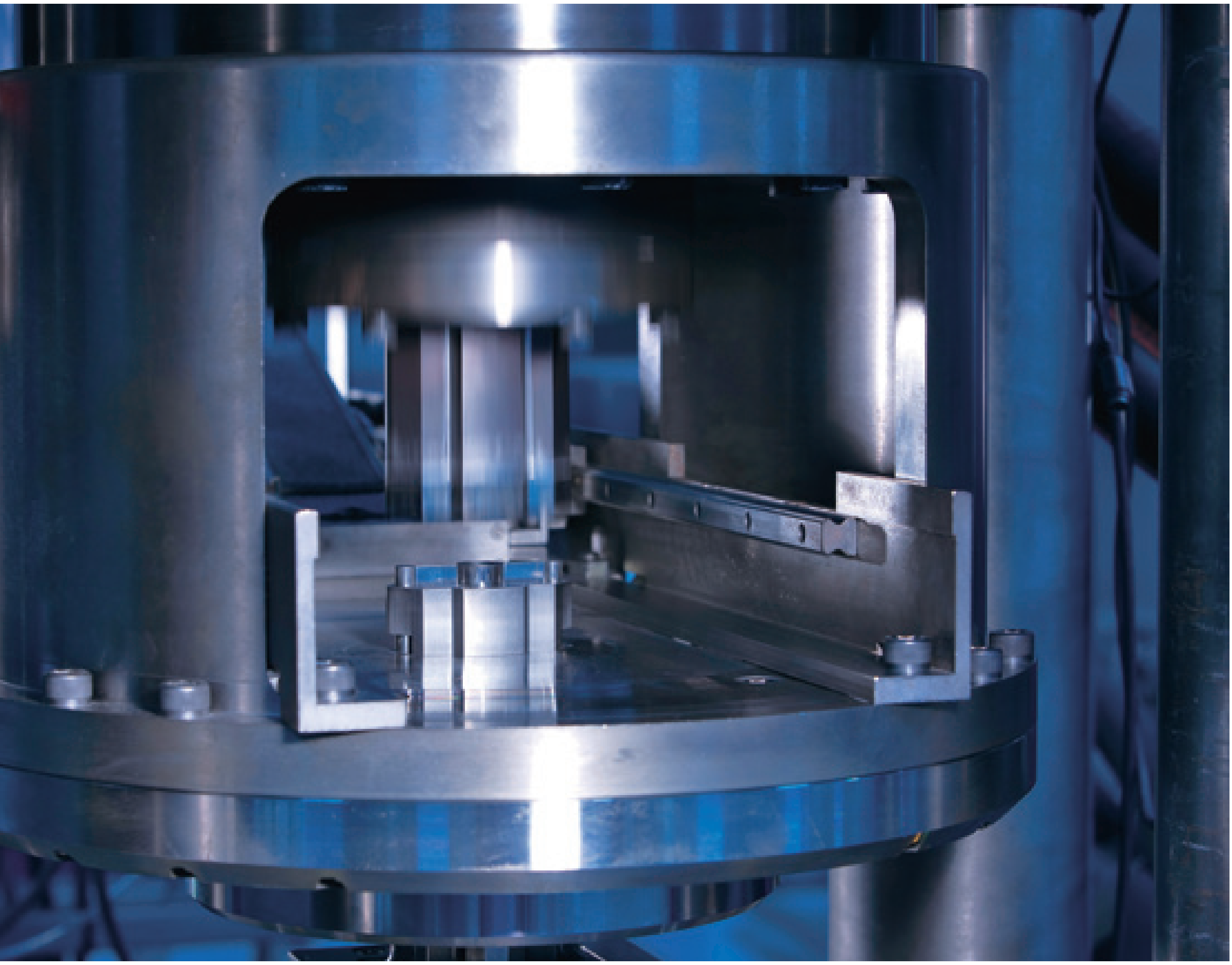
■ Compression direction spring characteristics AB-45-N, -50-N and -50-N-2



PREMIUM TECHNOLOGY

CONTENTS

MST PRODUCTS

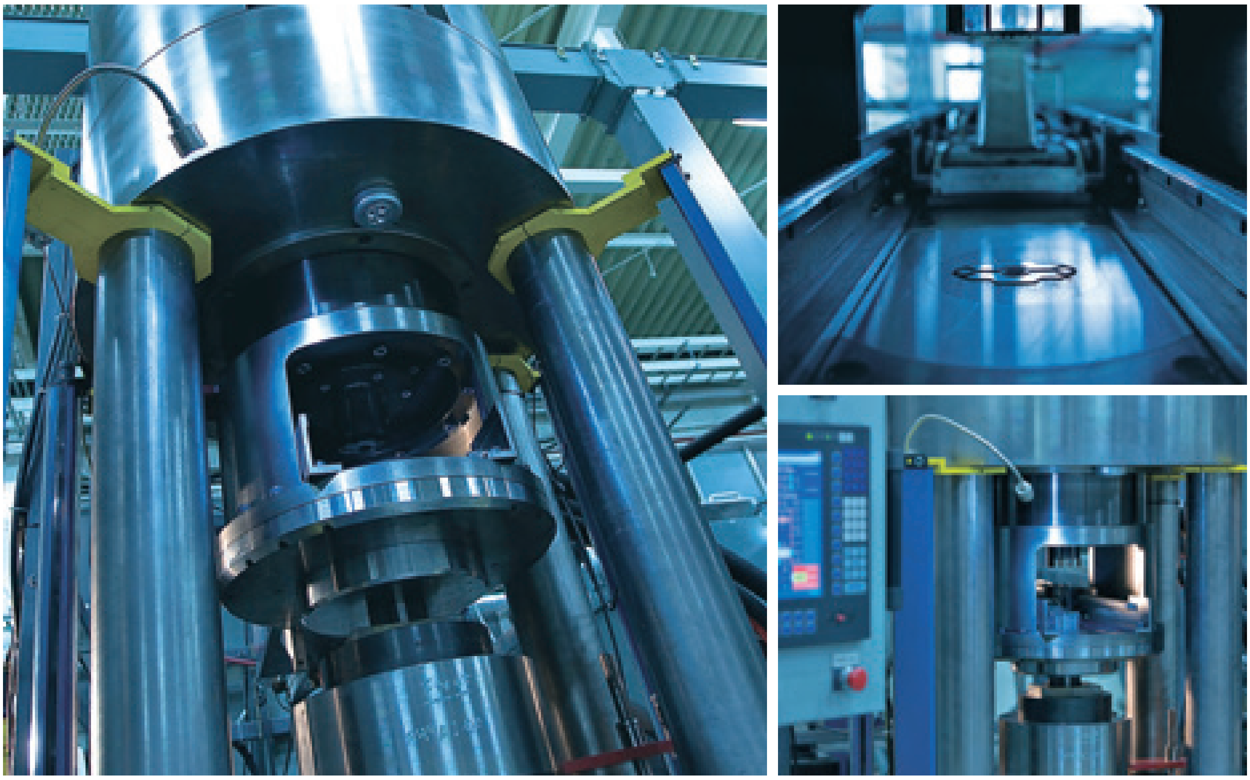


Large Sintered Parts Are Produced Using an MST Technique in Small Lots and at a Low Cost

- We employ our own unique large multi-stage CNC forming press system (500- or 1000-ton) that encompasses all steps of the manufacturing process, from filling and molding through to sintering.
- The high-density sintered parts boast a high mechanical strength close to that of ingot materials.
- Parts can be fabricated with a degree of precision not possible with conventional mechanical forming presses.

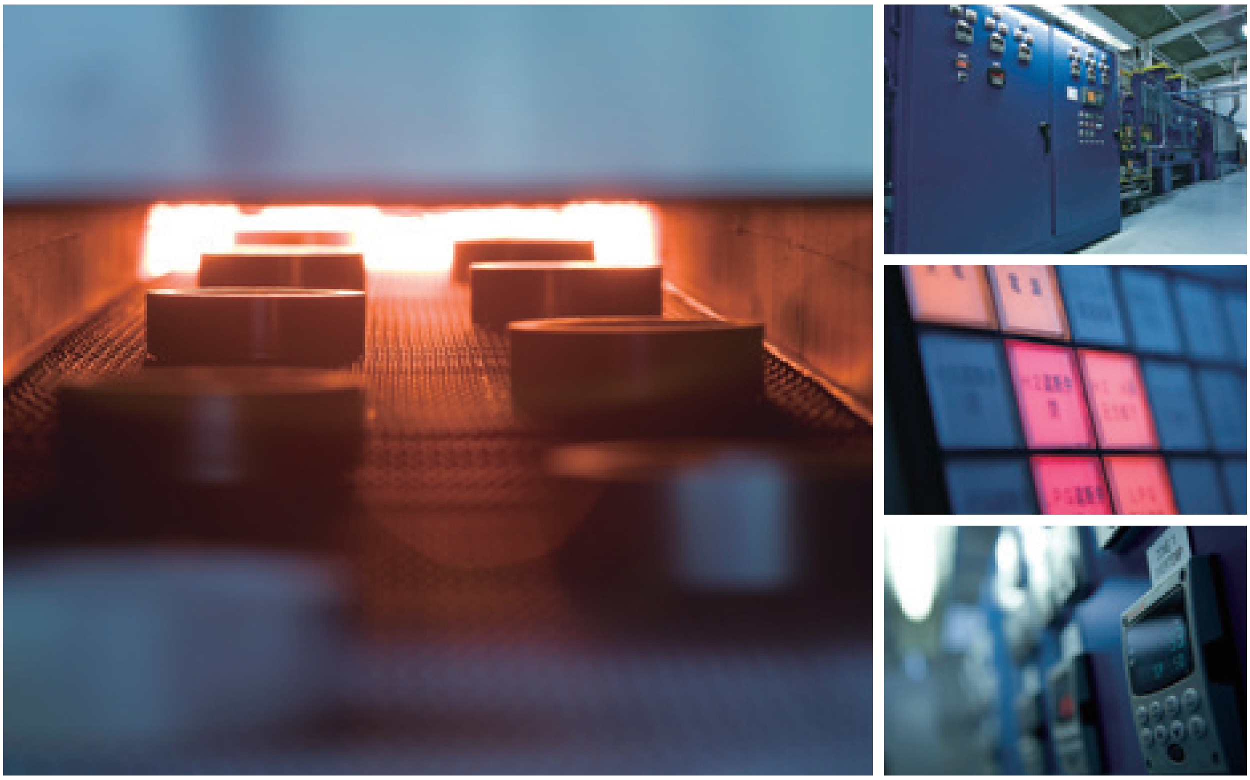
MST Forming Presses (500-ton and 1000-ton)

A high-output multi-stage CNC forming press is used to form high-density, high-precision and high-strength sintered parts in complex-shapes.



Sintering furnace of Continuous Operation

Parts formed with MST forming presses are sintered in a mixed atmosphere of nitrogen and hydrogen gas. A sinter hardening effect is obtained by controlling the cooling speed after the heating.



MST Products Four Features

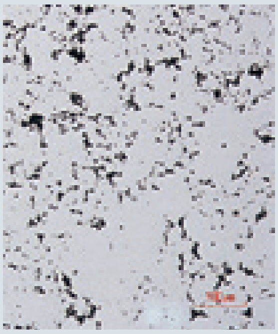
We provide large sintered parts with high mechanical strength in small lots and at a low cost using an MST technique that encompasses all manufacturing steps from filling through to forming and sintering.

1 High Density

High densities are achieved using a CNC forming press, high output and uniform filling

The strength of a sintered part is determined by elements such as the density, sintering conditions, alloy elements, and thermal processing. Of these elements, the density is a particularly important element.
The high density of MST products can be achieved with one pressing and sintering (1P-1S) operation.

Air holes with a density of 6.8 g/cm^3



Air holes with a density of 7.3 g/cm^3

* The black parts are air holes.

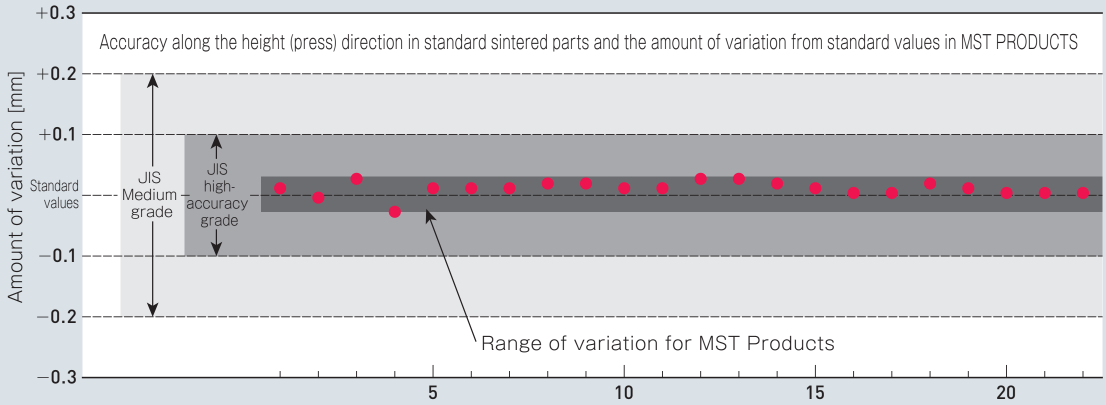
Torsion evaluation with a density of 6.8 g/cm^3

Torsion evaluation with a density of 7.3 g/cm^3

2 High Accuracy

High precision is achieved using a CNC forming press, uniform filling and the latest iron powder

MST products are made using a CNC forming press system and our own uniform filling technique, providing levels of precision not possible with conventional mechanical forming presses. The use of the latest iron powders also ensures stable dimensions.



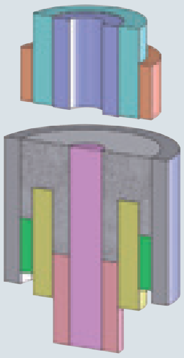
* The standard size of the measured product is 5 mm.
* The accuracy is as per JIS B 0411 (size classification 6 mm or less).

3

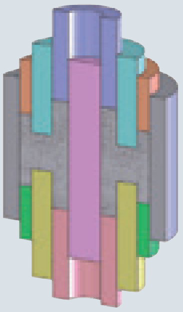
Complex Shapes

Complex shapes can be achieved using a multistage CNC forming press system

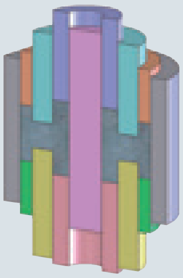
MST products are formed using a multi-stage CNC forming press system featuring computer-controlled pressure, position and speed.
This enables us to provide parts with a complex shape and large aspect ratio that were previously not possible.
In addition, CNC control enables us to make parts with near net shape, without waste and with stable quality.
This is an environmentally-friendly technique.



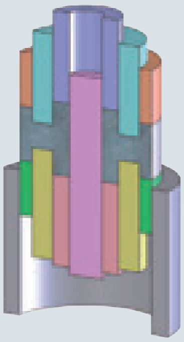
Fill powder



Move powder



Press-form



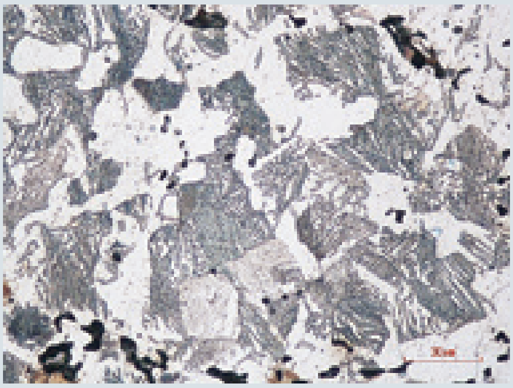
Removing

4

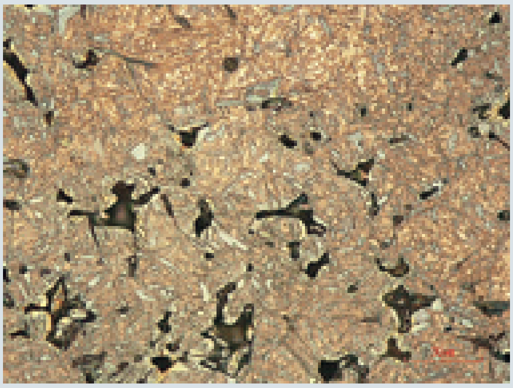
High Strength

High strength is achieved by using high-strength materials at even higher densities.

Heat treatment is an effective way to achieve high strength. However, post-sintering heat treatment has been a factor in increased costs.
MST products are able to effectively utilize high-strength materials by using an accelerated cooling function in during sintering.



Without accelerated cooling



With accelerated cooling

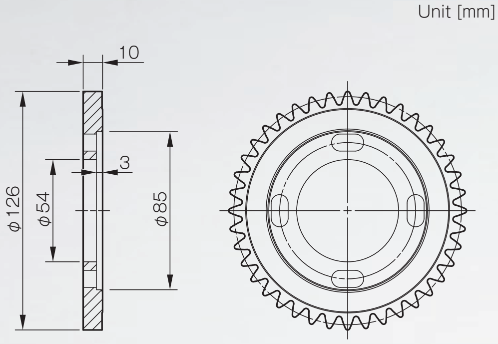
Cases of Making Parts

Sprocket

Material　Fe-Ni-Mo type
Mass　0.55 kg
Density　7.1 g/cm^3

High density
High precision
Complex shape
High strength
Large
Enhanced production

Used as a mold clamping gear in injection molding machines
A large gear fabricated by machining and then sintered

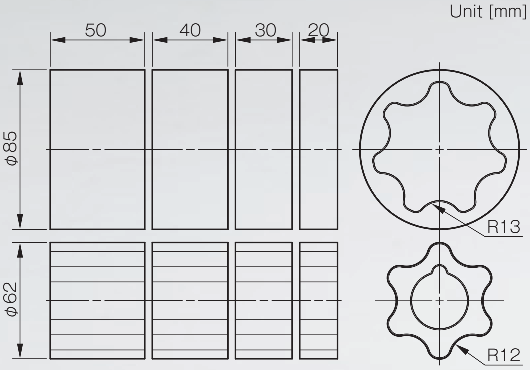


Outer/Inner Rotors

Material　Fe-Cu type
Mass　0.3 to 1.2 kg
Density　6.8 g/cm^3

High density
High precision
Complex shape
High strength
Large
Enhanced production

Used in large trochoid pumps
Previously fabricated by machining using 4 molds of different thicknesses
Can now be made using a single mold

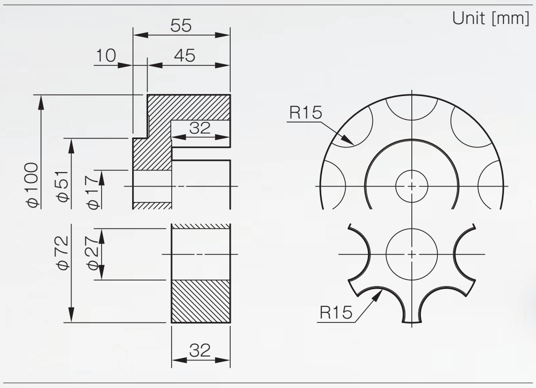


Rotor & Pinion

High density | High precision | Complex shape
High strength | Large | Enhanced production

Material Fe-Cu type
Mass 0.5 to 1.2 kg
Density 6.8 g/cm³

Used in gasoline pumps at filling stations
Allows the fabrication of high-aspect shapes not possible using conventional powder metallurgy

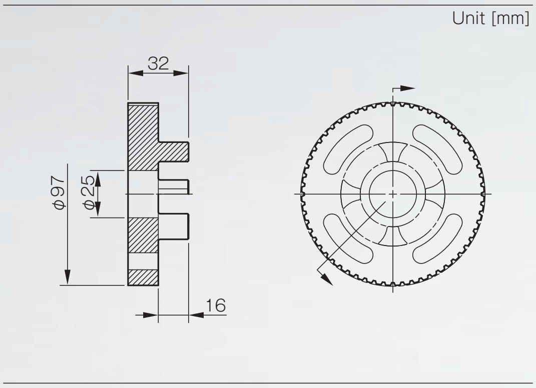


Timing Pulley

High density | High precision | Complex shape
High strength | Large | Enhanced production

Material Fe-Cu type
Mass 0.8 kg
Density 6.8 g/cm³

HV 600 or better using induction hardening
Two components integrated through molding and then hardened using heat treatment



Characteristic Values of Representative Materials Used for MST PRODUCTS

Fe-Cu type materials

Characteristic of materials

Name of material		Max. tensile strength [MPa]	Bearing force of 0.2 [MPa]	Elongation [%]	Young's modulus [GPa]	Poisson ratio	Charpy impact value (Without notch) [J/cm^2]	Deflective strength [MPa]	Compressive yield stress (0.1%) [MPa]	Appearance hardness	Converted value from vickers hardness	Fatigue limit [MPa]	Density [g/cm^3]
FC-0205	**– 30**	240	240	< 1.0	95	0.25	< 3	410	240	HRB 37	–	90	6.0
	– 35	280	280	< 1.0	115	0.25	4	520	280	HRB 48	–	100	6.3
	– 40	340	310	< 1.0	120	0.25	7	660	310	HRB 60	–	140	6.7
	– 45	410	340	< 1.0	150	0.27	10	790	340	HRB 72	–	210	7.1
FC-0205	**– 60HT**	480	480	< 0.5	110	0.25	3	660	390	HRB 99	HRC 58	190	6.2
	– 70HT	550	550	< 0.5	105	0.25	5	760	490	HRC 25	HRC 58	210	6.5
	– 80HT	620	620	< 0.5	130	0.27	6	830	590	HRC 31	HRC 58	230	6.8
	– 90HT	690	690	< 0.5	140	0.27	7	930	660	HRC 36	HRC 58	260	7.0
FC-0208	**– 30**	240	240	< 1.0	85	0.25	< 3	410	280	HRB 50	–	90	5.8
	– 40	340	310	< 1.0	115	0.25	3	620	310	HRB 61	–	120	6.3
	– 50	410	380	< 1.0	120	0.25	7	860	340	HRB 73	–	160	6.7
	– 60	520	450	< 1.0	155	0.28	9	1070	380	HRB 84	–	230	7.2
FC-0208	**– 50HT**	450	450	< 0.5	105	0.25	3	660	400	HRC 20	HRC 60	170	6.1
	– 65HT	520	520	< 0.5	120	0.27	5	760	500	HRC 27	HRC 60	210	6.4
	– 80HT	620	620	< 0.5	130	0.27	6	900	630	HRC 35	HRC 60	240	6.8
	– 95HT	720	720	< 0.5	150	0.27	7	1030	720	HRC 43	HRC 60	280	7.1

Chemical abundance

Unit [%]

Name of material	Fe	Cu	C	Width, Min./Max.
FC-0205	Remaining	1.5	0.3	Min.
	Remaining	3.9	0.6	Max.
FC-0208	Remaining	1.5	0.6	Min.
	Remaining	3.9	0.9	Max.

* Extracted from MPIF (Metal Powder Industries Federation) standard. MPIF Standard 35 Materials Standards for PM Structural Parts.

Fe-Ni type materials

Characteristic of materials

Name of material		Max. tensile strength [MPa]	Bearing force of 0.2 [MPa]	Elongation [%]	Young's modulus [GPa]	Poisson ratio	Charpy impact value (Without notch) [J/cm^2]	Deflective strength [MPa]	Compressive yield stress (0.1%) [MPa]	Appearance hardness	Converted value from vickers hardness	Fatigue limit [MPa]	Density [g/cm^3]
FN-0205	**– 20**	280	170	1.5	115	0.25	8	450	170	HRB 44	–	100	6.6
	– 25	340	210	2.5	135	0.27	16	690	210	HRB 59	–	120	6.9
	– 30	410	240	4.0	155	0.28	28	860	240	HRB 69	–	150	7.2
	– 35	480	280	5.5	170	0.28	46	1030	280	HRB 78	–	180	7.4
FN-0205	**– 80HT**	620	620	< 0.5	115	0.25	5	830	410	HRC 23	HRC 55	180	6.6
	– 105HT	830	830	< 0.5	135	0.27	6	1110	550	HRC 29	HRC 55	240	6.9
	– 130HT	1000	1000	< 0.5	150	0.27	8	1310	690	HRC 33	HRC 55	290	7.1
	– 155HT	1100	1100	< 0.5	155	0.28	9	1480	830	HRC 36	HRC 55	320	7.2
	– 180HT	1280	1280	< 0.5	170	0.28	13	1720	970	HRC 40	HRC 55	370	7.4
FN-0208	**– 30**	310	240	1.5	120	0.25	7	590	240	HRB 63	–	110	6.7
	– 35	380	280	1.5	135	0.27	11	720	280	HRB 71	–	140	6.9
	– 40	480	310	2.0	150	0.27	15	900	310	HRB 77	–	170	7.1
	– 45	550	340	2.5	160	0.28	22	1070	340	HRB 83	–	190	7.3
	– 50	620	380	3.0	170	0.28	28	1170	380	HRB 88	–	220	7.4
FN-0208	**– 80HT**	620	620	< 0.5	120	0.25	5	830	680	HRC 26	HRC 57	200	6.7
	– 105HT	830	830	< 0.5	135	0.27	6	1030	850	HRC 31	HRC 57	260	6.9
	– 130HT	1000	1000	< 0.5	140	0.27	7	1280	940	HRC 35	HRC 57	320	7.0
	– 155HT	1170	1170	< 0.5	155	0.28	9	1520	1120	HRC 39	HRC 57	370	7.2
	– 180HT	1340	1340	< 0.5	170	0.28	11	1720	1300	HRC 42	HRC 57	430	7.4

Chemical composition

Unit [%]

Name of material	Fe	Ni	C	Cu	Width, Min./Max.
FN-0205	Remaining	1.0	0.3	0.0	Min.
	Remaining	3.0	0.6	2.5	Max.
FN-0208	Remaining	1.0	0.6	0.0	Min.
	Remaining	3.0	0.9	2.5	Max.

* Extracted from MPIF (Metal Powder Industries Federation) standard. MPIF Standard 35 Materials Standards for PM Structural Parts.

Fe-Cu-Ni-Mo type materials (high-strength materials)

Characteristic of materials

Name of material		Max. tensile strength [MPa]	Bearing force of 0.2 [MPa]	Elongation [%]	Young's modulus [GPa]	Poisson ratio	Charpy impact value (Without notch) [J/cm²]	Deflective strength [MPa]	Compressive yield stress (0.1%) [MPa]	Appearance hardness	Converted value from vickers hardness	Fatigue limit [MPa]	Density [g/cm³]
FLN2-4405	**– 45**	410	360	0.5	115	0.25	7	860	340	HRB 75	–	130	6.60
	– 50	450	400	1.0	130	0.27	9	1070	380	HRB 80	–	170	6.80
	– 55	550	440	1.5	145	0.27	16	1310	430	HRB 85	–	220	7.05
	– 60	690	480	2.0	160	0.28	30	1520	480	HRB 90	–	280	7.30
FLN2-4405	**– 90HT**	690	690	< 0.5	115	0.25	5	1070	690	HRC 28	HRC 60	220	6.60
	– 120HT	900	860	< 0.5	130	0.27	8	1450	860	HRC 32	HRC 60	280	6.80
	– 160HT	1170	1000	< 0.5	145	0.27	14	1800	1100	HRC 38	HRC 60	340	7.05
	– 190HT	1450	1240	0.5	160	0.28	18	2210	1310	HRC 44	HRC 60	410	7.30
FLNC-4408	**– 60HT**	480	480	< 1.0	115	0.25	5	1100	520	HRB 98	HRC 55	120	6.60
	– 85HT	660	660	< 1.0	130	0.27	9	1310	590	HRC 21	HRC 55	180	6.80
	– 105HT	790	790	< 1.0	140	0.27	16	1520	660	HRC 25	HRC 55	230	7.00
	– 130HT	970	970	1.0	155	0.28	22	1720	720	HRC 30	HRC 55	290	7.20

Chemical abundance

Unit [%]

Name of material	Fe	C	Ni	Mo	Cu	Mn	Width, Min./Max.
FLN2-4405	Remaining	0.4	1.0	0.65	–	0.05	Min.
	Remaining	0.7	3.0	0.95	–	0.30	Max.
FLNC-4408	Remaining	0.6	1.0	0.65	1.0	0.05	Min.
	Remaining	0.9	3.0	0.95	3.0	0.30	Max.

*Extracted from MPIF (Metal Powder Industries Federation) standard. MPIF Standard 35 Materials Standards for PM Structural Parts.

SUS304 type materials

Characteristic of materials

Name of material		Max. tensile strength [MPa]	Bearing force of 0.2 [MPa]	Elongation [%]	Young's modulus [GPa]	Poisson ratio	Charpy impact value (Without notch) [J/cm²]	Deflective strength [MPa]	Compressive yield stress (0.1%) [MPa]	Appearance hardness	Converted value from vickers hardness	Fatigue limit [MPa]	Density [g/cm³]
SS-304	**N1-30**	300	260	0.5	105	0.25	5	770	260	HRB 61	–	105	6.4
	N2-33	390	280	10.0	115	0.25	34	880	320	HRB 62	–	125	6.5
	N2-38	480	310	13.0	140	0.27	75	–	320	HRB 68	–	160	6.9
	H-20	280	170	10.0	120	0.25	27	590	170	HRB 35	–	–	6.6
	L-13	300	120	23.0	120	0.25	61	–	150	HRB 30	–	115	6.6
	L-18	390	180	26.0	140	0.27	108	–	190	HRB 45	–	145	6.9

Chemical abundance

Unit [%]

Name of material	Fe	Cr	Ni	Mn	Si	S	C	P	Mo	N	Width, Min./Max.
SS-304N1, N2	Remaining	18.0	8.0	0.0	0.0	0.00	0.00	0.00	–	0.20	Min.
	Remaining	20.0	12.0	2.0	1.0	0.03	0.08	0.04	–	0.60	Max.
SS-304H, L	Remaining	18.0	8.0	0.0	0.0	0.00	0.00	0.00	–	0.00	Min.
	Remaining	20.0	12.0	2.0	1.0	0.03	0.03	0.04	–	0.03	Max.

* Extracted from MPIF (Metal Powder Industries Federation) standard. MPIF Standard 35 Materials Standards for PM Structural Parts.

Sintering materials for machine structural parts

Reference

JIS Z 2550:2000 Annex (Standard) Sintered Metal Materials for Mechanical Structural Parts

Type	Code	Mechanical properties			Density	Chemical composition [%]							
		Tensile strength [N/mm²]	Elongation [%]	Charpy impact value [J/cm²]	[g/cm³]	Fe	C	Cu	Ni	Sn	Cr	Mo	Other Total
SMF 1	SMF 1010	100 or more	3 or more	5 or more	6.2 or more	Residue	-	-	-	-	-	-	1 or less
	SMF 1015	150 or more	5 or more	10 or more	6.8 or more	Residue	-	-	-	-	-	-	1 or less
	SMF 1020	200 or more	5 or more	15 or more	7.0 or more	Residue	-	-	-	-	-	-	1 or less
SMF 2	SMF 2015	150 or more	1 or more	5 or more	6.2 or more	Residue	-	0.5 - 3	-	-	-	-	1 or less
	SMF 2025	250 or more	1 or more	5 or more	6.6 or more	Residue	-	0.5 - 3	-	-	-	-	1 or less
	SMF 2030	300 or more	2 or more	8 or more	6.8 or more	Residue	-	0.5 - 3	-	-	-	-	1 or less
SMF 3	SMF 3010	100 or more	1 or more	5 or more	6.2 or more	Residue	0.2 - 0.6	-	-	-	-	-	1 or less
	SMF 3020	200 or more	1 or more	5 or more	6.4 or more	Residue	0.4 - 0.8	-	-	-	-	-	1 or less
	SMF 3030	300 or more	1 or more	5 or more	6.6 or more	Residue	0.4 - 0.8	-	-	-	-	-	1 or less
	SMF 3035	350 or more	1 or more	5 or more	6.8 or more	Residue	0.4 - 0.8	-	-	-	-	-	1 or less
SMF 4	SMF 4020	200 or more	1 or more	5 or more	6.2 or more	Residue	0.2 - 1.0	1 - 5	-	-	-	-	1 or less
	SMF 4030	300 or more	1 or more	5 or more	6.4 or more	Residue	0.2 - 1.0	1 - 5	-	-	-	-	1 or less
	SMF 4040	400 or more	1 or more	5 or more	6.6 or more	Residue	0.2 - 1.0	1 - 5	-	-	-	-	1 or less
	SMF 4050	500 or more	1 or more	5 or more	6.8 or more	Residue	0.2 - 1.0	1 - 5	-	-	-	-	1 or less
SMF 5	SMF 5030	300 or more	1 or more	10 or more	6.6 or more	Residue	0.8 or less	0.5 - 3	1 - 5	-	-	-	1 or less
	SMF 5040	400 or more	1 or more	10 or more	6.8 or more	Residue	0.8 or less	0.5 - 3	2 - 8	-	-	-	1 or less
SMF 6	SMF 6040	400 or more	1 or more	10 or more	7.2 or more	Residue	0.3 or less	15 - 25	-	-	-	-	4 or less
	SMF 6055	550 or more	0.5 or more	5 or more	7.2 or more	Residue	0.3 - 0.7	15 - 25	-	-	-	-	4 or less
	SMF 6065	650 or more	0.5 or more	10 or more	7.4 or more	Residue	0.3 - 0.7	15 - 25	-	-	-	-	4 or less
SMF 7	SMF 7020	200 or more	3 or more	15 or more	6.6 or more	Residue	-	-	1 - 5	-	-	-	1 or less
	SMF 7025	250 or more	5 or more	20 or more	6.8 or more	Residue	-	-	1 - 5	-	-	-	1 or less
SMF 8	SMF 8035	350 or more	1 or more	10 or more	6.6 or more	Residue	0.4 - 0.8	-	1 - 5	-	-	-	1 or less
	SMF 8040	400 or more	2 or more	15 or more	6.8 or more	Residue	0.4 - 0.8	-	1 - 5	-	-	-	1 or less
SMS 1	SMS 1025	250 or more	1 or more	-	6.4 or more	Residue	0.08 or less	-	8 - 14	-	16 - 20	2 - 3	3 or less
	SMS 1035	350 or more	2 or more	-	6.8 or more	Residue	0.08 or less	-	8 - 14	-	16 - 20	2 - 3	3 or less
SMS 2	SMS 2025	250 or more	0.5 or more	-	6.4 or more	Residue	0.2 or less	-	-	-	12 - 14	-	3 or less
	SMS 2035	350 or more	1 or more	-	6.8 or more	Residue	0.2 or less	-	-	-	12 - 14	-	3 or less
SMK 1	SMK 1010	100 or more	2 or more	5 or more	6.8 or more	-	1.5 or less	Residue	-	9 - 11	-	-	2 or less
	SMK 1015	150 or more	3 or more	10 or more	7.2 or more	-	1.5 or less	Residue	-	9 - 11	-	-	2 or less

* Characteristic values for SMS 1 and 2 are for sintering in AX gas. * 1 N/mm² = 1 MPa * In the chemical composition, SUS316 and SUS304 qualify as SMS 1, and SUS410 qualifies as SMS 2.
* Other chemical substances include phosphorus, sulfur, manganese and silicon.

Characteristics of sintering materials for machine structural parts

Type	Alloys (composition)	Features
SMF 1	Pure iron (ferrite)	Tough, but has poor mechanical characteristics. Resistance to abrasion is improved through case-hardening.
SMF 2	Fe-Cu (ferrite)	Mechanical characteristics are improved by adding copper. Resistance to abrasion is improved through steam treatment or case hardening.
SMF 3	Fe-C (pearlite + ferrite)	Strength is improved by adding carbon. Resistance to abrasion is improved through steam treatment or case hardening.
SMF 4	Fe-C-Cu (pearlite + ferrite)	Strength and resistance to abrasion are improved by adding copper and carbon. Strength is improved through steam treatment, case hardening or induction hardening.
SMF 5	Fe-C-Cu-Ni (pearlite + ferrite, Ni rich layer)	Toughness is improved by adding nickel. Strength is improved through case hardening or induction hardening.
SMF 6	Fe-C (copper-infiltrated) (pearlite + ferrite)	Copper infiltration provides higher toughness and density. Can be subjected to heat treatment.
SMF 7	Fe-Ni (ferrite, with Ni rich layer)	A tough nickel alloy containing no carbon. Resistance to abrasion and strength are improved through case-hardening.
SMF 8	Fe-C-Ni (pearlite + ferrite, Ni rich layer)	A tough nickel alloy containing no copper. Resistance to abrasion and strength are improved through case-hardening.
SMS 1	Austenitic stainless steel	Resistant to corrosion and heat and weakly magnetic. (18Cr-8Ni alloy)
SMS 2	Ferritic stainless steel	Resistant to corrosion and heat and weakly magnetic. (13Cr alloy)
SMK 1	Bronze	Copper alloy, so easy to work. Resistant to corrosion.

Conditions for Manufacturing

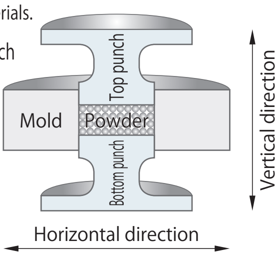
Conditions for Successful Manufacturing

Iron parts

Currently, most MST products manufactured are sintered iron parts. The most frequently manufactured parts are Fe-Cu parts containing 0.6% carbon. Needless to say, they can be subjected to heat treatment. MST products can also be made from 300-series stainless steel or other materials.

Parts that can be formed by vertical punch

MST products are formed using vertical punch presses. While there is a considerable flexibility in vertical shaping, horizontal undercuts and holes must be added by machining.



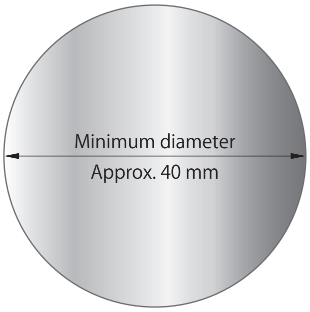
Parts with no draft angle on the side

Since the part is pressed vertically, draft angles cannot be made in the side of the workpiece. If tapering is required on the side, there must always be a straight section.

Parts with a maximum height of 80 mm

The maximum part height is approximately 40 mm for a 500-ton press and approximately 80 mm for a 1,000-ton press. However, these values are for simple shapes. Where the shape is more complex, additional limits apply. Conversely, for materials with a lower density, parts more than 80 mm high may be possible.

Parts with a punch area of 1,000 mm^2 or more



Since the presses for MST products are large (500 and 1,000 tons), they are not well suited to producing very small parts. The minimum punch area of the part must be 1,000 mm^2 (approximately 40 mm in diameter). The sizes of parts that can be made depend greatly on the part shape and the required density, so it is difficult to generalize. However, we have successfully manufactured parts up to 200 mm in diameter.

Prototyping materials are available

Molds for prototyping and evaluation can entail considerable costs. However, prototyping materials that maximize the benefits of high density can be provided for MST products. Prototypes for evaluation can be manufactured from the following prototyping materials by machining:

500-ton press: External diameter of 80 mm at thicknesses of 10 to 50 mm
1,000-ton press: External diameter of 105 mm at thicknesses of 10 to 70 mm

Other sizes are also available. Contact Miki Pulley for details.

Instances With Cost Benefits

Lot sizes of 500 or more

Press forming using molds requires that the molds be changed. When factors such as the retooling time are taken into consideration, cost benefits are likely where the lot size is at least 500. The standard lot size for quotation is 1,000.

Correlation between lot size and price percentage (approximate)	Lot of 500	110%
	Lot of 1,000	100%
	Lot of 2,000	95%

Total production quantity of 10,000 pieces or more

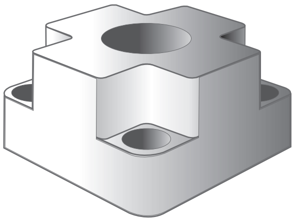
If the mold costs 2 million yen and a total of 10,000 pieces are made, one piece costs 200 yen. So the total production quantity is a large factor for the total cost.

The mass is 0.5 kg or more

The forming time of MST products is not so much influenced by the size. Therefore the running costs excluding material cost become constant. Parts with a mass of 0.5 kg or more can easily result in a cost benefit considering the balance with the total cost. The highest cost effective part is one with a mass of 1.4 kg at present.

Complex parts with combinations of flat punch surfaces

CNC is used to control multiple punches on the punch surface, making complex shapes possible. For machining currently performed using tools such as milling cutters, this promises considerable cost benefits.



Materials that lack sufficient strength for sintering (with a density of 7.0 g/cm^3 or more)

The strength of a material can be increased approximately 1.5 times by increasing its density. This makes it possible to manufacture sintered parts from materials that were previously unsuitable.

Materials that cannot be sintered due to inadequate press output (with a diameter of 80 mm or more)

The large size of the forming presses makes the manufacture of wide parts feasible. Where manufacturing is feasible, the larger the part, the greater the cost benefit.

Cases Where Cost Benefits Cannot Be Gained

Dimensional accuracy for almost all machining parts is IT7 class or higher

Accuracy in the lateral direction with which MST products can be made at a low cost is 7 or 8 class. If most of the tolerances are 7 class or more, it is difficult to gain a cost benefit since machining is required in the same manner as with other materials.

There are many shapes that cannot be formed with molds

Conventional machining is required since tapping and making undercuts are not possible.

Normal sintering is sufficient

Material costs are the same, but because a hydraulic forming press is used for MST products, productivity is lower than for normal sintered parts. So unless there is added value, costs are higher.

Cases that Require Caution

Impact load is applied

The impact load that the MST products can withstand is larger than that of the conventional sintered parts and high density MST products are also used, for example, in the gears of cars. However, please note that the maximum impact load is lower than that of ingot material due to the existence of air holes.

Process fluid penetrates

Compared to conventional sintered parts, there are less air holes in the surface layer of MST products, since they have high density, but if the MST part is exposed to a liquid, the liquid will penetrate into the inside of the part through the air holes, and then the process fluid may leak up out from the inside and result in deterioration of the surface.This can be prevented by impregnating the air holes with acrylic resin to prevent fluid from penetrating into them.

Safety Precautions (Be sure to read before use)

Carefully read the instruction manual and other technical information before using the product, and handle the product correctly, paying careful attention to safety.
In this manual, the safety precautions are divided into the levels of "Danger" and "Caution", and specific handling and actions are described under graphic warning symbols. Note that even items described under "Caution" may lead to serious consequences depending on the circumstances. Be sure to abide by all safety precautions because they are important.

● Level of safety precautions

⚠Danger	Indicates that mishandling by the user may result in death or severe injury and that the degree of danger is high.
⚠Caution	Indicates that mishandling by the user may cause injury or property damage.

● Explanation of the graphic warning symbols

🛇	Prohibited	Indicates prohibited actions when handling the product.
△	Caution	Indicates that caution is required when handling the product.
●	Instruction	Indicates mandatory actions to be performed according to the instruction when handling the product.

If you want to use the product for equipment whose failure or malfunction may directly endanger a human life or human body (e.g. nuclear power, aerospace, medical, traffic, and safety equipment), considerations must be taken for each case, so please contact our sales office before use.
Every effort has been taken to ensure the quality of the product, but please give sufficient consideration to safety measures for your machine in case of unexpected failure.

1. Precautions for Structure

⚠Danger ● Install a safety mechanism.

If the product is damaged, the driving side and driven side may be completely separated. Touching the product in operation with your hand or fingers may cause injury.
Be sure to install a safety mechanism such as a safety brake to prevent a hazard.

⚠Danger ● Put the product main unit into an enclosure in a flammable atmosphere.

Slipping during start-up and braking may cause a spark.
Put the product main unit into an enclosure if a cloth or other item that is flammable is near the product.
Note that putting the product main unit into an enclosure decreases the allowable design workload.

⚠Danger ● Check the surrounding environment.

Do not use the product in a place exposed to dust, high temperatures, condensation, wind, and rain.
Do not mount the product directly to locations subject to vibration and shock.
Doing so may damage the product or cause a malfunction or deterioration of performance.

⚠Caution ● Do not use the product in an environment that may adversely affect it.

Never use the product in an environment that may adversely affect it (e.g. locations exposed to chemicals or corrosive gases, or at extremely high or low temperatures).
Doing so may damage the product and cause a malfunction or deterioration of performance.

2. Precautions for Mounting

⚠Danger ● Never switch on the power of the equipment.

If the driving section is accidentally activated when mounting the product to the equipment, you may be caught in the equipment, resulting in injury. Be sure to check that the main power of the equipment is off before mounting.

⚠Danger ● Securely tighten the bolts and screws, and make sure they do not come loose.

Inappropriate tightening of the bolts and screws is very dangerous and may result in damage to the product or not being able to meet the performance of the product.
Be sure to use bolts and screws specified by us and tighten them to the tightening torque specified by us.
Make sure they do not come loose by using adhesive, spring washers, etc.

⚠Caution ● Do not use bolts and screws other than those specified by us.

If you use bolts and screws other than those specified by us, the bolts, screws, and product may be damaged, and the bolts may come loose.
Do not use bolts and screws other than those specified by us.

⚠Caution ● **Use a hoist or something similar for movement and assembly.**

Holding a heavy load may cause lower back pain. When handling a heavy product, move and assemble it using a hoist or something similar.

⚠Caution ● **Mount and use the product within the "allowable tolerance" specified by us.**

When you mount the product to the equipment, mount it within the "allowable tolerance" specified by us. If you use the equipment while exceeding the "allowable tolerance", the product itself may be damaged or the equipment may be adversely affected.

⚠Caution ● **Wear protection equipment when mounting the product.**

You may be injured by parts such as a stop ring, spring pin, or key groove when mounting the product.
Be sure to wear protection equipment such as safety glasses and gloves when carrying out work.

3. Precautions for Wiring

⚠Danger ● **Do not use the eye bolt of the motor frame when moving the motor.**

The eye bolt of the motor frame does not have enough strength because it is for motor transportation.
Never use the eye bolt of the motor frame.

⚠Danger ● **Be sure to connect the ground terminal (E) of the motor and controller to ground.**

Class three grounding method (100 Ω or less and ø1.6 mm or more) is recommended.

⚠Danger ● **Use an electric wire whose size matches the power supply capacity.**

If you use an electric wire with a small power capacity, the insulation coating may melt and cause an insulation failure, which may cause electric shock or electric leakage, as well as result in fire.

⚠Caution ● **Do not hold the speed change handle or lever or the motor lead wire when moving the product.**

The motor shaft may be deformed and the bearing may be damaged. Or the product may fall, causing foot or other injury.
Use the eye bolt on the top of the main unit when moving the product.

⚠Caution ● **Do not mount and use the input and output shafts of Zero-Max in reversed positions.**

Avoid incorrect operation. Failing to do so may cause a product failure.

⚠Caution ● **Be careful not to cut your hand with the key grooves on the input and output shafts of Zero-Max.**

You may be injured if you hold the pointed edges of key grooves on the input and output shafts when moving the product.

⚠Caution ● **Securely mount the product using sufficiently strong bolts.**

It is very dangerous if the strength of the mounting bolt is not adequate or the tightening torque is weak, because the product may accidentally be displaced or come loose.

⚠Caution ● **Mount the product to a rigid and strong floor surface or mounting base.**

If the strength of the mounting base is insufficient, vibration and noise may occur during use.

⚠Caution ● **Make sure the base surface is slightly higher than the floor surface when mounting the product to the floor surface.**

If the base surface is the same as the floor surface, there is the possibility that the insulation of the electric motor will deteriorate due to dust and humidity.

⚠Caution ● **Be sufficiently careful regarding the overhang load when mounting the sprocket and gear to the output shaft.**

If you use the product while exceeding the allowable overhang load, the output shaft may be broken or the bearing may be damaged.

Safety Precautions (Be sure to read before use)

⚠Caution ● After mounting, pull off the air drain plug of the worm reducer.

If the reducer is operated with the air drain plug attached, the internal pressure of the reducer will increase, resulting in the possibility of oil leakage. (For Zero-Max equipped with a motor, replace the oil filler plug with the supplied ventilation plug.)

⚠Caution ● Wire the motor correctly and surely.

Incorrect wiring may cause an electric shock, electric leakage, or fire.

■ 4. Precautions before Operation

⚠Danger ● Do not use the product in a flammable or explosive atmosphere.

Slipping during start-up and braking may cause a spark.
Never use the equipment near oil or in flammable gas atmosphere, where possibility of ignition and/or explosion exists.

⚠Danger ● Put the product main unit into an enclosure in a flammable atmosphere.

Slipping during start-up and braking may cause a spark.
Put the product main unit into an enclosure if a cloth or other item that is flammable is near the product.
Note that putting the product main unit into an enclosure decreases the allowable design workload.

■ 5. Precautions during Operation

⚠Danger ● Do not touch the product during operation.

Touching the rotating product or a rotating part around it may result in your hand or fingers getting caught in it.
Never touch the product or rotating parts during operation. Be careful not to get your hand or clothing caught in the rotating parts.

⚠Danger ● Never touch a live terminal block or lead wire with your hand.

Note that touching a live terminal block or lead wire may cause electric shock.

⚠Danger ● Do not increase the rotation speed to more than the max. rotation speed.

If you use the product at a speed of more than the max. rotation speed, vibration may increase, which is very dangerous because the product may be damaged or fly apart.
Be sure to use the product at a speed equal to or less than the max. rotation speed. Even if the product is used at a speed equal to or less than the max. rotation speed, vibration may increase if the mounting error is large.

⚠Danger ● If a reverse load (a force to rotate the output shaft) is to be applied to Zero-Max from the machine side, do not use Zero-Max.

Since a one-way clutch is used inside, the one-way clutch may slip, resulting in overrun if a reverse load is applied from the machine side.

⚠Danger ● Mount and use the product within the "allowable tolerance" specified by us.

If the product is used while exceeding the "allowable tolerance" specified by us, the product itself may be damaged and the equipment may be adversely affected.
Be sure to operate the equipment within the "allowable tolerance" specified by us.

⚠Caution ● Do not use a torque greater than the specified transmission torque.

If you use a torque greater than the specified transmission torque of the product (which may be indicated as rated torque, maximum torque, or nominal torque depending on the product), the product itself may be damaged and the equipment may be adversely affected.
Never use a torque greater than the specified transmission torque.

⚠Caution ● Do not perform variable speed operation when the variable speed pulley is stopped.

If variable speed operation is performed when the variable speed pulley is stopped, an excessive load will be applied to the belt, pulley, and bearings of the product, causing a failure of the equipment.

⚠Caution ● Touching the product in operation may cause a burn injury.

The surface temperature of the product may rise to approximately 90 ℃ to 100 ℃ due to the heat generated by slipping and the internal coil. Never touch the product in operation with your hand or fingers as doing so may result in a burn or other injury.
The temperature does not fall quickly after stopping operation. Before touching the product for disassembly or inspection, confirm that the temperature has fallen.

⚠Caution **● Touching the product when the power is on may cause a burn injury.**

If the power is on, the surface temperature of the main unit will increase due to the heat generated by the coil.
Note that touching the product may cause a burn injury.

⚠Caution **● Touching the product in operation may cause a burn injury.**

The surface of the motor, reducer, and Zero-Max may become very hot in continuous operation. Be careful when you touch the surface during or immediately after operation.

⚠Caution **● If you notice unusual noise or vibration, immediately stop operation.**

If unusual noise or vibration occurs during operation, there is the possibility of a mounting failure of the product. Leaving the failure as is may damage not only the product but also the equipment itself. Even if the noise or vibration is not caused by a mounting failure of the product, the bolts and screws may come loose. Immediately stop operation and perform inspection.

⚠Caution **● Never use the equipment while the joint is slipping.**

If the product is used while the joint is slipping, the product itself may generate heat or be damaged, and the equipment may be adversely affected.
Never use the equipment while the joint is slipping.

⚠Caution **● Ensure the voltage fluctuation is within ± 10 % . Ensure the voltage fluctuation of the model 546 (tooth clutch) is within −10% to +5%.**

Applying different voltages may deteriorate the performance or cause problems such as burnout.

6. Precautions during Maintenance and Inspection

⚠Danger **● Do not apply (insert) water or oil to the product.**

If water or oil are used on the friction surface or main unit and they stick to the friction surface, the torque will decrease significantly.
As a result, the machine may run by inertia or go out of control, resulting in injury.

⚠Danger **● Never switch on the power of the equipment.**

It is very dangerous if the driving section is accidentally activated during maintenance and inspection, because you may be caught in the equipment. Be sure to check that the main power of the equipment is off before carrying out work.

⚠Caution **● Never disassemble the product.**

We will not be liable for any damage caused by the repair, disassembly, or modification carried out by a third party other than us or a third party designated by us.
Accordingly, we ask you to use the service network designated by us when you must repair or disassemble your product even if the disassembly and repair procedures are described in the instruction manual.

⚠Caution **● Do not touch the product with your hand immediately after operation.**

The surface of Zero-Max may be extremely hot immediately after operation. Do not touch Zero-Max immediately after operation as doing so may result in a burn or other injury.

7. Precautions for Disposal

⚠Danger **● Do not leave the product in a place where small children have access.**

Leaving it as is may cause unexpected injury or accident. Parts disassembled for disposal also may cause injury or accident, so dispose of them as soon as possible.

⚠Caution **● Ask a professional company for disposal to ensure the environment is not adversely affected.**

If the product is to be disposed of, ask a professional company for disposal. If disassembled parts, accessories, or oil are to be disposed of before asking a professional company for disposal, dispose of them according to the laws and local regulations.

The safety precautions and the specifications in the instruction manual are subject to change without notice.
If you have any problems or questions regarding these precautions, please contact Miki Pulley.

TECHNICAL DOCUMENTS

CONTENTS

International System of Units (SI)

SI Base Unit

Quantity	Base unit		Definition
	Name	Symbol	
Length	metre	m	Length of the path traveled by light in vacuum during a time interval of 1/299 792 458 of a second.
Mass	kilogram	kg	Mass of the international kilogram prototype (a cylinder made of an alloy of 90% platinum and 10% iridium with a diameter and height of 39 mm).
Time	second	s	Duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels (F=4/M=0 and F=3/M=0) of the ground state of the cesium 133 atom.
Current	ampere	A	Electric current that, when flowing in straight parallel wires of infinite length and negligible cross section, separated by a distance of one meter in free space, produces a force between the wires of 2 × 10^{-7} newtons per meter of length.
Thermodynamic temperature	kelvin	K	1/273.16 of the thermodynamic temperature of the triple point of water. The temperature interval unit is also kelvin.
Amount of substance	mole	mol	Amount of substance of a system that contains as many elementary entities as there are atoms in 0.012 kg of carbon-12. When the mole is used, the elementary entities must be specified and may be atoms, molecules, ions, electrons, other particles, or specified groups of such particles.
Luminous intensity	candela	cd	Luminous intensity in a given direction of a source emitting monochromatic radiation of frequency 540 x 10^{12} Hz and the radiant intensity of which in that direction is 1/683 watt per steradian.

Consistent Derived SI Units with Special Names and Symbols

Quantity	Name	Symbol	Other SI unit equivalent	SI base unit equivalent
Plane angle	radian	rad	1	m/m
Solid angle	steradian	sr	1	m^2/m^2
Frequency	hertz	Hz		s^{-1}
Force	newton	N		$m \cdot kg \cdot s^{-2}$
Pressure, stress	pascal	Pa	N/m^2	$m^{-1} \cdot kg \cdot s^{-2}$
Energy, work, heat	joule	J	N • m	$m^2 \cdot kg \cdot s^{-2}$
Power, radiant flux	watt	W	J/s	$m^2 \cdot kg \cdot s^{-3}$
Electric charge, quantity of electricity	coulomb	C		s • A
Electrical potential difference (voltage), electromotive force	volt	V	W/A	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-1}$
Capacitance	farad	F	C/V	$m^{-2} \cdot kg^{-1} \cdot s^4 \cdot A^2$
Electrical resistance	ohm	Ω	V/A	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-2}$
Conductance	siemens	S	A/V	$m^{-2} \cdot kg^{-1} \cdot s^3 \cdot A^2$
Magnetic flux	weber	Wb	V • s	$m^2 \cdot kg \cdot s^{-2} \cdot A^{-1}$
Magnetic flux density	tesla	T	Wb/m^2	$kg \cdot s^{-2} \cdot A^{-1}$
Inductance	henry	H	Wb/A	$m^2 \cdot kg \cdot s^{-2} \cdot A^{-2}$
Celsius temperature	degree Celsius	℃	K	
Luminous flux	lumen	lm	cd • sr	$cd \cdot m^2/m^2=cd$
Illuminance	lux	lx	lm/m^2	$m^{-2} \cdot cd$
Radioactivity of radionuclides	becquerel	Bq		s^{-1}
Absorbed dose, specific energy distribution, kerma	gray	Gy	J/kg	$m^2 \cdot s^{-2}$
Dose equivalent, ambient dose equivalent, directional dose equivalent, individual dose equivalent	sievert	Sv	J/kg	$m^2 \cdot s^{-2}$
Enzymatic activity	katal	kat		$s^{-1} \cdot mol$

SI Prefixes

Multiplier	Name	Symbol	Decimal notation	Multiplier	Name	Symbol	Decimal notation
10^1	deca	da	10	10^{-1}	deci	d	0.1
10^2	hecto	h	100	10^{-2}	centi	c	0.01
10^3	kilo	k	1000	10^{-3}	milli	m	0.001
10^6	mega	M	1000 000	10^{-6}	micro	μ	0.000 001
10^9	giga	G	1000 000 000	10^{-9}	nano	n	0.000 000 001
10^{12}	tera	T	1000 000 000 000	10^{-12}	pico	p	0.000 000 000 001
10^{15}	peta	P	1000 000 000 000 000	10^{-15}	femto	f	0.000 000 000 000 001
10^{18}	exa	E	1000 000 000 000 000 000	10^{-18}	atto	a	0.000 000 000 000 000 001
10^{21}	zetta	Z	1000 000 000 000 000 000 000	10^{-21}	zepto	z	0.000 000 000 000 000 000 001
10^{24}	yotta	Y	1000 000 000 000 000 000 000 000	10^{-24}	yocto	y	0.000 000 000 000 000 000 000 001

Main SI Unit Conversion Factors

■ Force

N	dyn	kgf
1	1 × 10^{5}	1.019 72 × 10^{-1}
1 × 10^{-5}	1	1.019 72 × 10^{-6}
9.806 65	9.806 65 × 10^{5}	1

■ Stress

Pa or N/m^{2}	Pa or N/m^{2}	kgf/mm^{2}	kgf/cm^{2}
1	1 × 10^{-6}	1.019 72 × 10^{-7}	1.019 72 × 10^{-5}
1 × 10^{6}	1	1.019 72 × 10^{-1}	1.019 72 × 10
9.806 65 × 10^{6}	9.806 65	1	1 × 10^{2}
9.806 65 × 10^{4}	9.806 65 × 10^{-2}	1 × 10^{-2}	1

*1Pa = 1N/m^{2}, 1MPa = 1N/mm^{2}

■ Pressure

Pa	kPa	MPa	bar	kgf/cm^{2}	atm	mmH$_2$O	mmHg or Torr
1	1 × 10^{-3}	1 × 10^{-6}	1 × 10^{-5}	1.019 72 × 10^{-5}	9.869 23 × 10-6	1.019 72 × 10^{-1}	7.500 62 × 10^{-3}
1 × 10^{3}	1	1 × 10^{-3}	1 × 10^{-2}	1.019 72 × 10^{-2}	9.869 23 × 10^{-3}	1.019 72 × 10^{2}	7.500 62
1 × 10^{6}	1 × 10^{3}	1	1 × 10	1.019 72 × 10	9.869 23	1.019 72 × 10^{5}	7.500 62 × 10^{3}
1 × 10^{5}	1 × 10^{2}	1 × 10^{-1}	1	1.019 72	9.869 23 × 10^{-1}	1.019 72 × 10^{4}	7.500 62 × 10^{2}
9.806 65 × 10^{4}	9.806 65 × 10	9.806 65 × 10^{-2}	9.806 65 × 10^{-1}	1	9.678 41 × 10^{-1}	1 × 10^{4}	7.355 59 × 10^{2}
1.013 25 × 10^{5}	1.013 25 × 10^{2}	1.013 25 × 10^{-1}	1.013 25	1.033 23	1	1.033 23 × 10^{4}	7.600 00 × 10^{2}
9.806 65	9.806 65 × 10^{-3}	9.806 65 × 10^{-6}	9.806 65 × 10^{-5}	1 × 10^{-4}	9.678 41 × 10^{-5}	1	7.355 59 × 10^{-2}
1.333 22 × 10^{2}	1.333 22 × 10^{-1}	1.333 22 × 10^{-4}	1.333 22 × 10^{-3}	1.359 51 × 10^{-3}	1.315 79 × 10^{-3}	1.359 51 × 10	1

*1Pa = 1N/m^{2}

■ Energy, Work, Heat

J	kW • h	kgf • m	kcal
1	2.777 78 × 10^{-7}	1.019 72 × 10^{-1}	2.388 89 × 10^{-4}
3.600 × 10^{6}	1	3.670 98 × 10^{5}	8.600 0 × 10^{2}
9.806 65	2.724 07 × 10^{-6}	1	2.342 70 × 10^{-3}
4.186 05 × 10^{3}	1.162 79 × 10^{-3}	4.268 58 × 10^{2}	1

*1J = 1W • s, 1J = 1N • m

■ Power, Heat Flow

W	kgf • m/s	PS	kcal/h
1	1.019 72 × 10^{-1}	1.359 62 × 10^{-3}	8.600 0 × 10^{-1}
9.806 65	1	1.333 33 × 10^{-2}	8.433 71
7.355 × 10^{2}	7.5 × 10	1	6.325 29 × 10^{2}
1.162 79	1.185 72 × 10^{-1}	1.580 95 × 10^{-3}	1

*1W = 1J/s, PS: French horse power

■ Viscosity

Pa • s	cP	P
1	1 × 10^{3}	1 × 10
1 × 10^{-3}	1	1 × 10^{-2}
1 × 10^{-1}	1 × 10^{2}	1

*1P = 1dyn • s/cm^{2} = 1g/cm • s, 1Pa • s = 1N • s/m^{2}, 1cP = 1mPa • s

■ Kinematic Viscosity

m^{2}/s	cSt	St
1	1 × 10^{6}	1 × 10^{4}
1 × 10^{-6}	1	1 × 10^{-2}
1 × 10^{-4}	1 × 10^{2}	1

*1St = 1cm^{2}/s, 1cSt = 1mm^{2}/s

■ Thermal Conductivity

W/ (m • k)	kcal/ (h • m • ℃)
1	8.600 0 × 10^{-1}
1.162 79	1

■ Heat Transfer Coefficient

W (m^{2} • K)	kcal/ (h • m^{2} • ℃)
1	8.600 0 × 10^{-1}
1.162 79	1

■ Specific Heat

J/ (kg • K)	kcal/ (kg • ℃) cal/ (g • ℃)
1	2.388 89 × 10^{-4}
4.186 05 × 10^{3}	1

General Tolerances（Excerpt from JIS B 0405-1991/JIS B 0419-1991）

Tolerance for the Lengths Excluding the Chamfer Portions

Unit [mm]

Tolerance class		Standard size classification							
Symbol	Description	0.5 or more 3 or below	Over 3 6 or below	Over 6 30 or below	Over 30 120 or below	Over 120 400 or below	Over 400 1000 or below	Over 1000 2000 or below	Over 2000 4000 or below
		Tolerance							
f	Fine	± 0.05	± 0.05	± 0.1	± 0.15	± 0.2	± 0.3	± 0.5	–
m	Medium	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2
c	Coarse	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2	± 3	± 4
v	Very coarse	–	± 0.5	± 1	± 1.5	± 2.5	± 4	± 6	± 8

* For standard sizes of 0.5 mm or less, the individual tolerance is added to the respective standard size.

Tolerance for Lengths of Chamfer Portions (Corner Roundness and Corner Chamfer Sizes)

Unit [mm]

Tolerance class		Standard size classification		
Symbol	Description	0.5 or more 3 or below	Over 3 6 or below	Over 6
		Tolerance		
f	Fine	± 0.2	± 0.5	± 1
m	Medium			
c	Coarse	± 0.4	± 1	± 2
v	Very coarse			

* For standard sizes of 0.5 mm or less, the individual tolerance is added to the respective standard size.

Tolerance for the Angular Sizes

Tolerance class		Category of target angle's shorter side length (mm)				
Symbol	Description	10 or below	Over 10 50 or below	Over 50 120 or below	Over 120 400 or below	Over 400
		Tolerance				
f	Fine	± 1°	± 30′	± 20′	± 10′	± 5′
m	Medium					
c	Coarse	± 1° 30′	± 1°	± 30′	± 15′	± 10′
v	Very coarse	± 3°	± 2°	± 1°	± 30′	± 20′

General Tolerance of Straightness and Flatness

Unit [mm]

Tolerance class	Nominal length category					
	10 or below	Over 10 30 or below	Over 30 100 or below	Over 100 300 or below	Over 300 1000 or below	Over 1000 3000 or below
	Straightness tolerance and flatness tolerance					
H	0.02	0.05	0.1	0.2	0.3	0.4
K	0.05	0.1	0.2	0.4	0.6	0.8
L	0.1	0.2	0.4	0.8	1.2	1.6

General Tolerance of Straightness and Flatness

Unit [mm]

Tolerance class	Nominal short side length classification			
	100 or below	Over 100 300 or below	Over 300 1000 or below	Over 1000 3000 or below
	Straightness tolerance			
H	0.2	0.3	0.4	0.5
K	0.4	0.6	0.8	1
L	0.6	1	1.5	2

General Tolerance of Symmetry

Unit [mm]

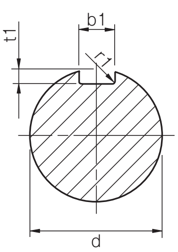
Tolerance class	Nominal length classification			
	100 or below	Over 100 300 or below	Over 300 1000 or below	Over 1000 3000 or below
	Symmetry tolerance			
H	0.5			
K	0.5		0.8	1
L	0.6	1	1.5	2

General Tolerance of Circumferential Deflection

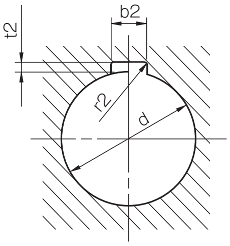
Unit [mm]

Tolerance class	Circumferential deflection tolerance
H	0.1
K	0.2
L	0.5

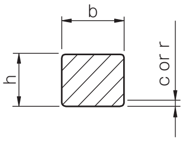
Parallel Key and Keyway Sizes and Tolerances



Cross section of the shaft



Cross section of the bore



Cross section of the key

JIS (Excerpt from JIS B 1301-1996)

Unit [mm]

Nominal key size b × h	Applied shaft diameter d	Key size						Keyway size							
		b		h			c or r	Standard size of b1 and b2	Tightening type	Normal type		r1 and r2	t1		t2	
		Standard size	Tolerance (h9)	Standard size	Tolerance				b1/b2 tolerance (P9)	b1 tolerance (N9)	b2 tolerance (Js9)		Standard size	Tolerance	Standard size	Tolerance
2 × 2	6 ～ 8	2	0 − 0.025	2	0 − 0.025	h9	0.16 ≀ 0.25	2	− 0.006 − 0.031	− 0.004 − 0.029	± 0.0125	0.08 ≀ 0.16	1.2	＋0.1 0	1.0	＋0.1 0
3 × 3	8 ～ 10	3		3				3					1.8		1.4	
4 × 4	10 ～ 12	4	0 − 0.030	4	0 − 0.030			4	− 0.012 − 0.042	0 − 0.030	± 0.0150		2.5		1.8	
5 × 5	12 ～ 17	5		5			0.25 ≀ 0.40	5				0.16 ≀ 0.25	3.0		2.3	
6 × 6	17 ～ 22	6		6				6					3.5		2.8	
8 × 7	22 ～ 30	8	0 − 0.036	7	0 − 0.090	h11		8	− 0.015 − 0.051	0 − 0.036	± 0.0180		4.0	＋0.2 0	3.3	＋0.2 0
10 × 8	30 ～ 38	10		8			0.40 ≀ 0.60	10				0.25 ≀ 0.40	5.0		3.3	
12 × 8	38 ～ 44	12	0 − 0.043	8				12	− 0.018 − 0.061	0 − 0.043	± 0.0215		5.0		3.3	
14 × 9	44 ～ 50	14		9				14					5.5		3.8	
16 × 10	50 ～ 58	16		10				16					6.0		4.3	
18 × 11	58 ～ 65	18		11	0 − 0.110			18					7.0		4.4	
20 × 12	65 ～ 75	20	0 − 0.052	12			0.60 ≀ 0.80	20	− 0.022 − 0.074	0 − 0.052	± 0.0260	0.40 ≀ 0.60	7.5		4.9	
22 × 14	75 ～ 85	22		14				22					9.0		5.4	
25 × 14	85 ～ 95	25		14				25					9.0		5.4	
28 × 16	95 ～ 110	28		16				28					10.0		6.4	
32 × 18	110 ～ 130	32	0 − 0.062	18				32	− 0.026 − 0.088	0 − 0.062	± 0.0310		11.0		7.4	

Old JIS Class 1 (Excerpt from JIS B 1301-1959)

Unit [mm]

Nominal key size b × h	Applied Shaft diameter d	Key size					Keyway size							
		b		h		c or r					t1		t2	
		Standard size	Tolerance (p7)	Standard size	Tolerance (h9)		Standard size of b1 and b2	b1 tolerance (H8)	b2 tolerance (F7)	r1 and r2	Standard size	Tolerance	Standard size	Tolerance
4 × 4	10 or more and 13 or below	4	＋0.024 ＋0.012	4	0 − 0.030	0.5	4	＋0.018 0	＋0.022 ＋0.010	0.4	2.5	＋0.05 0	1.5	＋0.05 0
5 × 5	Over 13 and 20 or below	5		5			5				3		2	
7 × 7	Over 20 and 30 or below	7	＋0.030 ＋0.015	7	0 − 0.036		7	＋0.022 0	＋0.028 ＋0.013		4		3	
10 × 8	Over 30 and 40 or below	10		8		0.8	10			0.6	4.5		3.5	
12 × 8	Over 40 and 50 or below	12	＋0.036 ＋0.018	8			12	＋0.027 0	＋0.034 ＋0.016		4.5		3.5	
15 × 10	Over 50 and 60 or below	15		10			15				5		5	
18 × 12	Over 60 and 70 or below	18		12	0 − 0.043	1.2	18			1.0	6		6	
20 × 13	Over 70 and 80 or below	20	＋0.043 ＋0.022	13			20	＋0.033 0	＋0.041 ＋0.020		7		6	
24 × 16	Over 80 and 95 or below	24		16			24				8		8	
28 × 18	Over 95 and 110 or below	28		18			28				9		9	
32 × 20	Over 110 and 125 or below	32	＋0.051 ＋0.026	20	0 − 0.052	2	32	＋0.039 0	＋0.050 ＋0.025	1.6	10		10	

Old JIS Class 2 (Excerpt from JIS B 1301-1959)

Unit [mm]

Nominal key size b × h	Applied shaft diameter d	Key size					Keyway size							
		b		h		c or r					t1		t2	
		Standard size	Tolerance (h8)	Standard size	Tolerance (h10)		Standard size of b1 and b2	b1 tolerance (H9)	b2 tolerance (E9)	r1 and r2	Standard size	Tolerance	Standard size	Tolerance
4 × 4	10 or more and 13 or below	4	0 − 0.018	4	0 − 0.048	0.5	4	＋0.030 0	＋0.050 ＋0.020	0.4	2.5	＋0.1 0	1.5	＋0.1 0
5 × 5	Over 13 and 20 or below	5		5			5				3		2	
7 × 7	Over 20 and 30 or below	7	0 − 0.022	7	0 − 0.058		7	＋0.036 0	＋0.061 ＋0.025		4		3	
10 × 8	Over 30 and 40 or below	10		8		0.8	10			0.6	4.5		3.5	
12 × 8	Over 40 and 50 or below	12	0 − 0.027	8			12	＋0.043 0	＋0.075 ＋0.032		4.5		3.5	
15 × 10	Over 50 and 60 or below	15		10			15				5		5	
18 × 12	Over 60 and 70 or below	18		12	0 − 0.070	1.2	18			1.0	6		6	
20 × 13	Over 70 and 80 or below	20	0 − 0.033	13			20	＋0.052 0	＋0.092 ＋0.040		7		6	
24 × 16	Over 80 and 95 or below	24		16			24				8		8	
28 × 18	Over 95 and 110 or below	28		18			28				9		9	
32 × 20	Over 110 and 125 or below	32	0 − 0.039	20	0 − 0.084	2	32	＋0.062 0	＋0.112 ＋0.050	1.6	10		10	

MIKI PULLEY Coupling Standard Hole Drilling Standards

These standard hole drilling standards apply to the 6 mm to 65 mm hole drilling for SERVOFLEX (excluding SFC), SPRFLEX, BAUMANNFLEX (excluding ZG and LM), and CENTAFLEX. However, if other standard hole drilling standards are available for each model, those standards are given priority and may not match these standards.

Hole Drilling Tolerances for the Mating Shaft Tolerances

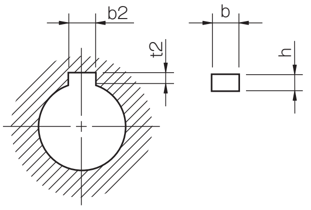
Unless otherwise specified, a hole is drilled with a tolerance of H7. However, H8 is used for holes with a diameter of 10 mm or less. The following shows the recommended hole tolerances for the shaft tolerances. With the exception of H7, the tolerance must be determined through discussion. Surface finishing is not performed for the additional drilled hole based on the prepared hole. If surface finishing is required for the additional drilled hole, please contact Miki Pulley.

Shaft tolerance	Recommended hole tolerance
h6 ~ h9	H7
j6	G7
k6	F7
m6	F7

* j6, k6, and m6 are used for new standard motor shafts.

Keyway Sizes for Hole Diameters (Table Below)

Unless otherwise specified, a hole is drilled according to the old JIS (class 2) standards.
Keyway is not made for holes of less than 12 mm.



Old JIS (Class 2) Standards

Unit [mm]

Hole diameter	b2		t2		Key size b × h
	Standard size	Tolerance (E9)	Standard size	Tolerance	
12 or more and 13 or below	4	+0.050 +0.020	1.5	+0.3 0	4× 4
Over 13 and 20 or below	5		2.0		5× 5
Over 20 and 30 or below	7	+0.061 +0.025	3.0	+0.3 0	7× 7
Over 30 and 40 or below	10		3.5		10× 8
Over 40 and 50 or below	12	+0.075 +0.032			12× 8
Over 50 and 60 or below	15		5.0		15× 10
Over 60 and 65 or below	18		6.0		18× 12

New JIS Standards

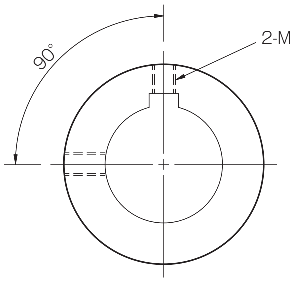
Unit [mm]

Bore diameter	b2		t2		Key size b × h
	Standard size	Tolerance (H9)	Standard size	Tolerance	
12	4	+0.030 0	1.8	+0.3 0	4× 4
Over 12 and 17 or below	5		2.3		5× 5
Over 17 and 22 or below	6		2.8		6× 6
Over 22 and 30 or below	8	+0.036 0	3.3	+0.3 0	8× 7
Over 30 and 38 or below	10				10× 8
Over 38 and 44 or below	12	+0.043 0			12× 8
Over 44 and 50 or below	14		3.8		14× 9
Over 50 and 58 or below	16		4.3		16× 10
Over 58 and 65 or below	18		4.4		18× 11

Nominal Set Screw Diameters for Keyways

Keyway standard size b2	Nominal set screw diameter
4	M4
5	M4
6	M5
7	M6
8	M6
10	M8
12	M8
14	M10
15	M10
16	M10
18	M10

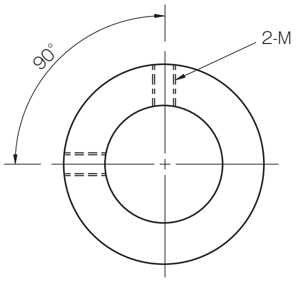
* Unless otherwise specified, the set screw position is 90° at two points.
* The set screw position varies depending on the applied product. For details, refer to the standard hole drilling standards of each product.



Nominal Set Screw Diameter for Hole Diameter (without Keyway)

Bore diameter	Nominal set screw diameter
6 or more and under 12	M4

* Unless otherwise specified, the set screw position is 90° at two points.
* The set screw position varies depending on the applied product. For details, refer to the standard hole drilling standards of each product.



MIKI PULLEY Clutch and Brake Standard Hole Drilling Standards

These standard hole drilling standards apply to the 6 mm to 85 mm hole drilling for electromagnetic-activated clutches and brakes (excluding CYT, CSZ, and BSZ) and spring-activated brakes (excluding BXW). However, if the standard clutches and brakes come with holes, they may not match these standards.

Hole Drilling Tolerances for the Mating Shaft Tolerances

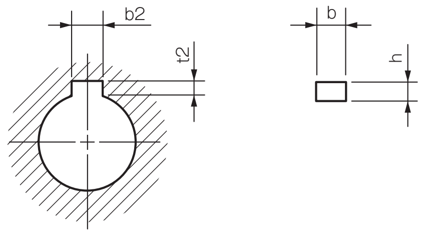
Unless otherwise specified, a hole is drilled with a tolerance of H7. However, H8 is used for the hole diameters of 10 mm or less of spring-activated brakes. With the exception of tolerance grade H7, the tolerance is determined through discussion. Surface finishing is not performed for the additional drilled hole based on the prepared hole. If surface finishing is required for the additional drilled hole, please contact Miki Pulley.

The following shows the shaft tolerances under various load conditions.

Load condition	Shaft tolerance	Remark
Shaft with ø10 or below	h6 h7	h5 if accuracy is required
Light and normal load and variable load	h6 js6 js7 j6 j7	h6 for motor shaft j6 for clutch and brake unit
Heavy load and impact load	K6 K7 m6	

* Keyway is not made for drilling holes of less than 10 mm.

Keyway Sizes for Hole Diameters (Table Below)



In Compliance with the Old JIS Standards (Class 2)

Unit [mm]

Hole diameter	b2		t2		Key size b × h
	Standard size	Tolerance (E9)	Standard size	Tolerance	
10 or more and 13 or below	4	+ 0.05 + 0.02	1.5	+ 0.5 0	4 × 4
Over 13 and 20 or below	5		2.0		5 × 5
Over 20 and 30 or below	7	+ 0.061 + 0.025	3.0		7 × 7
Over 30 and 40 or below	10		3.5		10 × 8
Over 40 and 50 or below	12	+ 0.075 + 0.032			12 × 8
Over 50 and 60 or below	15		5.0		15 × 10
Over 60 and 70 or below	18		6.0		18 × 12
Over 70 and 80 or below	20	+ 0.092 + 0.040			20 × 13

* The recommended key standards are the old JIS class 1 (width tolerance P7).

Models Compliant with the New JIS Standards

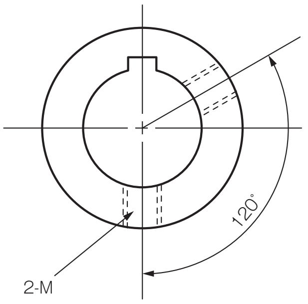
Unit [mm]

Hole diameter	b2		t2		Key size b × h
	Standard size	Tolerance (P9)	Standard size	Tolerance	
6 or more and 8 or below	2	− 0.006 − 0.031	0.8	+ 0.3 0	2 × 2
Over 8 and 10 or below	3		1.2		3 × 3
Over 10 and 12 or below	4	− 0.012 − 0.042	1.5	+ 0.5 0	4 × 4
Over 12 and 17 or below	5		2.0		5 × 5
Over 17 and 22 or below	6		2.5		6 × 6
Over 22 and 30 or below	8	− 0.015 − 0.051	3.0		8 × 7
Over 30 and 38 or below	10				10 × 8
Over 38 and 44 or below	12	− 0.018 − 0.061			12 × 8
Over 44 and 50 or below	14		3.5		14 × 9
Over 50 and 58 or below	16		4.0		16 × 10
Over 58 and 65 or below	18				18 × 11
Over 65 and 75 or below	20	− 0.022 − 0.074	4.5		20 × 12
Over 75 and 85 or below	22		5.0		22 × 14

* The recommended key standards are the new JIS ones (width tolerance h9).

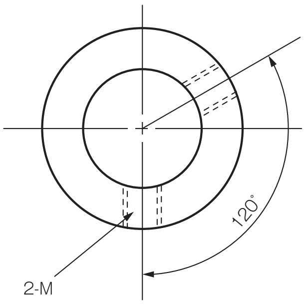
Nominal Set Screw Diameters for Keyways

Keyway standard size b_2	Nominal set screw diameter
4	M4
5	M4
6	M5
7	M6
8	M6
10	M8
12	M8
14	M10
15	M10
16	M10, M12
18	M12, M16
20	M16
22	M16



Nominal Set Screw Diameter for Hole Diameter (without Keyway)

Hole diameter	Nominal set screw diameter
6 or more and under 10	M3



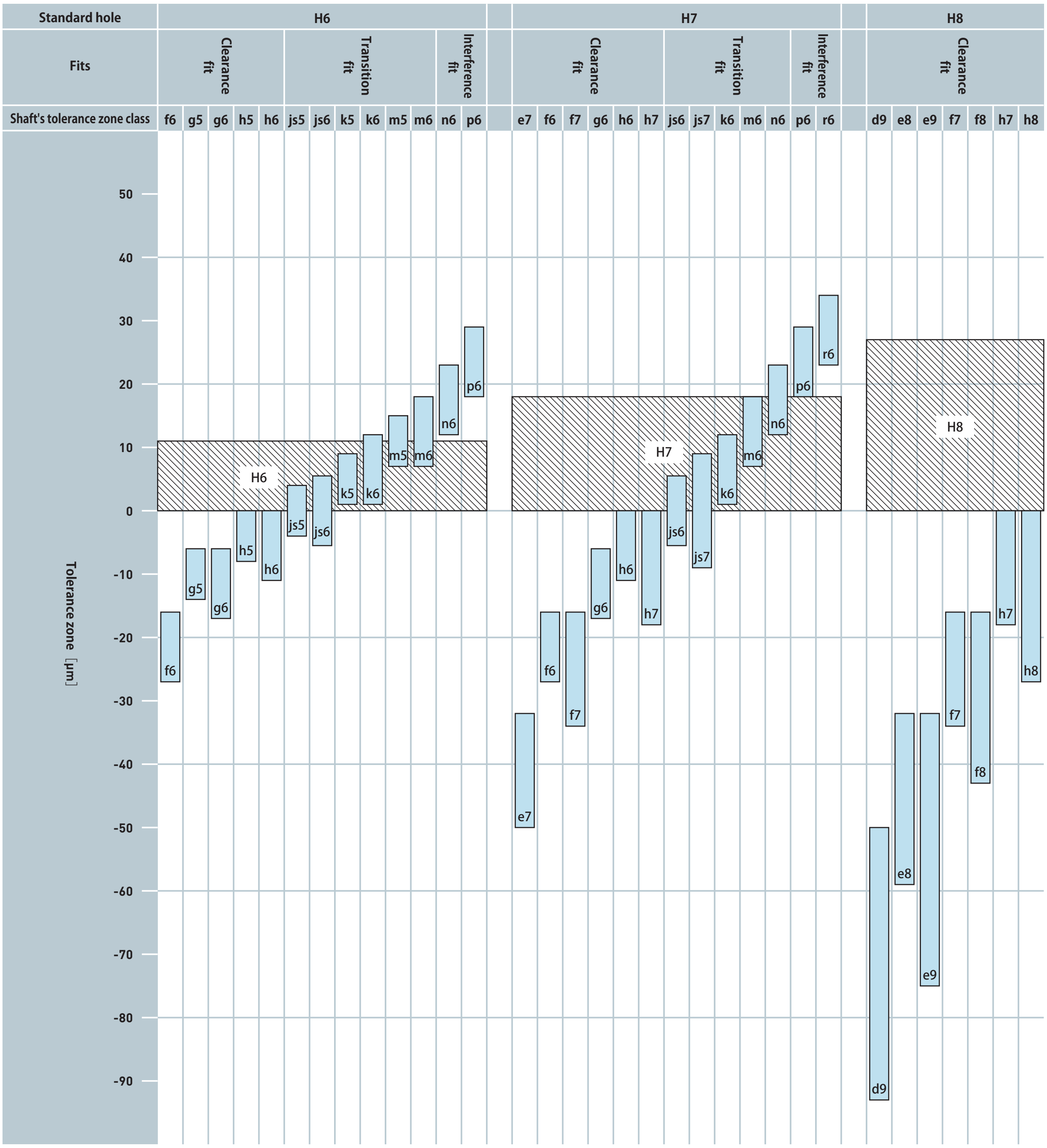
Frequently Used Fits

Frequently Used Hole Standard Fits Table

Standard hole	Shaft's tolerance zone class																
	Clearance fit							Transition fit			Interference fit						
H6						g5	h5	js5	k5	m5							
					f6	g6	h6	js6	k6	m6	m6 *	p6 *					
H7					f6	g6	h6	js6	k6	m6	m6	p6 *	r6 *	s6	t6	u6	x6
				e7	f7		h7	js7									
H8					f7		h7										
				e8	f8		h8										
			d9	e9													
H9			d8	e8			h8										
		c9	d9	e9			h9										
H10	b9	c9	d9														

* There is an exception for the fits marked by * depending on the size classification.

Illustration of Frequently Used Hole Standard Fits (Larger than 10-mm Standard Size and Lower than 18 mm)

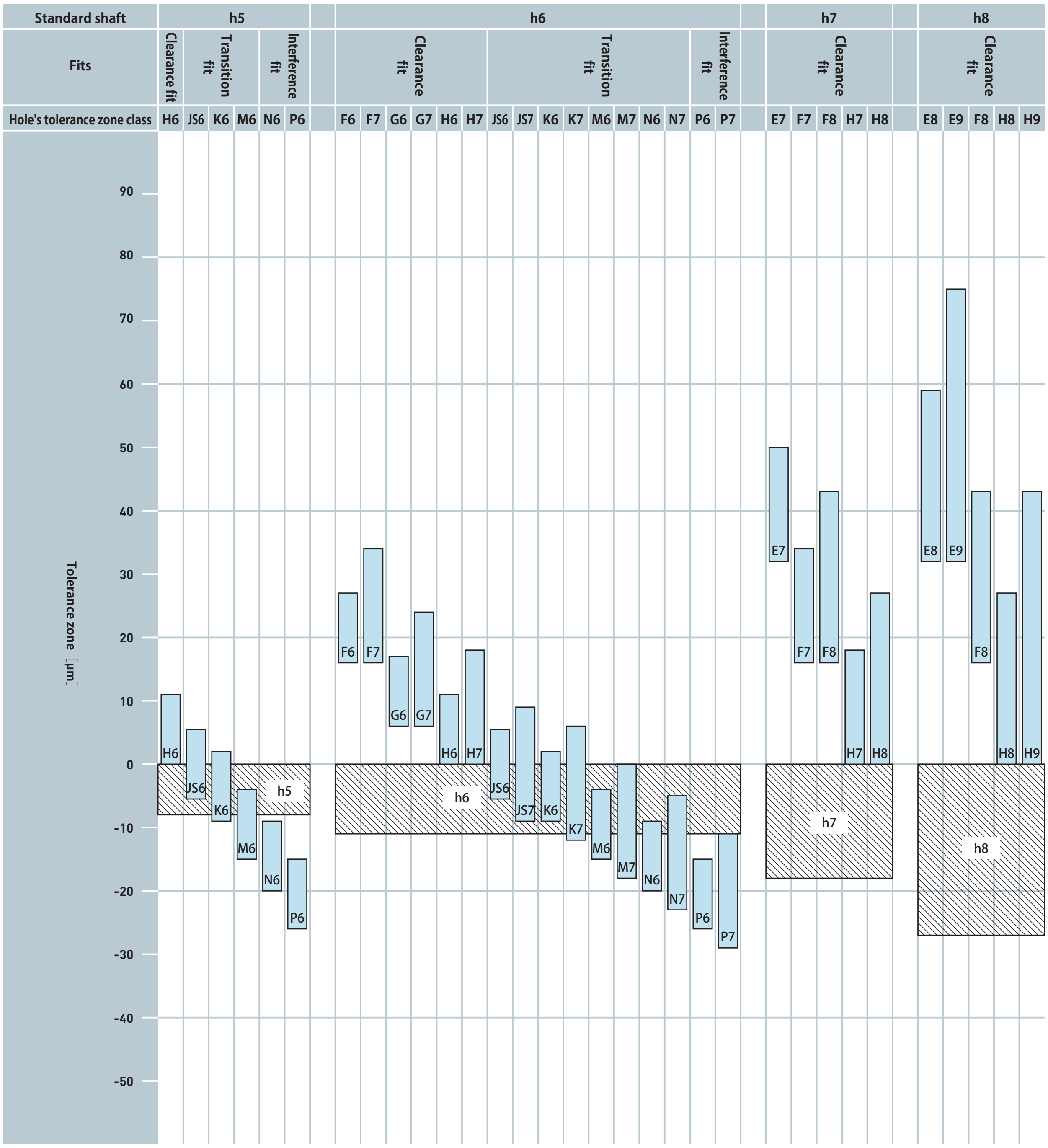


Frequently Used Shaft Standard Fits Table

Standard shaft	Hole's tolerance zone class																
	Clearance fit							Transition fit			Interference fit						
h5							H6	JS6	K6	M6	N6 *	P6					
h6					F6	G6	H6	JS6	K6	M6	N6	P6 *					
					F6	G6	H7	JS7	K7	M7	N7	P7 *	R7	S7	T7	U7	X7
h7				E7	F7		H7										
					F8		H8										
h8			D8	E8	F8		H8										
			D9	E9			H9										
h9			D8	E8			H8										
		C9	D9	E9			H9										
	B10	C10	D10														

* There is an exception for the fits marked by * depending on the size classification.

Illustration of Frequently Used Shaft Standard Fits (Larger than 10-mm Standard Size and Lower than 18 mm)



Shaft Dimensional Tolerances (Excerpt from JIS B 0401)

Size classification [mm]		d		e			f			g		h				
Over	Equal to or lower than	d8	d9	e7	e8	e9	f6	f7	f8	g5	g6	h5	h6	h7	h8	h9
3	6	− 30 − 48	− 30 − 60	− 20 − 32	− 20 − 38	− 20 − 50	− 10 − 18	− 10 − 22	− 10 − 28	− 4 − 9	− 4 − 12	0 − 5	0 − 8	0 − 12	0 − 18	0 − 30
6	10	− 40 − 62	− 40 − 76	− 25 − 40	− 25 − 47	− 25 − 61	− 13 − 22	− 13 − 28	− 13 − 35	− 5 − 11	− 5 − 14	0 − 6	0 − 9	0 − 15	0 − 22	0 − 36
10	14	− 50 − 77	− 50 − 93	− 32 − 50	− 32 − 59	− 32 − 75	− 16 − 27	− 16 − 34	− 16 − 43	− 6 − 14	− 6 − 17	0 − 8	0 − 11	0 − 18	0 − 27	0 − 43
14	18															
18	24	− 65 − 98	− 65 − 117	− 40 − 61	− 40 − 73	− 40 − 92	− 20 − 33	− 20 − 41	− 20 − 53	− 7 − 16	− 7 − 20	0 − 9	0 − 13	0 − 21	0 − 33	0 − 52
24	30															
30	40	− 80 − 119	− 80 − 142	− 50 − 75	− 50 − 89	− 50 − 112	− 25 − 41	− 25 − 50	− 25 − 64	− 9 − 20	− 9 − 25	0 − 11	0 − 16	0 − 25	0 − 39	0 − 62
40	50															
50	65	− 100 − 146	− 100 − 174	− 60 − 90	− 60 − 106	− 60 − 134	− 30 − 49	− 30 − 60	− 30 − 76	− 10 − 23	− 10 − 29	0 − 13	0 − 19	0 − 30	0 − 46	0 − 74
65	80															
80	100	− 120 − 174	− 120 − 207	− 72 − 107	− 72 − 126	− 72 − 159	− 36 − 58	− 36 − 71	− 36 − 90	− 12 − 27	− 12 − 34	0 − 15	0 − 22	0 − 35	0 − 54	0 − 87
100	120															
120	140	− 145 − 208	− 145 − 245	− 85 − 125	− 85 − 148	− 85 − 185	− 43 − 68	− 43 − 83	− 43 − 106	− 14 − 32	− 14 − 39	0 − 18	0 − 25	0 − 40	0 − 63	0 − 100
140	160															
160	180															
180	200	− 170 − 242	− 170 − 285	− 100 − 146	− 100 − 172	− 100 − 215	− 50 − 79	− 50 − 96	− 50 − 122	− 15 − 35	− 15 − 44	0 − 20	0 − 29	0 − 46	0 − 72	0 − 115
200	225															
225	250															
250	280	− 190 − 271	− 190 − 320	− 110 − 162	− 110 − 191	− 110 − 240	− 56 − 88	− 56 − 108	− 56 − 137	− 17 − 40	− 17 − 49	0 − 23	0 − 32	0 − 52	0 − 81	0 − 130
280	315															
315	355	− 210 − 299	− 210 − 350	− 125 − 182	− 125 − 214	− 125 − 265	− 62 − 98	− 62 − 119	− 62 − 151	− 18 − 43	− 18 − 54	0 − 25	0 − 36	0 − 57	0 − 89	0 − 140
355	400															
400	450	− 230 − 327	− 230 − 385	− 135 − 198	− 135 − 232	− 135 − 290	− 68 − 108	− 68 − 131	− 68 − 165	− 20 − 47	− 20 − 60	0 − 27	0 − 40	0 − 63	0 − 97	0 − 155
450	500															

* The values in the upper row in the table below show the upper deviations and the values in the lower row show the lower deviations.

Unit [μ m]

js			j		k		m		n	p	r	Size classification [mm]	
js5	js6	js7	j5	j6	k5	k6	m5	m6	n6	p6	r6	Over	Equal to or lower than
± 2.5	± 4	± 6	+ 3 − 2	+ 6 − 2	+ 6 + 1	+ 9 + 1	+ 9 + 4	+ 12 + 4	+ 16 + 8	+ 20 + 12	+ 23 + 15	3	6
± 3	± 4.5	± 7.5	+ 4 − 2	+ 7 − 2	+ 7 + 1	+ 10 + 1	+ 12 + 6	+ 15 + 6	+ 19 + 10	+ 24 + 15	+ 28 + 19	6	10
± 4	± 5.5	± 9	+ 5 − 3	+ 8 − 3	+ 9 + 1	+ 12 + 1	+ 15 + 7	+ 18 + 7	+ 23 + 12	+ 29 + 18	+ 34 + 23	10	14
												14	18
± 4.5	± 6.5	± 10.5	+ 5 − 4	+ 9 − 4	+ 11 + 2	+ 15 + 2	+ 17 + 8	+ 21 + 8	+ 28 + 15	+ 35 + 22	+ 41 + 28	18	24
												24	30
± 5.5	± 8	± 12.5	+ 6 − 5	+ 11 − 5	+ 13 + 2	+ 18 + 2	+ 20 + 9	+ 25 + 9	+ 33 + 17	+ 42 + 26	+ 50 + 34	30	40
												40	50
± 6.5	± 9.5	± 15	+ 6 − 7	+ 12 − 7	+ 15 + 2	+ 21 + 2	+ 24 + 11	+ 30 + 11	+ 39 + 20	+ 51 + 32	+ 60 + 41	50	65
											+ 62 + 43	65	80
± 7.5	± 11.5	± 17.5	+ 6 − 9	+ 13 − 9	+ 18 + 3	+ 25 + 3	+ 28 + 13	+ 35 + 13	+ 45 + 23	+ 59 + 37	+ 73 + 51	80	100
											+ 76 + 54	100	120
± 9	± 12.5	± 20	+ 7 − 11	+ 14 − 11	+ 21 + 3	+ 28 + 3	+ 33 + 15	+ 40 + 15	+ 52 + 27	+ 68 + 43	+ 88 + 63	120	140
											+ 90 + 65	140	160
											+ 93 + 68	160	180
± 10	± 14.5	± 23	+ 7 − 13	+ 16 − 13	+ 24 + 4	+ 33 + 4	+ 37 + 17	+ 46 + 17	+ 60 + 31	+ 79 + 50	+ 106 + 77	180	200
											+ 109 + 80	200	225
											+ 113 + 84	225	250
± 11.5	± 16	± 26	+ 7 − 16	± 16	+ 27 + 4	+ 36 + 4	+ 43 + 20	+ 52 + 20	+ 66 + 34	+ 88 + 56	+ 126 + 94	250	280
											+ 130 + 98	280	315
± 12.5	± 18	± 28.5	+ 7 − 18	± 18	+ 29 + 4	+ 40 + 4	+ 46 + 21	+ 57 + 21	+ 73 + 37	+ 98 + 62	+ 144 + 108	315	355
											+ 150 + 114	355	400
± 13.5	± 20	± 31.5	+ 7 − 20	± 20	+ 32 + 5	+ 45 + 5	+ 50 + 23	+ 63 + 23	+ 80 + 40	+ 108 + 68	+ 166 + 126	400	450
											+ 172 + 132	450	500

Hole Dimensional Tolerances (Excerpt from JIS B 0401)

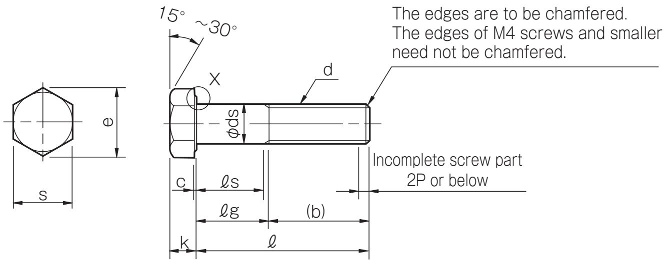
Size classification [mm]		E			F			G		H					
Over	Equal to or lower than	E7	E8	E9	F6	F7	F8	G6	G7	H5	H6	H7	H8	H9	H10
3	6	+ 32 + 20	+ 38 + 20	+ 50 + 20	+ 18 + 10	+ 22 + 10	+ 28 + 10	+ 12 + 4	+ 16 + 4	+ 5 0	+ 8 0	+ 12 0	+ 18 0	+ 30 0	+ 48 0
6	10	+ 40 + 25	+ 47 + 25	+ 61 + 25	+ 22 + 13	+ 28 + 13	+ 35 + 13	+ 14 + 5	+ 20 + 5	+ 6 0	+ 9 0	+ 15 0	+ 22 0	+ 36 0	+ 58 0
10	14	+ 50 + 32	+ 59 + 32	+ 75 + 32	+ 27 + 16	+ 34 + 16	+ 43 + 16	+ 17 + 6	+ 24 + 6	+ 8 0	+ 11 0	+ 18 0	+ 27 0	+ 43 0	+ 70 0
14	18														
18	24	+ 61 + 40	+ 73 + 40	+ 92 + 40	+ 33 + 20	+ 41 + 20	+ 53 + 20	+ 20 + 7	+ 28 + 7	+ 9 0	+ 13 0	+ 21 0	+ 33 0	+ 52 0	+ 84 0
24	30														
30	40	+ 75 + 50	+ 89 + 50	+ 112 + 50	+ 41 + 25	+ 50 + 25	+ 64 + 25	+ 25 + 9	+ 34 + 9	+ 11 0	+ 16 0	+ 25 0	+ 39 0	+ 62 0	+ 100 0
40	50														
50	65	+ 90 + 60	+ 106 + 60	+ 134 + 60	+ 49 + 30	+ 60 + 30	+ 76 + 30	+ 29 + 10	+ 40 + 10	+ 13 0	+ 19 0	+ 30 0	+ 46 0	+ 74 0	+ 120 0
65	80														
80	100	+ 107 + 72	+ 126 + 72	+ 159 + 72	+ 58 + 36	+ 71 + 36	+ 90 + 36	+ 34 + 12	+ 47 + 12	+ 15 0	+ 22 0	+ 35 0	+ 54 0	+ 87 0	+ 140 0
100	120														
120	140	+ 125 + 85	+ 148 + 85	+ 185 + 85	+ 68 + 43	+ 83 + 43	+ 106 + 43	+ 39 + 14	+ 54 + 14	+ 18 0	+ 25 0	+ 40 0	+ 63 0	+ 100 0	+ 160 0
140	160														
160	180														
180	200	+ 146 + 100	+ 172 + 100	+ 215 + 100	+ 79 + 50	+ 96 + 50	+ 122 + 50	+ 44 + 15	+ 61 + 15	+ 20 0	+ 29 0	+ 46 0	+ 72 0	+ 115 0	+ 185 0
200	225														
225	250														
250	280	+ 162 + 110	+ 191 + 110	+ 240 + 110	+ 88 + 56	+ 108 + 56	+ 137 + 56	+ 49 + 17	+ 69 + 17	+ 23 0	+ 32 0	+ 52 0	+ 81 0	+ 130 0	+ 210 0
280	315														
315	355	+ 182 + 125	+ 214 + 125	+ 265 + 125	+ 98 + 62	+ 119 + 62	+ 151 + 62	+ 54 + 18	+ 75 + 18	+ 25 0	+ 36 0	+ 57 0	+ 89 0	+ 140 0	+ 230 0
355	400														
400	450	+ 198 + 135	+ 232 + 135	+ 290 + 135	+ 108 + 68	+ 131 + 68	+ 165 + 68	+ 60 + 20	+ 83 + 20	+ 27 0	+ 40 0	+ 63 0	+ 97 0	+ 155 0	+ 250 0
450	500														

* The values in the upper row in the table below show the upper deviations and the values in the lower row show the lower deviations.

Unit [μ m]

Js		J		K		M		N		P	R	Size classification [mm]	
Js6	Js7	J6	J7	K6	K7	M6	M7	N6	N7	P7	R7	Over	Equal to or lower than
± 4	± 6	+ 5 − 3	± 6	+ 2 − 6	+ 3 − 9	− 1 − 9	0 − 12	− 5 − 13	− 4 − 16	− 8 − 20	− 11 − 23	3	6
± 4.5	± 7.5	+ 5 − 4	+ 8 − 7	+ 2 − 7	+ 5 − 10	− 3 − 12	0 − 15	− 7 − 16	− 4 − 19	− 9 − 24	− 13 − 28	6	10
± 5.5	± 9	+ 6 − 5	+ 10 − 8	+ 2 − 9	+ 6 − 12	− 4 − 15	0 − 18	− 9 − 20	− 5 − 23	− 11 − 29	− 16 − 34	10	14
												14	18
± 6.5	± 10.5	+ 8 − 5	+ 12 − 9	+ 2 − 11	+ 6 − 15	− 4 − 17	0 − 21	− 11 − 24	− 7 − 28	− 14 − 35	− 20 − 41	18	24
												24	30
± 8	± 12.5	+ 10 − 6	+ 14 − 11	+ 3 − 13	+ 7 − 18	− 4 − 20	0 − 25	− 12 − 28	− 8 − 33	− 17 − 42	− 25 − 50	30	40
												40	50
± 9.5	± 15	+ 13 − 6	+ 18 − 12	+ 4 − 15	+ 9 − 21	− 5 − 24	0 − 30	− 14 − 33	− 9 − 39	− 21 − 51	− 30 − 60	50	65
											− 32 − 62	65	80
± 11	± 17.5	+ 16 − 6	+ 22 − 13	+ 4 − 18	+ 10 − 25	− 6 − 28	0 − 35	− 16 − 38	− 10 − 45	− 24 − 59	− 38 − 73	80	100
											− 41 − 76	100	120
± 12.5	± 20	+ 18 − 7	+ 26 − 14	+ 4 − 21	+ 12 − 28	− 8 − 33	0 − 40	− 20 − 45	− 12 − 52	− 28 − 68	− 48 − 88	120	140
											− 50 − 90	140	160
											− 53 − 93	160	180
± 14.5	± 23	+ 22 − 7	+ 30 − 16	+ 5 − 24	+ 13 − 33	− 8 − 37	0 − 46	− 22 − 51	− 14 − 60	− 33 − 79	− 60 − 106	180	200
											− 63 − 109	200	225
											− 67 − 113	225	250
± 16	± 26	+ 25 − 7	+ 36 − 16	+ 5 − 27	+ 16 − 36	− 9 − 41	0 − 52	− 25 − 57	− 14 − 66	− 33 − 88	− 74 − 126	250	280
											− 78 − 130	280	315
± 18	± 28.5	+ 29 − 7	+ 39 − 18	+ 7 − 29	+ 17 − 40	− 10 − 46	0 − 57	− 26 − 62	− 16 − 73	− 41 − 98	− 87 − 144	315	355
											− 93 − 150	355	400
± 20	± 31.5	+ 33 − 7	+ 43 − 20	+ 8 − 32	+ 18 − 45	− 10 − 50	0 − 63	− 27 − 67	− 17 − 80	− 45 − 108	− 103 − 166	400	450
											− 109 − 172	450	500

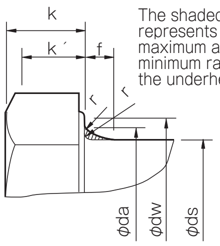
Shapes and Sizes of Hexagon Bolts (Parts Grade A) (Excerpt from JIS B 1180-1985)



The edges are to be chamfered.
The edges of M4 screws and smaller need not be chamfered.

Incomplete screw part
2P or below

Enlarged view of section X



The shaded part represents the maximum and minimum ranges for the underhead fillet.

Unit [mm]

Nominal screw (d)		M3	M4	M5	M6	M8	M10	M12	(M14)	M16	M20	M24
Screw pitch (P)		0.5	0.7	0.8	1	1.25	1.5	1.75	2	2	2.5	3
b (Reference)	ℓ ≦ 125	12	14	16	18	22	26	30	34	38	46	54
	125 < ℓ ≦ 150	—	—	—	—	—	—	—	40	44	52	60
c	Min.	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.2	0.2	0.2
	Max.	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.8	0.8	0.8
da	Max.	3.6	4.7	5.7	6.8	9.2	11.2	13.7	15.7	17.7	22.4	26.4
ds	Max. (standard size)	3	4	5	6	8	10	12	14	16	20	24
	Min.	2.86	3.82	4.82	5.82	7.78	9.78	11.73	13.73	15.73	19.67	23.67
dw	Min.	4.57	5.88	6.88	8.88	11.63	14.63	16.63	19.64	22.49	28.19	33.61
e	Min.	6.01	7.66	8.79	11.05	14.38	17.77	20.03	23.36	26.75	33.53	39.98
f	Max.	1	1.2	1.2	1.4	2	2	3	3	3	4	4
k	Nominal (standard size)	2	2.8	3.5	4	5.3	6.4	7.5	8.8	10	12.5	15
	Min.	1.875	2.675	3.35	3.85	5.15	6.22	7.32	8.62	9.82	12.285	14.785
	Max.	2.125	2.925	3.65	4.15	5.45	6.58	7.68	8.98	10.18	12.715	15.215
k'	Min.	1.31	1.87	2.35	2.7	3.61	4.35	5.12	6.03	6.87	8.6	10.35
r	Min.	0.1	0.2	0.2	0.25	0.4	0.4	0.6	0.6	0.6	0.8	0.8
s	Max. (standard size)	5.5	7	8	10	13	16	18	21	24	30	36
	Min.	5.32	6.78	7.78	9.78	12.73	15.73	17.73	20.67	23.67	29.67	35.38

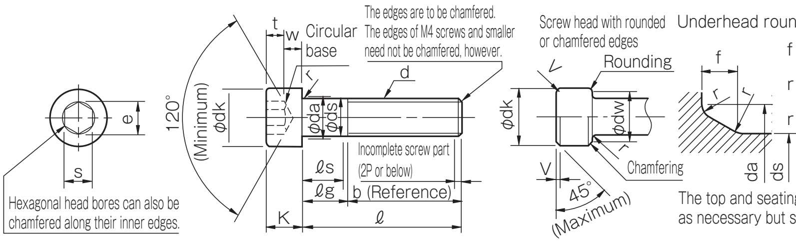
* Do not use the nominal screw diameters in parentheses if possible.

Unit [mm]

Nominal screw diameter			M3		M4		M5		M6		M8		M10		M12		(M14)		M16		M20		M24	
ℓ			ℓ s and ℓ g																					
Nominal length (Standard size)	Min.	Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.
20	19.58	20.42	5.5	8																				
25	24.58	25.42	10.5	13	7.5	11	5	9																
30	29.58	30.42	15.5	18	12.5	16	10	14	7	12														
35	34.5	35.5			17.5	21	15	19	12	17														
40	39.5	40.5			22.5	26	20	24	17	22	11.75	18												
45	44.5	45.5					25	29	22	27	16.75	23	11.5	19										
50	49.5	50.5					30	34	27	32	21.75	28	16.5	24	11.25	20								
55	54.4	55.6							32	37	26.75	33	21.5	29	16.25	25								
60	59.4	60.6							37	42	31.75	38	26.5	34	21.25	30	16	26						
65	64.4	65.6									36.75	43	31.5	39	26.25	35	21	31	17	27				
70	69.4	70.6									41.75	48	36.5	44	31.25	40	26	36	22	32				
80	79.4	80.6									51.75	58	46.5	54	41.25	50	36	46	32	42	21.5	34		
90	89.3	90.7											56.5	64	51.25	60	46	56	42	52	31.5	44	21	36
100	99.3	100.7											66.5	74	61.25	70	56	66	52	62	41.5	54	31	46
110	109.3	110.7													71.25	80	66	76	62	72	51.5	64	41	56
120	119.3	120.7													81.25	90	76	86	72	82	61.5	74	51	66
130	129.2	130.8															80	90	76	86	65.5	78	55	70
140	139.2	140.8															90	100	86	96	75.5	88	65	80
150	149.2	150.8																	96	106	85.5	98	75	90

* The frame ▭ indicates the recommended nominal lengths (ℓ) for the nominal screw diameters.

Shapes and Sizes of Hexagon Socket Head Cap Screws (Excerpt from JIS B 1176-1988)



Underhead rounding at maximum

f (Max.) = 1.7r (Max.)

$$r\ (\text{Max.}) = \frac{da\ (\text{Max.}) - ds\ (\text{Max.})}{2}$$

r (Min.) = Depends on the values in the appendix.

The top and seating surfaces of the screw head can be rounded or chamfered as necessary but should not exhibit burring, flashing, or other problems.

Unit [mm]

Nominal screw diameter (d)			M1.6	M2	M2.5	M3	M4	M5	M6	M8	M10	M12	(M14)	M16	(M18)	M20
Screw pitch (P)			0.35	0.4	0.45	0.5	0.7	0.8	1	1.25	1.5	1.75	2	2	2.5	2.5
b	Reference		15	16	17	18	20	22	24	28	32	36	40	44	48	52
dk	Max. (nominal size) *1		3	3.8	4.5	5.5	7	8.5	10	13	16	18	21	24	27	30
	Max. *2		3.14	3.98	4.68	5.68	7.22	8.72	10.22	13.27	16.27	18.27	21.33	24.33	27.33	30.33
	Min.		2.86	3.62	4.32	5.32	6.78	8.28	9.78	12.73	15.73	17.73	20.67	23.67	26.67	29.67
da	Max.		2	2.6	3.1	3.6	4.7	5.7	6.8	9.2	11.2	13.7	15.7	17.7	20.2	22.4
ds	Max. (standard size)		1.6	2	2.5	3	4	5	6	8	10	12	14	16	18	20
	Min.		1.46	1.86	2.36	2.86	3.82	4.82	5.82	7.78	9.78	11.73	13.73	15.73	17.73	19.67
e	Min.		1.73	1.73	2.30	2.87	3.44	4.58	5.72	6.86	9.15	11.43	13.72	16.00	16.00	19.44
f	Max.		0.34	0.51	0.51	0.51	0.60	0.60	0.68	1.02	1.02	1.45	1.45	1.45	1.87	2.04
k	Max. (standard size)		1.6	2	2.5	3	4	5	6	8	10	12	14	16	18	20
	Min.		1.46	1.86	2.36	2.86	3.82	4.82	5.70	7.64	9.64	11.57	13.57	15.57	17.57	19.48
r	Min.		0.1	0.1	0.1	0.1	0.2	0.2	0.25	0.4	0.4	0.6	0.6	0.6	0.6	0.8
s	Nominal (standard size)		1.5	1.5	2	2.5	3	4	5	6	8	10	12	14	14	17
	Min.		1.52	1.52	2.02	2.52	3.02	4.02	5.02	6.02	8.025	10.025	12.032	14.032	14.032	17.050
	Max.	Column 1	1.560	1.560	2.060	2.580	3.080	4.095	5.140	6.140	8.175	10.175	12.212	14.212	14.212	17.230
		Column 2	1.545	1.545	2.045	2.560	3.080	4.095	5.095	6.095	8.155	10.115	12.142	14.142	14.142	17.230
t	Min.		0.7	1	1.1	1.3	2	2.5	3	4	5	6	7	8	9	10
v	Max.		0.16	0.2	0.25	0.3	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2
dw	Min.		2.72	3.40	4.18	5.07	6.53	8.03	9.38	12.33	15.33	17.23	20.17	23.17	25.87	28.87
w	Min.		0.55	0.55	0.85	1.15	1.4	1.9	2.3	3.3	4	4.8	5.8	6.8	7.7	8.6

* Knurling is to be provided on the side of the head. In this case, the value marked with *2 is used as dk (max). If knurling is not provided, the value marked with *1 is used.

* Values in column 1 of S (max.) are used for strength classes 8.8 and 10.9 and property classes A2-50 ad A2-70, and values in column 2 apply to strength class 12.9. Values in column 1 can be used for strength class 12.9 if the delivering and receiving parties agree.

* Do not use the nominal screw diameters in parentheses if possible.

Unit [mm]

Screw nominal diameter			M1.6		M2		M2.5		M3		M4		M5		M6		M8		M10		M12		(M14)		M16		(M18)		M20	
ℓ			ℓ s and ℓ g																											
Nominal diameter length	Min.	Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.	ℓ s Min.	ℓ g Max.
2.5	2.30	2.70																												
3	2.80	3.20																												
4	3.76	4.24																												
5	4.76	5.24																												
6	5.76	6.24																												
8	7.71	8.29																												
10	9.71	10.29																												
12	11.65	12.35																												
16	15.65	16.35																												
20	19.58	20.42			2	4																								
25	24.58	25.42					5.75	8	4.5	7																				
30	29.58	30.42							9.5	12	6.5	10	4	8																
35	34.5	35.5									11.5	15	9	13	6	11														
40	39.5	40.5									16.5	20	14	18	11	16	5.75	12												
45	44.5	45.5											19	23	16	21	10.75	17	5.5	13										
50	49.5	50.5											24	28	21	26	15.75	22	10.5	18	5.25	14								
55	54.4	55.6													26	31	20.75	27	15.5	23	10.25	19								
60	59.4	60.6													31	36	25.75	32	20.5	28	15.25	24	10	20	6	16				
65	64.4	65.6															30.75	37	25.5	33	20.25	29	15	25	11	21	4.5	17		
70	69.4	70.6															35.75	42	30.5	38	25.25	34	20	30	16	26	9.5	22	5.5	18
80	79.4	80.6															45.75	52	40.5	48	35.25	44	30	40	26	36	19.5	32	15.5	28
90	89.3	90.7																	50.5	58	45.25	54	40	50	36	46	29.5	42	25.5	38
100	99.3	100.7																	60.5	68	55.25	64	50	60	46	56	39.5	52	35.5	48
110	109.3	110.7																			65.25	74	60	70	56	66	49.5	62	45.5	58
120	119.3	120.7																			75.25	84	70	80	66	76	59.5	72	55.5	68
130	129.2	130.8																					80	90	76	86	69.5	82	65.5	78
140	139.2	140.8																					90	100	86	96	79.5	92	75.5	88
150	149.2	150.8																							96	106	89.5	102	85.5	98
160	159.2	160.8																							106	116	99.5	112	95.5	108
180	179.2	180.8																									119.5	132	115.5	128
200	199.05	200.95																											135.5	148

* The frame ▨ indicates the recommended nominal lengths (ℓ) for the nominal screw diameters. Note that if ℓ falls short of the position of the dotted line, it is defined as a full thread, and the length of the incomplete thread under the head portion shall be about 3P.

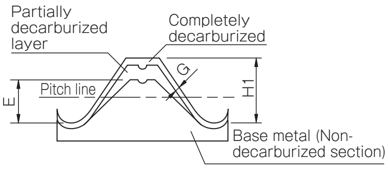
Mechanical Properties of Steel Bolts and Screws (Excerpt from JIS B 1051-2000)

Mechanical Properties for Strength Classification

Mechanical properties				Strength classification										
				3.6	4.6	4.8	5.6	5.8	6.8	8.8		9.8*2	10.9	12.9
										d≦16*1	d＞16*1			
Tensile strength Rm *3 *4 [N/mm²]			Nominal diameter	300	400		500		600	800	800	900	1,000	1,200
			Min.	330	400	420	500	520	600	800	830	900	1,040	1,220
Hardness	Vickers hardness HV		Min.	95	120	130	155	160	190	250	255	290	320	385
			Max.	220*5					250	320	335	360	380	435
	Brinell hardness HB		Min.	90	114	124	147	152	181	238	242	276	304	366
			Max.	209*5					238	304	318	342	361	414
	Rockwell hardness	HRB	Min.	52	67	71	79	82	89	—	—	—	—	—
			Max.	95.0*5					99.5	—	—	—	—	—
		HRC	Min.	—	—	—	—	—	—	22	23	28	32	39
			Max.	—						32	34	37	39	44
Surface hardness HV0.3			Max.	—						*6				
Yield stress ReL *7 [N/mm²]			Nominal diameter	180	240	320	300	400	480	—				
			Min.	190	240	340	300	420	480	—				
0.2% yield strength Rp0.2 *8 [N/mm²]			Nominal diameter	—						640	640	720	900	1,080
			Min.	—						640	660	720	940	1,100
Guaranteed load stress			Stress ratio	0.94	0.94	0.91	0.93	0.90	0.92	0.91	0.91	0.90	0.88	0.88
			[N/mm²]	180	225	310	280	380	440	580	600	650	830	970
Breaking elongation%			Min.	25	22	—	20	—	—	12	12	10	9	8
Wedge tensile strength				Shall not be less than the minimum tensile strength value.										
Impact strength [J]			Min.	—			25	—		30	30	25	20	15
Head hitting strength				Shall not be destroyed										
Height of the thread's non-decarbonized part E			Min.	—						1/2H1			2/3H1	3/4H1
Depth of the completely carbonized part G [mm]			Max.	—						0.015				

*1 Strength classification 8.8 bolt for structural steel is classified by the screw's nominal diameter of 12 mm.
*2 Strength classification 9.8 only applies to those with the screw's nominal diameter of 16 mm or less.
*3 The minimum tensile strength applies to those with a nominal length of 2.5d or more, and the minimum hardness applies to those with a nominal length of less than 2.5d or those for which a tensile test cannot be performed (for example, those with a special head shape).
*4 The tensile load value used for product tests shall be calculated based on the minimum tensile strength Rm, min.
*5 The hardness of the thread tip of bolts, screws, and stud bolts shall be 250HV, 238HB, or 99.5HRB or less.
*6 For the surface hardness of products with strength classification 8.8 to 12.9, there shall not be a difference of more than 30 points from the inner hardness in respect to the Vickers hardness HV0.3 value. However, the surface hardness of products with strength classification 10.9 shall not be greater than the 390VH.
*7 0.2% yield strength Rp0.2 applies to those for which the lower yield stress ReL cannot be measured. The ReL values for strength classification 4.8, 5.8, and 6.8 are only for calculation purposes and not for test purposes.
*8 The yield stress ratio and minimum 0.2% yield strength Rp0.2 according to the strength classification apply to tests using samples. If you try to obtain these values in product tests, these values will vary depending on the production method of the products or the screw's nominal diameter.

Evaluation of Carbon on the Surface



H1: Maximum height of the screw thread

H1 and E (Min.) Values

Unit [mm]

Screw pitch (P)			0.5	0.6	0.7	0.8	1	1.25	1.5	1.75	2	2.5	3	3.5	4
H1			0.307	0.368	0.429	0.491	0.613	0.767	0.920	1.074	1.227	1.534	1.840	2.147	2.454
E (Min.)	Strength classification	8.8,9.8	0.154	0.184	0.215	0.245	0.307	0.384	0.460	0.537	0.614	0.767	0.920	1.074	1.227
		10.9	0.205	0.245	0.286	0.327	0.409	0.511	0.613	0.716	0.818	1.023	1.227	1.431	1.636
		12.9	0.230	0.276	0.322	0.368	0.460	0.575	0.690	0.806	0.920	1.151	1.380	1.610	1.841

Mechanical Properties and Maximum Tightening Torque of Hexagon Socket Head Cap Screw (in Case of Strength Classification 10.9 and 12.9 Coarse Screw Threads)

Reference

Nominal d	Effective cross-sectional area [mm²]	Min. tensile load [N]		Yield load [N]		Guaranteed load [N]		Max. allowable shaft force F [N]		(Tf max.) Max. tightening torque [N•m]			
										K=0.17		K=0.25	
		10.9	12.9	10.9	12.9	10.9	12.9	10.9	12.9	10.9	12.9	10.9	12.9
M1.6	1.27	1,320	1,550	1,190	1,390	1,050	1,230	832	976	0.23	0.27	0.33	0.39
M2	2.07	2,150	2,530	1,940	2,270	1,720	2,010	1,360	1,590	0.46	0.54	0.68	0.80
M2.5	3.39	3,530	4,140	3,170	3,720	2,810	3,290	2,220	2,610	0.94	1.11	1.39	1.63
M3	5.03	5,230	6,140	4,710	5,520	4,180	4,880	3,300	3,870	1.68	1.97	2.47	2.90
M4	8.78	9,130	10,700	8,220	9,640	7,290	8,520	5,750	6,750	3.91	4.59	5.75	6.75
M5	14.2	14,800	17,300	13,300	15,600	11,800	13,800	9,300	10,900	7.91	9.28	11.6	13.6
M6	20.1	20,900	24,500	18,800	22,100	16,700	19,500	13,200	15,400	13.4	15.8	19.8	23.2
M8	36.6	38,100	44,600	34,300	40,200	30,400	35,500	24,000	28,100	32.6	38.3	48	56.3
M10	58.0	60,300	70,800	54,300	63,700	48,100	56,300	38,000	44,600	64.6	75.8	95	111
M12	84.3	87,700	103,000	78,900	92,600	70,000	81,800	55,200	64,800	113	132	166	194
M14	115	120,000	140,000	108,000	126,000	95,500	112,000	75,300	88,400	179	210	264	309
M16	157	163,000	192,000	147,000	172,000	130,000	152,000	103,000	121,000	280	328	411	483
M18	192	200,000	234,000	180,000	211,000	159,000	186,000	126,000	148,000	385	452	566	664
M20	245	255,000	299,000	229,000	269,000	203,000	238,000	161,000	188,000	546	640	803	942
M22	303	315,000	370,000	284,000	333,000	252,000	294,000	199,000	233,000	742	871	1,090	1,280
M24	353	367,000	431,000	330,000	388,000	293,000	342,000	231,000	271,000	944	1,110	1,390	1,630
M27	459	477,000	560,000	430,000	504,000	381,000	445,000	301,000	353,000	1,380	1,620	2,030	2,380
M30	561	583,000	684,000	525,000	616,000	466,000	544,000	368,000	431,000	1,870	2,200	2,760	3,230

K: Torque coefficient

Remark

1. The minimum tensile load and the guaranteed load in the table above are based on JIS B 1051-2000.
2. Yield load = yield strength (lower yield stress) x effective cross-sectional area
3. Max. allowable shaft force ≒ 0.7 x yield load, and max. tightening torque (Tfmax) = torque coefficient (K) x max. allowable shaft force (F) x nominal diameter (d).
4. In the case of torque coefficient K=0.17, oil lubrication, tightened material SS400, tightened surface finishing about 25S, female screw material SS400, and female screw accuracy 6 g or class 2 In the case of K=0.25, electrogalvanizing, tightened material SS400, tightened surface finishing about 25S, female screw material SCM, and female screw accuracy 6 g or class 2
Reference: If the female screw material is SS400 above, K=0.35.

■ Recommended Tightening Torque [Tf]

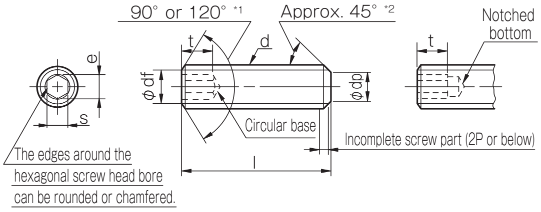
The recommended tightening torque (Tf) varies because the initial tightening force varies depending on the tool you use.
Recommended tightening torque (Tf) = tool-specific value x max. tightening torque (Tfmax)

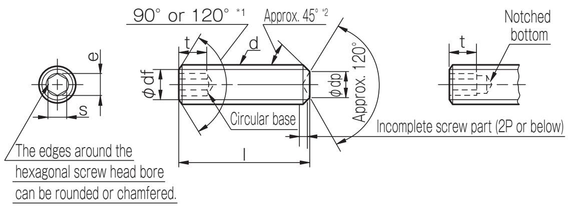
Tool-specific value

1) Manual tightening : 0.65 Tfmax.
2) Impact driver or powered driver : 0.75 Tfmax.
3) Torque wrench or torque limiting wrench : 0.85 Tfmax.
4) Torque wrench : 0.9 Tfmax.

Note: The above are reference values. Obtain the appropriate tightening torque based on the JIS B 1083 and 1084.

Shapes and Sizes of Hexagon Socket Set Screws (Excerpt from JIS B 1177-1997)





Nominal screw diameter (d)				M1.6	M2	M2.5	M3	M4	M5	M6	M8	M10	M12	M16	M20	M24
Pitch (P)				0.35	0.4	0.45	0.5	0.7	0.8	1	1.25	1.5	1.75	2	2.5	3
dp		Max.		0.80	1.00	1.5	2.00	2.50	3.5	4	5.5	7.00	8.50	12.00	15.00	18.00
		Min.		0.55	0.75	1.25	1.75	2.25	3.2	3.7	5.2	6.64	8.14	11.57	14.57	17.57
dz		Max.		0.80	1.00	1.20	1.40	2.00	2.50	3.00	5.0	6.0	8.00	10.00	14.00	16.00
		Min.		0.55	0.75	0.95	1.15	1.75	2.25	2.75	4.7	5.7	7.64	9.64	13.57	15.57
df				Approximately equivalent to the root diameter of male screw												
e*3		Min.		0.803	1.003	1.427	1.73	2.3	2.87	3.44	4.58	5.72	6.86	9.15	11.43	13.72
s*4		Nominal diameter		0.7	0.9	1.3	1.5	2	2.5	3	4	5	6	8	10	12
		Max.		0.724	0.902	1.295	1.545	2.045	2.560	3.071	4.084	5.084	6.095	8.115	10.115	12.142
		Min.		0.711	0.889	1.270	1.520	2.020	2.520	3.020	4.020	5.020	6.020	8.025	10.025	12.032
t		Min.*5		0.7	0.8	1.2	1.2	1.5	2	2	3	4	4.8	6.4	8	10
		Min.*6		1.5	1.7	2	2	2.5	3	3.5	5	6	8	10	12	15
ℓ				(Reference) Rough mass (kg) per 1,000 pieces (density: 7.85 kg/dm^3)												
Nominal length		Min.	Max.													
Float point	2	1.8	2.2	0.021	0.029	0.05	0.059									
	2.5	2.3	2.7	0.025	0.037	0.063	0.08	0.099								
	3	2.8	3.2	0.029	0.044	0.075	0.1	0.14	0.2							
	4	3.76	4.24	0.037	0.059	0.1	0.14	0.22	0.32	0.41						
	5	4.76	5.24	0.046	0.074	0.125	0.18	0.3	0.44	0.585	0.945					
	6	5.76	6.24	0.054	0.089	0.15	0.22	0.38	0.56	0.76	1.26	1.77				
	8	7.71	8.29	0.07	0.119	0.199	0.3	0.54	0.8	1.11	1.89	2.78	4			
	10	9.71	10.29		0.148	0.249	0.38	0.7	1.04	1.46	2.52	3.78	5.4	8.5		
	12	11.65	12.35			0.299	0.46	0.86	1.28	1.81	3.15	4.78	6.8	11.1	15.8	
	16	15.65	16.35				0.62	1.18	1.76	2.51	4.41	6.78	9.6	16.3	24.1	30
	20	19.58	20.42					1.49	2.24	3.21	5.67	8.76	12.4	21.5	32.3	42
	25	24.58	25.42						2.84	4.09	7.25	11.2	15.9	28	42.6	57
	30	29.58	30.42							4.94	8.82	13.7	19.4	34.6	52.9	72
	35	34.5	35.5								10.4	16.2	22.9	41.1	63.2	87
	40	39.5	40.5								12	18.7	26.4	47.7	73.5	102
	45	44.5	45.5									21.2	29.9	54.2	83.8	117
	50	49.5	50.5									23.7	33.4	60.7	94.1	132
	55	54.4	55.6										36.8	67.3	104	147
	60	59.4	60.6										40.3	73.7	115	162
Half point	2	1.8	2.2	0.019	0.029	0.05										
	2.5	2.3	2.7	0.025	0.037	0.063	0.079									
	3	2.8	3.2	0.029	0.044	0.075	0.1	0.155								
	4	3.76	4.24	0.037	0.059	0.1	0.14	0.23	0.3							
	5	4.76	5.24	0.046	0.074	0.125	0.18	0.305	0.42	0.565						
	6	5.76	6.24	0.054	0.089	0.15	0.22	0.38	0.54	0.74	1.25					
	8	7.71	8.29	0.07	0.119	0.199	0.3	0.53	0.78	1.09	1.88	2.71				
	10	9.71	10.29		0.148	0.249	0.38	0.68	1.02	1.44	2.51	3.72	5.3			
	12	11.65	12.35			0.299	0.46	0.83	1.26	1.79	3.14	4.73	6.7	10.5		
	16	15.65	16.35				0.62	1.13	1.74	2.49	4.4	6.73	9.5	15.7	22.9	
	20	19.58	20.42					1.42	2.22	3.19	5.66	8.72	12.3	20.9	31.1	40.2
	25	24.58	25.42						2.82	4.07	7.24	11.2	15.8	27.4	41.4	55.2
	30	29.58	30.42							4.94	8.81	13.7	19.3	33.9	51.7	70.3
	35	34.5	35.5								10.4	16.2	22.7	40.4	62	85.3
	40	39.5	40.5								12	18.7	26.2	46.9	72.3	100
	45	44.5	45.5									21.2	29.7	53.3	82.6	115
	50	49.5	50.5									23.6	33.2	59.8	92.6	130
	55	54.4	55.6										36.6	66.3	103	145
	60	59.4	60.6										40.1	72.8	114	160

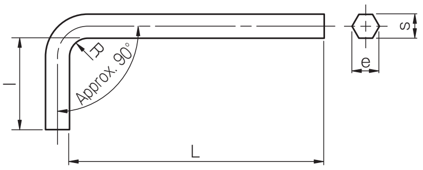
*1 If the nominal length (ℓ) is shorter than the 2 stepped lines above, a 120° chamfer shall be provided.
*2 The angle of about 45° applies to the slope zone under the root diameter of male screw.
*3 e min. = 1.14 x s min. However, with the exception of nominal screw M1.6, M2, and M2.5.

*4 Use the specified hexagonal hole gauge to determine s.
*5 The minimum t values in the upper row apply to a nominal length (ℓ) shorter than the 2 stepped lines.
*6 The minimum t values in the lower row apply to a nominal length (ℓ) longer than the 2 stepped lines.

Remark

1. The frame ▨ indicates the recommended nominal lengths (ℓ) for the nominal screw diameters.
2. The dimension series numbers are as per JIS B 0143.
3. The diagonal hole bottom shape shall be conical or straight. If the shape is straight, the depth of the straight hole shall not be more than 1.2 times the depth t of the hexagonal hole.

Shapes and Sizes of Hex Keys (Excerpt from JIS B 4648-1994)



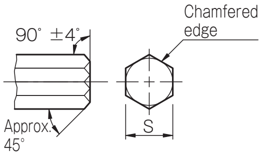
Spanner nominal	Shape and size [mm]							Mechanical properties		
	s		e		L	l	R	Hardness (min.)*1		Guaranteed torque*2 [N・m]
	Max.	Min.	Max.	Min.	Approx.	Approx.	Approx.	Rockwell hardness	Vickers hardness	
0.7	0.711	0.698	0.79	0.76	32	6	1.5	52HRC	545HV	0.08
0.9	0.889	0.876	0.99	0.96	32	10	1.5			0.18
1.3	1.270	1.244	1.42	1.37	40	12	1.5			0.53
1.5	1.500	1.475	1.68	1.63	45	14	1.5			0.82
2	2.00	1.960	2.25	2.18	50	16	2			1.9
2.5	2.50	2.460	2.82	2.75	56	18	2.5			3.8
3	3.00	2.960	3.39	3.31	63	20	3			6.6
4	4.00	3.952	4.53	4.44	70	25	4			16
5	5.00	4.952	5.67	5.58	80	28	5			30
6	6.00	5.952	6.81	6.71	90	32	6			52
8	8.00	7.942	9.09	8.97	100	36	8	50HRC	513HV	120
10	10.00	9.942	11.37	11.23	112	40	10	48HRC	485HV	220
12	12.00	11.89	13.65	13.44	125	45	12			370
14	14.00	13.89	15.93	15.70	140	56	14			590
17	17.00	16.89	19.35	19.09	160	63	17	45HRC	446HV	980
19	19.00	18.87	21.63	21.32	180	70	19			1360
22	22.00	21.87	25.05	24.71	200	80	22			2110
24	24.00	23.87	27.33	26.97	224	90	24			2750
27	27.00	26.87	30.75	30.36	250	100	27			3910
32	32.00	31.84	36.45	35.98	315	125	32			6510
36	36.00	35.84	41.01	40.50	355	140	36			9260

*1 The hardness is as per the Rockwell hardness or Vickers hardness.
*2 The spanner shall not be damaged at a value of this torque or lower, and there shall be no defects that render it useless, such as distortion, deformation of the hexagonal shape, and bending.

Remark

The spanner edge does not need to be provided with a chamfer if the spanner can be smoothly inserted into the hexagonal hole. However, if a chamfer is provided, a width across flats (s) must be left for the edges as shown in the figure on the right.
Note that the side of the long and short ends must be at a right angle to the respective shaft center and must not be titled by ±4° or more.

Chamfering of the wrench edges



■ Guaranteed Torque for Strength Class 45H (Reference)

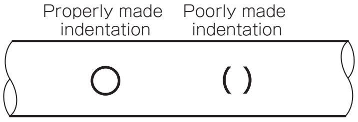
Nominal screw d	Guaranteed torque [N・m]	Recommended tightening torque [N・m]	Used spanner size
M1.6	0.07	0.04	0.7
2	0.15	0.09	0.9
2.5	0.44	0.26	1.3
(2.6)	0.44	0.26	1.3
3	1.17	0.69	1.5
4	2.74	1.67	2
5	5.88	3.53	2.5
6	9.8	5.9	3
8	23.5	14.2	4
10	45.1	27.5	5
12	77.5	47.1	6
(14)	88.3	53.0	6
16	186	118	8
(18)	211	128	8
20	363	216	10

How to Use Hexagon Socket Set Screws

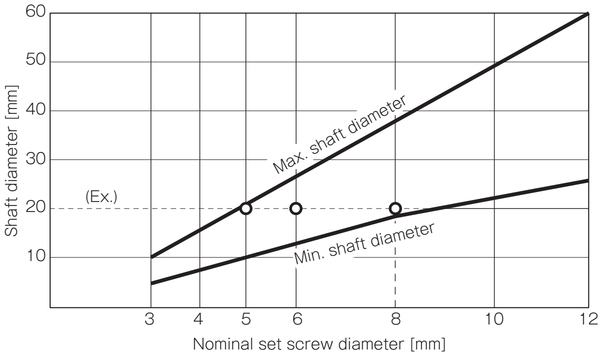
Shaft Diameters and Set Screw Sizes

When selecting the set screw size, you should select a size where the indentation on the end of the screw is apparent on the cylindrical surface of the shaft. The following figure shows the correlation between the tightened shaft diameter and the set screw (half point).

■ Indentation on the Screw End



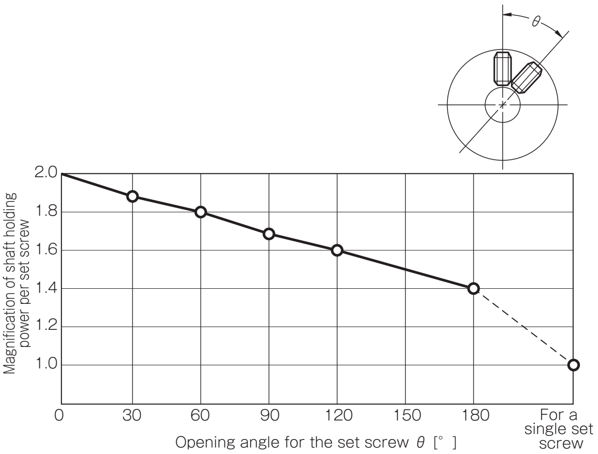
Correlation between the set screw and the shaft diameter



If the Set Screw Size Cannot Be Increased

Note that even if two set screws are used for applications that require a great shaft holding power, the shaft holding power is not necessarily doubled. The reason is that the shaft holding power varies depending on the opening angle between the two set screws. The following figure shows this relationship.

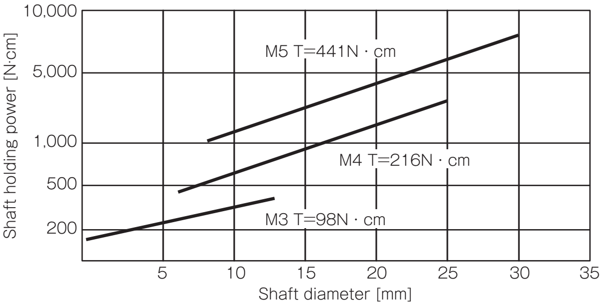
■ Opening Angle of the Set Screw and Shaft Holding Power



Shaft Diameters and Shaft Holding Power

A limit where the shaft and hub or flange can be held together (which is called a shaft holding power) is determined by the friction coefficient between the end of the set screw and the shaft. The following figure shows the limit of the practical shaft holding power obtained by experiment results.

■ Diameter of the Tightened Shaft and Shaft Holding Power (Half Point)

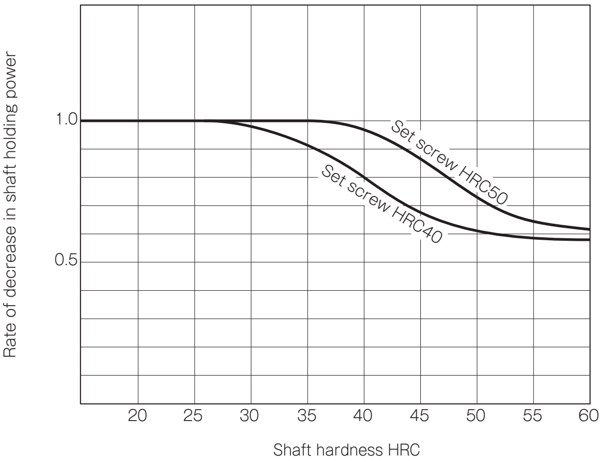


* The shaft holding power of the set screw is related to the tightened shaft diameter size.

Hardness and Shaft Holding Power

The greater the tightened shaft hardness, the lower the shaft holding power. The following figure shows this relationship.

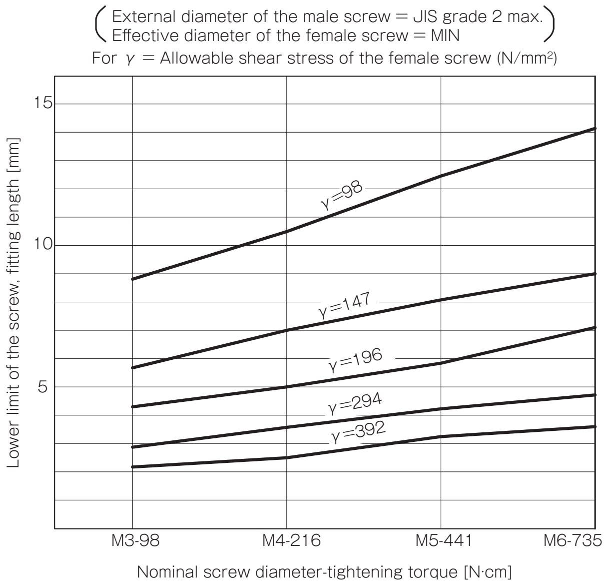
■ Set Screw and Shaft Hardness and Shaft Holding Power



Set Screws and Fit Length

With an increasing use of materials such as zinc die-cast and iron-based sintered alloy in the female screw parts, the allowable load of the female screws decrease resulting in problems. This problem can be solved by increasing the thickness of the female screw part. The following figure shows the relationship between the fit length of the set screw and the strength of the female screw material.

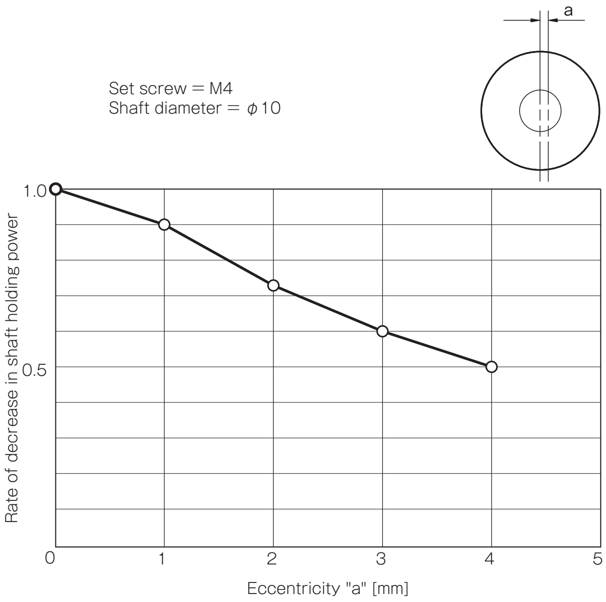
■ Female screw strength and fit length of set screw



Parallel Misalignment Amount of Female Screw Hole

If the female screw hole is displaced from the center of the tightened shaft, the shaft holding power decreases. The following figure shows this relationship obtained from an experiment with the M4 set screw.

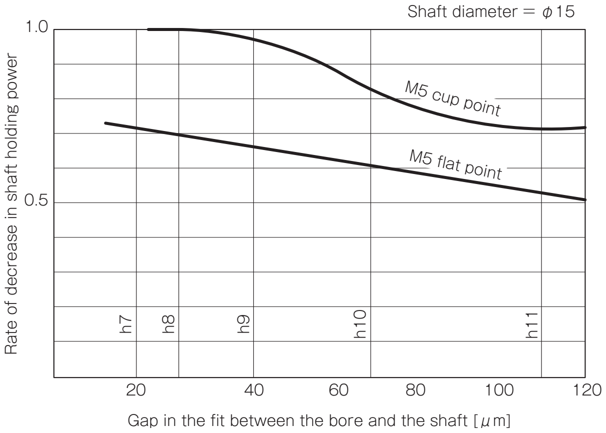
■ Parallel Misalignment Amount and Shaft Holding Power of Female Screw



Shaft and Hub or Flange Hole Fit Accuracy

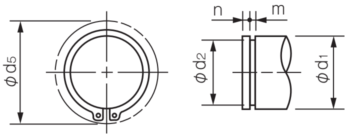
The shaft holding power does not decrease very much until the shaft accuracy h9 for the hole standard as shown in the figure below. Since the fit accuracy is expected to have considerable influence in a dynamic operating environment, sufficient attention needs to be paid to the fit accuracy.

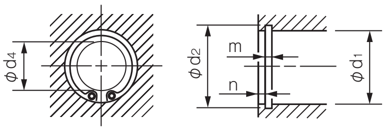
■ Fit Accuracy of the Bushing Hole and Shaft Holding Power



Reference: Socket Screw Technology Group
"How to Select and Use Hexagon Socket Set Screws"

C Type Retaining Ring Groove Dimensions (Excerpt from JIS B 2804-1978)





Unit [mm]

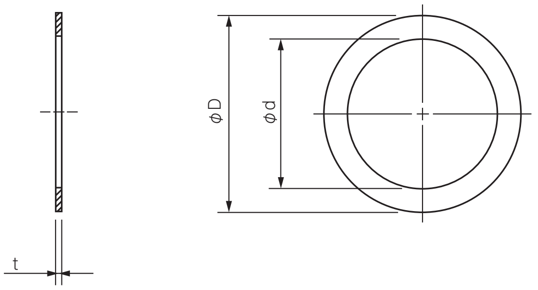
d₁	d₂		m		n min (reference value)	d₅ (reference value)
	Basic size	Tolerance	Basic size	Tolerance		
10	9.6	$^{0}_{-0.09}$	1.15	$^{+0.14}_{0}$	1.5	17
12	11.5	$^{0}_{-0.11}$				19
15	14.3					23
17	16.2					25
20	19	$^{0}_{-0.21}$	1.35			28
25	23.9					34
30	28.6		1.75			40
35	33	$^{0}_{-0.25}$				46
40	38		1.95		2	53
45	42.5					58
50	47		2.2			64
55	52	$^{0}_{-0.3}$				70
60	57					75
65	62		2.7		2.5	81
70	67					86
75	72					92
80	76.5					97
85	81.5	$^{0}_{-0.35}$	3.2	$^{+0.18}_{0}$	3	103
90	86.5					108
95	91.5					114
100	96.5					119
110	106	$^{0}_{-0.54}$	4.2		4	131
120	116					143
125	121	$^{0}_{-0.63}$				148

Unit [mm]

d₁	d₂		m		n min (reference value)	d₄ (reference value)
	Basic size	Tolerance	Basic size	Tolerance		
26	27.2	$^{+0.21}_{0}$	1.35	$^{+0.14}_{0}$	1.5	16
28	29.4					18
32	33.7	$^{+0.25}_{0}$				21
35	37		1.75		2	24
40	42.5		1.95			28
42	44.5					30
47	49.5					34
52	55	$^{+0.3}_{0}$	2.2			39
55	58				2.5	41
62	65					48
68	71		2.7			53
72	75					57
80	83.5	$^{+0.35}_{0}$				64
90	93.5		3.2	$^{+0.18}_{0}$	3	73
95	98.5					77
100	103.5					82
110	114	$^{+0.54}_{0}$	4.2		4	89
115	119					94
125	129	$^{+0.63}_{0}$				103
∗ 160	165	$^{+0.7}_{0}$	4.2	$^{+0.2}_{0}$		134
∗ 200	205					171

The * mark indicates non-JIS standard sizes.

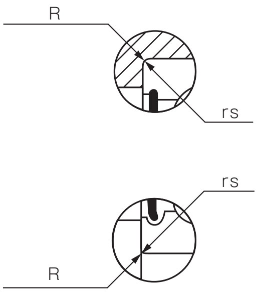
Shim Sizes

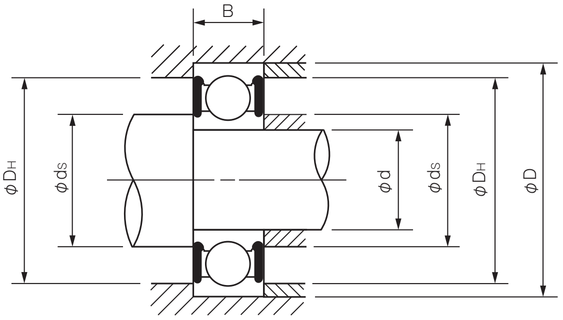


Unit [mm]

Inner diameter ød	Outer diameter øD	Thickness t				Applied shaft	Applied hole
		0.05	0.1	0.15	0.5		
6.3	8.7	○	○	—	○	6	
8.3	11.7	○	○	—	○	8	
10.3	13.7	○	○	—	○	10	
12.3	15.7	—	○	○	○	12	
15.3	20.7	—	○	○	○	15	
17.3	25.7	—	○	○	○	17	26
20.3	27.7	—	○	○	○	20	28
25.3	31.7	—	○	○	○	25	32
25.3	34.7	—	○	—	○	25	35
30.3	39.7	—	○	○	○	30	40
35.3	41.7	—	○	○	○	35	42
35.3	46.7	—	○	—	○	35	47
40.3	51.7	—	○	○	○	40	52
45.3	51.7	—	○	○	○	45	52
45.3	54.7	—	○	—	○	45	55
50.3	61.7	—	○	—	○	50	62
50.3	67.7	—	○	—	○	50	68
55.3	67.7	—	○	—	○	55	68
60.3	71.7	—	○	—	○	60	72
60.3	84.7	—	○	—	○	60	85
65.3	79.7	—	○	—	○	65	80
70.3	79.7	—	○	—	○	70	80
75.3	89.7	—	○	—	○	75	90
85.3	99.7	—	○	—	○	85	100
90.3	109.7	—	○	—	○	90	110
105.3	124.7	—	○	—	○		125
115.3	129.7	—	○	—	○		130

Bearing Mounting Dimensions





Unit [mm]

Bearing number	d	D	B	rs min	D_H max	d_s min	R max
6000	10	26	8	0.3	23.5	12.5	0.3
6001	12	28	8	0.3	25.5	14.5	0.3
6002	15	32	9	0.3	29.5	17.5	0.3
6003	17	35	10	0.3	32.5	19.5	0.3
6004	20	42	12	0.6	37	25	0.6
6005	25	47	12	0.6	42	30	0.6
6006	30	55	13	1	49	36	1
6007	35	62	14	1	56	41	1
6008	40	68	15	1	62	46	1
6010	50	80	16	1	74	56	1
6011	55	90	18	1.1	83	62	1
6012	60	95	18	1.1	88	67	1
6013	65	100	18	1.1	93	72	1
6014	70	110	20	1.1	103	77	1
6015	75	115	20	1.1	108	82	1

* Label symbol of each manufacturer
* NTN: LLB NSK: VV KOYO: 2RU
* rs min is the allowable minimum chamfer dimension.

Unit [mm]

Bearing number	d	D	B	rs min	D_H max	d_s min	R max
6201	12	32	10	0.6	27	17	0.6
6202	15	35	11	0.6	30	20	0.6
6203	17	40	12	0.6	35	22	0.6
6204	20	47	14	1	41	26	1
6205	25	52	15	1	46	31	1
6206	30	62	16	1	56	36	1
6208	40	80	18	1.1	73	47	1
6210	50	90	20	1.1	83	57	1
6211	55	100	21	1.5	91.5	63.5	1.5
6212	60	110	22	1.5	101.5	68.5	1.5
6214	70	125	24	1.5	116.5	78.5	1.5
6302	15	42	13	1	36	21	1
6303	17	47	14	1	41	23	1
6304	20	52	15	1.1	45	27	1
6305	25	62	17	1.1	55	32	1
6306	30	72	19	1.1	65	37	1
6307	35	80	21	1.5	71.5	43.5	1.5

Physical and Mechanical Properties of Metal Materials

Physical Properties

Metal material	Specific gravity	Longitudinal elasticity modulus $\times 10^3$ [N/mm^2]	Traverse elasticity modulus $\times 10^3$ [N/mm^2]	Thermal conductivity [W/ (m・k)]	Thermal expansion coefficient $\times 10^{-6}$ [1/k]
Low-carbon steel (0.08C to 0.12C)	7.86	206	79	57～60	11.3～11.6
Medium-carbon steel (0.40C to 0.50C)	7.84	205	82	44	10.7
High-carbon steel (0.8C to 1.6C)	7.81～7.83	196～202	80～81	37～43	9.6～10.9
Chrome steel (SCr430)	7.84	—	—	44.8	12.6 (300～470k)
Chrome molybdenum steel (SCM440)	7.83	—	—	42.7	12.3
Martensitic stainless steel (SUS410)	7.80	200	—	24.9	9.9
Austenitic stainless steel (SUS304)	8.03	197	73.7	15	17.3
Tool steel (SKD6)	7.75	206	82	42.2 (373k)	10.8
Gray cast iron (FC)	7.05～7.3	73.6～127.5	28.4～39.2	44～58.6	9.2～11.8
Spheroidal graphite cast iron (FCD)	7.10	161	78	33.5～37.7	10
Duralumin (A2017-T4)	2.79	69	—	201	23.4
Super duralumin (A2024-T4)	2.77	74	29	121	23.2
Extra super duralumin (A7075-T6)	2.80	72	28	130	23.6
Lautan (AC2A-T6)	2.79	72	—	121	24.0
Silumin (AC3A-F)	2.66	71	—	121	20.4
Aluminum cast iron alloy (AC4CH-T6)	2.68	72	—	151	21.5
Aluminum die cast alloy (ADC12)	2.70	72	—	100	21.0
Zinc die cast alloy (ZDC-2)	6.60	89	—	113	27.4

Mechanical Properties

Metal material	Yield point [N/mm^2]	Tensile strength [N/mm^2]	Hardness [HB]
S20C-N	245	402	116～174
S30C-N	284	471	137～197
S30C-H	333	539	152～212
S45C-N	343	569	167～229
S45-H	490	686	201～269
SS400	216	402～510	—
SCM420	—	932	262～352
SCM435	785	932	269～331
SUS303	206	520	187 or below
SUS304	206	520	200 or below
FC200	—	200	223 or below
FC250	—	250	241 or below
FC300	—	300	262 or below
FC350	—	350	277 or below
FCD400	250	400	201 or below
FCD450	280	450	143～217
FCD500	320	500	170～241
A2014-T4	245	412	—
A2017-T4	196	353	—
A7075-T6	471	539	—

General Properties of Vulcanized Rubber

Rubber type (ASTM abbreviation)		Natural rubber (NR)	Chloroprene rubber (CR)	Acrylonitrile butadiene rubber (NBR)	Urethane rubber (U)
Mechanical properties	**Hardness 〔JIS Hs〕**	10～100	10～90	15～100	10～100
	Tensile strength 〔MPa〕	3～29	5～25	5～25	20～44
	Elongation 〔%〕	100～1000	100～1000	100～800	300～800
	Impact resilience	◎	◎	○	◎
	Tear strength	◎	○	○	◎
	Compression set	◎	◎	◎	◎
	Abrasion resistance	◎	◎～○	◎	◎
	Flex cracking resistance	◎	○	○	◎
Physical properties	**Heat resistance (highest operating temperature ℃)**	90	130	130	80
	Cold resistance (brittle temperature ℃)	— 70	— 55	— 40	— 60
	Aging resistance	○	◎	○	○
	Ozone resistance	×	○	×	◎
	Light (weather) resistance	○	◎	○	◎
	Flame resistance	×	○	△～×	△～×
	Gas permeability (ability to prevent the passage of gas)	○	○	○	○
	Radiation resistance	○～△	○～△	○～×	○
Oil and chemical resistance	**Gasoline and light oil**	×	○	◎	◎
	Benzene and toluene	×	×	△～×	△～×
	Trichlene	×	×	×	×
	Alcohol	◎	◎	◎	◎
	Ethyl acetate	○～△	○～△	×	×
	Strong acid	△	○	○	×
	Weak acid	○	◎	○	△
	Strong alkali	○	◎	○	×
	Weak alkali	○	◎	○	×
Main features		Has the most typical rubber elasticity and is excellent in mechanical properties.	Has average features such as weather resistance, ozone resistance, heat resistance, and chemical resistance.	Good at oil resistance, abrasion resistance, and aging resistance.	Has particularly excellent mechanical properties.

Remark ◎: Very good ○: Good △: Acceptable ×: Unacceptable

Approximate Conversion Values for Rockwell C Hardness of Steel Materials

Rockwell C scale hardness (HRC)	Vickers hardness (HV)	Brinell hardness (HB) 10 mm ball 3000 kgf load		Rockwell hardness			Rockwell superficial hardness diamond conical indenter			Shore hardness (HS)	Tensile strength [MPa] (approximate value) 1 MPa= 1N/mm^2	Rockwell C scale hardness (HRC)
		Standard ball	Tungsten carbide ball	A scale (HRA) 60 kgf load diamond conical indenter	B scale (HRB) 100 kgf load 1.6 mm diameter (1/16 in) ball	D scale (HRD) 100 kgf load diamond conical indenter	15－N scale 15 kgf load	30－N scale 30 kgf load	45－N scale 45 kgf load			
68	940	—	—	85.6	—	76.9	93.2	84.4	75.4	97	—	68
67	900	—	—	85.0	—	76.1	92.9	83.6	74.2	95	—	67
66	865	—	—	84.5	—	75.4	92.5	82.8	73.3	92	—	66
65	832	—	(739)	83.9	—	74.5	92.2	81.9	72.0	91	—	65
64	800	—	(722)	83.4	—	73.8	91.8	81.1	71.0	88	—	64
63	772	—	(705)	82.8	—	73.0	91.4	80.1	69.9	87	—	63
62	746	—	(688)	82.3	—	72.2	91.1	79.3	68.8	85	—	62
61	720	—	(670)	81.8	—	71.5	90.7	78.4	67.7	83	—	61
60	697	—	(654)	81.2	—	70.7	90.2	77.5	66.6	81	—	60
59	674	—	(634)	80.7	—	69.9	89.8	56.6	65.5	80	—	59
58	653	—	615	80.1	—	69.2	89.3	75.7	64.3	78	—	58
57	633	—	595	79.6	—	68.5	88.9	74.8	63.2	76	—	57
56	613	—	577	79.0	—	67.7	88.3	73.9	62.0	75	—	56
55	595	—	560	78.5	—	66.9	87.9	73.0	60.9	74	2075	55
54	577	—	543	78.0	—	66.1	87.4	72.0	59.8	72	2015	54
53	560	—	525	77.4	—	65.4	86.9	71.2	58.5	71	1950	53
52	544	(500)	512	76.8	—	64.6	86.4	70.2	57.4	69	1880	52
51	528	(487)	496	76.3	—	63.8	85.9	69.4	56.1	68	1820	51
50	513	(475)	481	75.9	—	63.1	85.5	68.5	55.0	67	1760	50
49	498	(464)	469	75.2	—	62.1	85.0	67.6	53.8	66	1695	49
48	484	451	455	74.7	—	61.4	84.5	66.7	52.5	64	1635	48
47	471	442	443	74.1	—	60.8	83.9	65.8	51.4	63	1580	47
46	458	432	432	73.6	—	60.0	83.5	64.8	50.3	62	1530	46
45	446	421	421	73.1	—	59.2	83.0	64.0	49.0	60	1480	45
44	434	409	409	72.5	—	58.5	82.5	63.1	47.8	58	1435	44
43	423	400	400	72.0	—	57.7	82.0	62.2	46.7	57	1385	43
42	412	390	390	71.5	—	56.9	81.5	61.3	45.5	56	1340	42
41	402	381	381	70.9	—	56.2	80.9	60.4	44.3	55	1295	41
40	392	371	371	70.4	—	55.4	80.4	59.5	43.1	54	1250	40
39	382	362	362	69.9	—	54.6	79.9	58.6	41.9	52	1215	39
38	372	353	353	69.4	—	53.8	79.4	57.7	40.8	51	1180	38
37	363	344	344	68.9	—	53.1	78.8	56.8	39.6	50	1160	37
36	354	336	336	68.4	(109.0)	52.3	78.3	55.9	38.4	49	1115	36
35	345	327	327	67.9	(108.5)	51.5	77.7	55.0	37.2	48	1080	35
34	336	319	319	67.4	(108.0)	50.8	77.2	54.2	36.1	47	1055	34
33	327	311	311	66.8	(107.5)	50.0	76.6	53.3	34.9	46	1025	33
32	318	301	301	66.3	(107.0)	49.2	76.1	52.1	33.7	44	1000	32
31	310	294	294	65.8	(106.0)	48.4	75.6	51.3	32.7	43	980	31
30	302	286	286	65.3	(105.5)	47.7	75.0	50.4	31.3	42	950	30
29	294	279	279	64.7	(104.5)	47.0	74.5	49.5	30.1	41	930	29
28	286	271	271	64.3	(104.0)	46.1	73.9	48.6	28.9	41	910	28
27	279	264	264	63.8	(103.0)	45.2	73.3	47.7	27.8	40	880	27
26	272	258	258	63.3	(102.5)	44.6	72.8	46.8	26.7	38	860	26
25	266	253	253	62.8	(101.5)	43.8	72.2	45.9	25.5	38	840	25
24	260	247	247	62.4	(101.0)	43.1	71.6	45.0	24.3	37	825	24
23	254	243	243	62.0	100.0	42.1	71.0	44.0	23.1	36	805	23
22	248	237	237	61.5	99.0	41.6	70.5	43.2	22.0	35	785	22
21	243	231	231	61.0	98.5	40.9	69.9	42.3	20.7	35	770	21
20	238	226	226	60.5	97.8	40.1	69.4	41.5	19.6	34	760	20
(18)	230	219	219	—	96.7	—	—	—	—	33	730	(18)

* The bold numbers are based on the ASTM E-140 table (adjusted by SAE, ASM, and ASTM in collaboration).
* The numbers in parentheses in the table are not used very much and are shown as a reference.

Balance Quality of Rotating Equipment

According to JIS B 0153-1985, the balance quality is defined as a quantity that shows the balance of a rigid rotor and is a product between a specific unbalance and specified angular velocity.

Procedure to Determine Allowable Unbalance

The following numerical information on the rotor is needed to determine the allowable unbalance.

- Max. rotation speed at which the rotor is used: n_{max}
- Rotor mass: m
- Position of the rotor bearing
- Position of the correction plane

The following information is needed for more detailed calculation.

- Position of the center of mass (gravity) of the rotor

1. Set the balance quality grade according to the type of the rotor. The smaller the balance quality grade value, the higher the balance accuracy. However, special attention needs to be paid to G1 and G0.4 as mentioned in the JIS text.
2. Obtain the allowable residual specific unbalance e_{per} from the max. rotation speed at which the rotor is actually used. This can be obtained by the following calculation formula or from the figure on the right.

Balance quality $= e \cdot \omega$

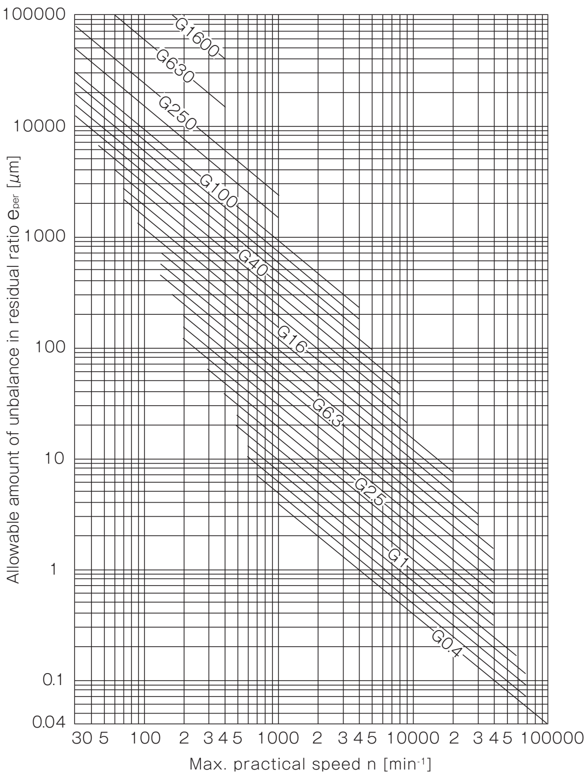
$\omega = 2\pi n/60 = n/9.55$

n [min^{-1}]

ω [rad/s]

$$\text{Balance quality} = \frac{e \cdot n}{9.55}$$

3. Obtain the allowable residual unbalance from the allowable residual specific unbalance and rotor mass.
   Allowable residual unbalance $U_{per} = e_{per} m$ [g·mm]
4. Actually allocate the allowable residual unbalance to the unbalance of the correction plane (for details, refer to the JIS text, because the allocation calculation varies depending on the relationship of the position of the bearing, the position of the correction plane, the mass, and the position of the center of the mass).



Recommended Balance Quality Grade for Each Type of Rotating Machine (JIS B 0905-1992)

Balance quality grade	Balance quality upper limit mm/s ($e_{per} \times \omega$)	Rotor type example
G4000	**4000**	● Rigidly supported crank shaft system *2 of a low-speed diesel engine *1 for vessels with an odd number of cylinders
G1600	**1600**	● Rigidly supported crank shaft of a large 2-cycle engine *2
G630	**630**	● Rigidly supported crank shaft system *2 of a large 4-cycle engine ● Elastically supported crank shaft system *2 of a diesel engine for vessels *1
G250	**250**	● Rigidly supported crank shaft system *2 of a high-speed 4-cylinder diesel engine *1
G100	**100**	● Six or more cylinder crank shaft system of a high-speed diesel engine *1, and complete engine (gasoline or diesel) for cars, trucks, and railway cars
G40	**40**	● Wheel, rim, wheel set, and drive shaft for cars ● Elastically supported 6 or more cylinder high-speed 4-cycle engine *1 ● (Gasoline or diesel) crank shaft system *2 ● Crank shaft system *2 of an engine for cars, trucks, and railway cars
G16	**16**	● Drive shafts with special requirements (propeller shaft and cardan shaft) ● Crusher parts ● Agriculture machine parts ● Parts of (gasoline and diesel) engines for cars, trucks, and railway cars ● 6 or more cylinder crank shaft systems with special requirements *2
G6.3	**6.3**	● Equipment for process plants ● Marine main turbine gears (for merchant ships) ● Centrifugal separator drums ● Papermaking rolls and printing rolls ● Fans ● Assembled aircraft gas turbine rotors ● Flywheels ● Pump impellers ● Machine tool and general machine parts ● Medium and large armatures (of power generators with a shaft center height of at least 80 mm) without special requirements ● Small armatures (mainly for mass production) that are used for vibration insensitive applications or that are vibration resistant ● Engine parts with special requirements
G2.5	**2.5**	● Gas turbines, steam turbines, and marine main turbines (for merchant ships) ● Rigid turbo-generator rotors ● Computer memory drums and disc turbo compressors ● Machine tool main shafts ● Medium and large armatures with special requirements ● Small armatures (excluding those under conditions of G6.3 and G1) ● Turbine drive pumps
G1	**1**	● Tape recorder and audio equipment rotating parts ● Grinder wheel spindle ● Small armatures with special requirements
G0.4	**0.4**	● Precision grinder wheel spindles, grinding wheels and armatures ● Gyroscopes

*1: Diesel engines with a piston speed of 9 m/s or less are defined as low-speed ones, and those with a piston speed of greater than 9 m/s are defined as high-speed ones.
*2: Crank shaft system refers to a system that includes a crank shaft, flywheel, clutch, pulley, damper, and rotating parts of the connecting rod.
* The mass of the rotor of a complete engine refers to the total mass of all parts of the crank shaft system.

Power Supplies in the World

Region/country		Power supply frequency	Voltage (single-phase)	Voltage (three-phase)
Japan		50Hz/60Hz	100V/200V	200V/400V
North America	**US**	60Hz	115V/230V	208V/230V/460V/（480V）
	Canada	60Hz	120V/347V	208V/240V/600V
South America	**Brazil**	60Hz	127V	127V/220V
Asia	**South Korea**	60Hz	110V/220V	220V/380V
	Taiwan	60Hz	110V/220V	200V/220V/380V
	Hong Kong	50Hz	200V/220V	346V/380V
	China	50Hz	220V	220V/380V
	Philippines	60Hz	220V	380V
	Thailand	50Hz	220V	220V/380V
	Singapore	50Hz	230V	415V
	Malaysia	50Hz	240V	415V
	Indonesia	50Hz	220V	380V
	India	50Hz	240V	240V/415V
	Bangladesh	50Hz	230V	400V
Oceania	**Australia**	50Hz	240V	415V
	Guam	60Hz	120V	240V/480V
	New Zealand	50Hz	230V	230V/415V
Europe	**Austria**	50Hz	230V	400V
	Belgium	50Hz	230V	400V
	Bulgaria	50Hz	220V	380V
	Denmark	50Hz	230V	400V
	Finland	50Hz	230V	400V
	France	50Hz	230V	400V
	Germany	50Hz	230V	400V
	Greece	50Hz	230V	400V
	Hungary	50Hz	220V	380V
	Italy	50Hz	220V	380V
	Luxembourg	50Hz	230V	400V
	Holland	50Hz	230V	400V
	Norway	50Hz	220V/230V	380V
	Poland	50Hz	220V	380V
	Portugal	50Hz	230V	400V/480V
	Romania	50Hz	220V	380V
	Spain	50Hz	127V/220V	220V/380V
	Sweden	50Hz	230V/400V	400V/690V
	Switzerland	50Hz	230V	400V
	UK	50Hz	230V	400V
	Russia	50Hz	127V/220V	220V/380V

* The actual voltage may differ from the one above in some regions and cities even in the same country.
* The standard voltage in the US and Canada is single-phase 115 V but is usually rated at 120 V.

General Purpose Motor Specifications

2 Pole

Output [kW]		0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Frame number		63	71M	80M	90L	90L	112M	132S	132S	160M	160M	160L	180M	180L	200LB	200LB
Shaft diameter [mm]		11	14	19	24	24	28	38	38	42	42	42	48	55	55	55
Rated current [A]	**200V 50Hz**	1.1	2.0	3.5	6.0	9.0	14.2	21.5	28	41	55	67	82	109	133	161
	200V 60Hz	1.0	1.8	3.1	5.8	8.4	13.4	20	27	38	52	63	76	104	127	152
	220V 60Hz	1.0	1.8	3.0	5.4	8.0	12.4	18.5	25	35	47	57	70	94	117	141
Rated rotation speed [min^{-1}]	**200V 50Hz**	2800	2910	2890	2900	2870	2880	2900	2900	2910	2920	2920	2920	2930	2930	2930
	200V 60Hz	3340	3480	3470	3470	3440	3440	3490	3480	3500	3510	3510	3510	3510	3510	3510
	220V 60Hz	3400	3500	3490	3490	3460	3460	3510	3510	3520	3530	3530	3530	3530	3530	3530

* The above are reference values. The values may vary depending on the motor manufacturer.

4 Pole

Output [kW]		0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Frame number		63	71M	80M	90L	100L	112M	132S	132M	160M	160L	180M	180M	180L	200LB	200L
Shaft diameter [mm]		11	14	19	24	28	28	38	38	42	42	48	48	55	60	60
Rated current [A]	**200V 50Hz**	1.26	2.5	3.9	7.0	9.9	15.8	23	30	44	58	72	84	114	139	168
	200V 60Hz	1.1	2.1	3.5	6.3	8.9	14.5	21	28	40	53	66	78	106	132	159
	220V 60Hz	1.1	2.2	3.4	6.0	8.6	13.6	20	26	38	50	62	73	99	123	148
Rated rotation speed [min^{-1}]	**200V 50Hz**	1430	1420	1420	1430	1430	1430	1440	1440	1450	1450	1455	1455	1460	1460	1460
	200V 60Hz	1730	1700	1700	1720	1720	1710	1730	1730	1740	1740	1750	1750	1750	1750	1750
	220V 60Hz	1740	1710	1710	1730	1730	1730	1740	1740	1750	1750	1760	1760	1760	1760	1760

* The above are reference values. The values may vary depending on the motor manufacturer.

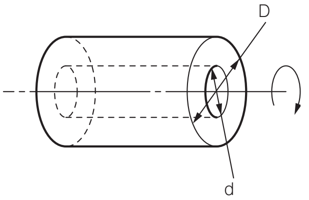
6 Pole

Output [kW]		0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Frame number		71	80M	90L	100L	112M	132S	132M	160M	160L	180M	180L	180L	200L	200L	225S
Shaft diameter [mm]		14	19	24	28	28	38	38	42	42	48	55	55	60	60	65
Rated current [A]	**200V 50Hz**	1.4	2.8	4.4	7.5	10.8	16.8	25	32	43	61	75	89	120	145	174
	200V 60Hz	1.3	2.5	3.9	6.8	9.8	16	23	28	40	56	69	82	110	134	163
	220V 60Hz	1.3	2.5	3.9	6.6	9.4	15	22	27	38	53	65	77	105	128	156
Rated rotation speed [min^{-1}]	**200V 50Hz**	930	940	940	940	950	940	950	960	960	965	965	965	970	970	970
	200V 60Hz	1110	1130	1130	1120	1130	1120	1140	1150	1150	1160	1160	1160	1165	1165	1165
	220V 60Hz	1120	1140	1140	1130	1140	1130	1150	1160	1160	1170	1165	1165	1170	1170	1170

* The above are reference values. The values may vary depending on the motor manufacturer.

Moment of Inertia J Calculation Formula

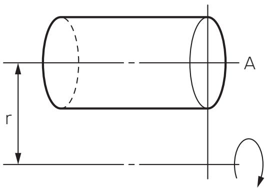
Moment of Inertia of a Hollow Cylinder



D : Outer diameter of the cylinder [m]
d : Inner diameter of the cylinder [m]
M: Mass of the cylinder [kg]

$$J=\frac{1}{8}M\ (D^2+d^2)\ [kg \cdot m^2]$$

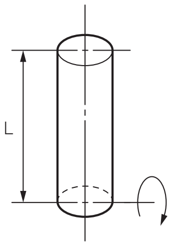
Moment of Inertial of a Cylinder with a Displaced Center-of-Rotation



r : Radius of gyration [m]
M : Mass of the cylinder [kg]
J_A : Moment of inertia of the cylinder rotating around the center axis A [kg•m²]

$$J=J_A+M \cdot r^2 \quad [kg \cdot m^2]$$

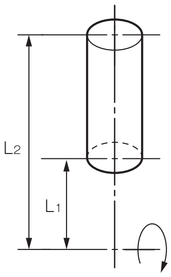
Moment of Inertia of a Rotating Rod



L : Length of the rod [m]
M: Mass of the rod [kg]

$$J=\frac{1}{12}M \cdot L^2 \quad [kg \cdot m^2]$$

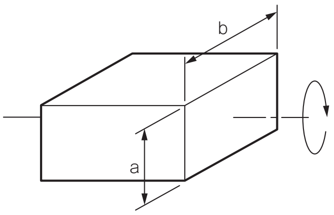
Moment of Inertial of a Rod with a Displaced Center-of-Rotation



L1, L2 : Distance from the center of rotation [m]
M : Mass of the rod [kg]

$$J=\frac{1}{12}M\,(L_1^2+L_1L_2+L_2^2)\,[kg \cdot m^2]$$

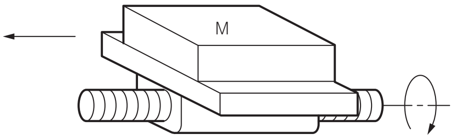
Moment of Inertia of a Cuboid



a, b : Side length [m]
M : Mass of the cuboid [kg]

$$J=\frac{1}{12}M\,(a^2+b^2)\,[kg \cdot m^2]$$

Moment of Inertia of an Object that Moves in a Straight Line

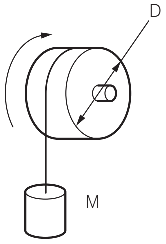


P : Feed screw lead [m]
M : Mass of the load [kg]
J_A : Moment of inertia of the feed screw [kg•m²]

$$J=J_A+\frac{M \cdot P^2}{4\pi^2}\ [kg \cdot m^2]$$

Moment of Inertia J Calculation Formula

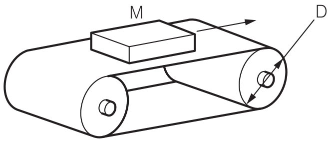
Moment of Inertia of the Winding Mechanism



J_A : Moment of inertia of the drum [kg•m^2]
D : Diameter of the drum [m}
M : Mass of the load [kg]

$$J=J_A+\frac{1}{4}M\bullet D^2\ [\mathrm{kg}\cdot\mathrm{m}^2]$$

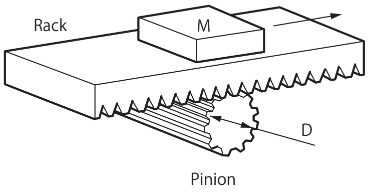
Moment of Inertia of the Belt Conveyor



J_A : Moment of inertia of the roller [kg•m^2]
D : Diameter of the roller [m]
M : Mass of the load [kg]

$$J=J_A+\frac{1}{4}M\bullet D^2\ [\mathrm{kg}\cdot\mathrm{m}^2]$$

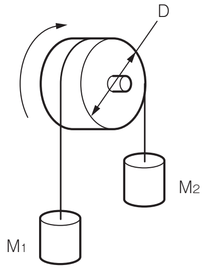
Moment of Inertia of the Rack and Pinion



J_A : Moment of inertia of thepinion [kg•m^2]
D : Diameter of the pinion [m]
M : Mass of the rack and load [kg]

$$J=J_A+\frac{1}{4}M\bullet D^2\ [\mathrm{kg}\cdot\mathrm{m}^2]$$

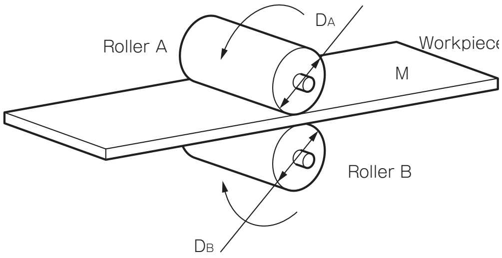
Moment of Inertia with Counterbalance



J_A : Moment of inertia of the drum [kg•m^2]
D : Diameter of the drum [m]
M_1, M_2 : Mass [kg]

$$J=J_A+\frac{1}{4}(M_1+M_2)\ D^2\ \ [\mathrm{kg}\cdot\mathrm{m}^2]$$

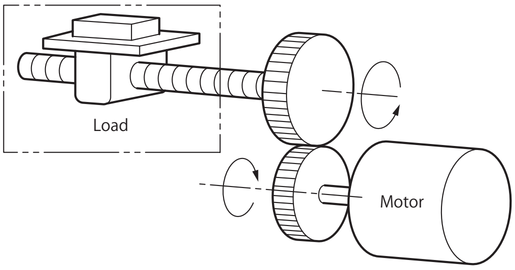
Moment of Inertia when a Workpiece Is Held by the Rollers



J_A : Moment of inertia of the roller A [kg•m^2]
J_B : Moment of inertia of the roller B [kg•m^2]
D_A: Diameter of the roller A [m]
D_B: Diameter of the roller B [m]
M : Equivalent mass of the workpiece [kg]

$$J=J_A+\left(\frac{D_A}{D_B}\right)^2J_B+\frac{1}{4}\ M\bullet D_A^2\ \ [\mathrm{kg}\cdot\mathrm{m}^2]$$

Motor Shaft Conversion Moment of Inertia



Z_1 : Teeth number of the motor-side gear
Z_2 : Teeth number of the load-side gear
R : Gear ratio Z_1/Z_2
J_A : Moment of inertia of load [kg•m^2]
J_1 : Moment of inertia of the motor-side gear [kg•m^2]
J_2 : Moment of inertia of the load-side gear [kg•m^2]

$$J=J_1+(J_A+J_2)\ R^2\ [\mathrm{kg}\cdot\mathrm{m}^2]$$

Moment of Inertia J Table

This table shows J (kg・m^2) of a disc made of steel (specific gravity 7.85) with a thickness of 10 mm and diameter of D mm. The values are given with intervals of 10 mm in the column and the values in the row are those in the column plus 1 mm. For discs with a thickness other than 10 mm, J can be obtained by dividing the thickness (ℓ mm) by 10 mm and then multiplying the value in the table by the result. For materials other than the steel, J can be obtained by multiplying the value in the table by the coefficient of each material.

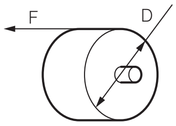
Cast iron	**0.93**
Aluminum	**0.33**
Copper	**1.1**

For example, if the diameter is 205 mm, the thickness is 20 mm, and the material is aluminum, 0.0089826 (kg・m^2) can be obtained by multiplying 0.01361 (in the intersection cell of column 200 and row 5) by 2 and multiplying the result by material factor 0.33.

Diameter [mm]	J [kg・m²]									
	0	1	2	3	4	5	6	7	8	9
10	0.000000077	0.000000113	0.000000160	0.000000220	0.000000296	0.000000390	0.000000505	0.000000644	0.000000809	0.00000104
20	0.00000123	0.00000150	0.00000181	0.00000216	0.00000256	0.00000301	0.00000352	0.00000410	0.00000474	0.00000545
30	0.00000624	0.00000712	0.00000808	0.00000914	0.00001030	0.00001156	0.00001294	0.00001444	0.00001607	0.00001783
40	0.00001973	0.00002178	0.00002398	0.00002635	0.00002889	0.00003160	0.00003451	0.00003761	0.00004091	0.00004443
50	0.00004817	0.00005214	0.00005635	0.00006081	0.00006553	0.00007052	0.00007579	0.00008135	0.00008721	0.00009339
60	0.00009988	0.0001067	0.0001139	0.0001214	0.0001293	0.0001376	0.0001462	0.0001553	0.0001648	0.0001747
70	0.0001850	0.0001958	0.0002071	0.0002189	0.0002311	0.0002439	0.0002571	0.0002709	0.0002853	0.0003002
80	0.0003157	0.0003317	0.0003484	0.0003657	0.0003837	0.0004023	0.0004216	0.0004415	0.0004622	0.0004835
90	0.0005056	0.0005285	0.0005521	0.0005765	0.0006017	0.0006277	0.0006546	0.0006823	0.0007108	0.0007403
100	0.0007707	0.0008020	0.0008342	0.0008674	0.0009016	0.0009368	0.0009730	0.001010	0.001048	0.001088
110	0.001128	0.001170	0.001213	0.001257	0.001302	0.001348	0.001395	0.001444	0.001494	0.001545
120	0.001598	0.001652	0.001707	0.001764	0.001822	0.001882	0.001942	0.002005	0.002069	0.002134
130	0.002201	0.002270	0.002340	0.002411	0.002485	0.002560	0.002636	0.002715	0.002795	0.002877
140	0.002961	0.003046	0.003133	0.003223	0.003314	0.003407	0.003502	0.003599	0.003698	0.003799
150	0.003902	0.004007	0.004114	0.004223	0.004335	0.004448	0.004564	0.004682	0.004803	0.004926
160	0.005051	0.005178	0.005308	0.005440	0.005575	0.005712	0.005852	0.005994	0.006139	0.006287
170	0.006437	0.006590	0.006745	0.006903	0.007064	0.007228	0.007395	0.007564	0.007737	0.007912
180	0.008090	0.008271	0.008456	0.008643	0.008834	0.009027	0.009224	0.009424	0.009627	0.009834
190	0.01004	0.01026	0.01047	0.01069	0.01092	0.01114	0.01137	0.01161	0.01184	0.01209
200	0.01233	0.01258	0.01283	0.01309	0.01335	0.01361	0.01388	0.01415	0.01443	0.01470
210	0.01499	0.01528	0.01557	0.01586	0.01616	0.01647	0.01678	0.01709	0.01741	0.01773
220	0.01805	0.01838	0.01872	0.01906	0.01940	0.01975	0.02010	0.02046	0.02083	0.02119
230	0.02157	0.02194	0.02233	0.02271	0.02311	0.02350	0.02391	0.02431	0.02473	0.02515
240	0.02557	0.02600	0.02643	0.02687	0.02732	0.02777	0.02822	0.02869	0.02915	0.02963
250	0.03010	0.03059	0.03108	0.03158	0.03208	0.03259	0.03310	0.03362	0.03415	0.03468
260	0.03522	0.03576	0.03631	0.03687	0.03744	0.03801	0.03858	0.03917	0.03976	0.04035
270	0.04096	0.04157	0.04218	0.04281	0.04344	0.04408	0.04472	0.04537	0.04603	0.04670
280	0.04737	0.04805	0.04874	0.04943	0.05014	0.05085	0.05156	0.05229	0.05302	0.05376
290	0.05451	0.05526	0.05603	0.05680	0.05758	0.05837	0.05916	0.05996	0.06078	0.06160
300	0.06242	0.06326	0.06411	0.06496	0.06582	0.06669	0.06757	0.06846	0.06935	0.07026
310	0.07117	0.07210	0.07303	0.07397	0.07492	0.07588	0.07685	0.07782	0.07881	0.07981
320	0.08081	0.08183	0.08285	0.08388	0.08493	0.08598	0.08704	0.08812	0.08920	0.09029
330	0.09140	0.09251	0.09363	0.09476	0.09591	0.09706	0.09823	0.09940	0.10059	0.10178
340	0.10299	0.10420	0.10543	0.10667	0.10792	0.10918	0.11045	0.11173	0.11303	0.11433
350	0.11565	0.11698	0.11832	0.11967	0.12103	0.12240	0.12379	0.12518	0.12659	0.12801
360	0.12944	0.13089	0.13234	0.13381	0.13529	0.13679	0.13829	0.13981	0.14134	0.14288
370	0.14444	0.14600	0.14758	0.14918	0.15078	0.15240	0.15404	0.15568	0.15734	0.15901
380	0.16070	0.16239	0.16411	0.16583	0.16757	0.16932	0.17109	0.17287	0.17466	0.17647
390	0.17829	0.18013	0.18198	0.18384	0.18572	0.18761	0.18952	0.19144	0.19338	0.19533
400	0.19729	0.19927	0.20127	0.20328	0.20530	0.20734	0.20940	0.21147	0.21356	0.21566
410	0.21777	0.21991	0.22205	0.22422	0.22640	0.22859	0.23080	0.23303	0.23527	0.23753
420	0.23981	0.24210	0.24441	0.24674	0.24908	0.25143	0.25381	0.25620	0.25861	0.26103
430	0.26348	0.26594	0.26841	0.27091	0.27342	0.27595	0.27849	0.28106	0.28364	0.28624
440	0.28886	0.29149	0.29414	0.29681	0.29950	0.30221	0.30494	0.30768	0.31044	0.31322
450	0.31602	0.31884	0.32168	0.32454	0.32741	0.33030	0.33322	0.33615	0.33910	0.34207
460	0.34506	0.34808	0.35111	0.35416	0.35722	0.36031	0.36342	0.36655	0.36970	0.37287
470	0.37606	0.37927	0.38251	0.38576	0.38903	0.39232	0.39564	0.39897	0.40233	0.40571
480	0.40910	0.41252	0.41597	0.41943	0.42291	0.42642	0.42995	0.43350	0.43707	0.44066
490	0.44428	0.44791	0.45158	0.45526	0.45896	0.46269	0.46644	0.47021	0.47401	0.47783
500	0.48167	0.48553	0.48942	0.49333	0.49727	0.50123	0.50521	0.50922	0.51324	0.51730

Load Torque Calculation Formula

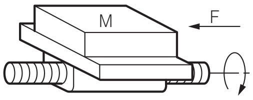
Torque when Adding the External Force of the Rotating Object: T



D : Diameter of the drum [m]
F : External force [N]

$$T=\frac{1}{2}D\cdot F\ [\mathrm{N\cdot m}]$$

Torque by Friction Force of the Feed Screw and External Force: T

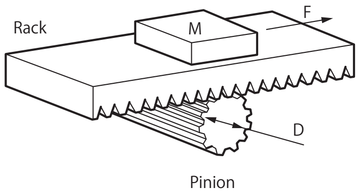


P : Feed screw lead [m]
M : Mass of the load [kg]
g : Gravitational acceleration [m/s^2]
μ : Friction coefficient of the feed screw
F : External force [N]

$$T=\frac{1}{2\pi}P\ (F+\mu Mg)\ \ [\mathrm{N\cdot m}]$$

(Normally, μ : approximately 0.05 to 0.2)

Torque by Friction Force of Rack and Pinion and External Force: T

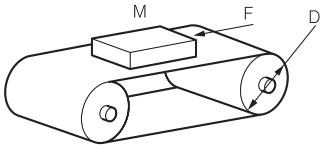


D : Diameter of the pinion [m]
M : Mass of the load [kg]
g : Gravitational acceleration [m/s^2]
μ : Friction coefficient of the rack and pinion
F : External force [N]

$$T=\frac{1}{2}D\ (F+\mu Mg)\ [\mathrm{N\cdot m}]$$

(Normally, μ : approximately 0.08 to 0.1)

Torque by Friction Force of Conveyor and External Force: T

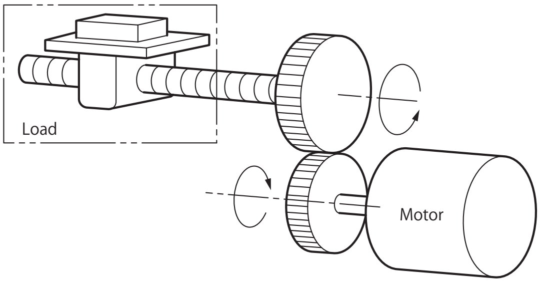


D : Diameter of the roller [m]
M : Mass of the load [kg]
g : Gravitational acceleration [m/s^2]
μ : Friction coefficient of the conveyor
F : External force [N]

$$T=\frac{1}{2}D\ (F+\mu Mg)\ [\mathrm{N\cdot m}]$$

(Normally, μ : approximately 0.05 to 0.1)

Motor Shaft Conversion Torque: To



Z_1 : Teeth number of the motor-side gear
Z_2 : Teeth number of the load-side gear
R : Gear ratio Z_1/Z_2
η : Transmission efficiency %/100
T : Load-side torque [N•m]

$$T_O=\frac{R\cdot T}{\eta}\ [\mathrm{N\cdot m}]$$

* The friction coefficient value μ varies depending on the machine processing accuracy, lubrication condition, and other factors. Pay enough attention when calculating the load torque.
* The transmission efficiency η between the motor and load varies depending on the connection method. The following shows typical values.
Spur gear: 0.85 Chain: 0.9 V-belt: 0.9

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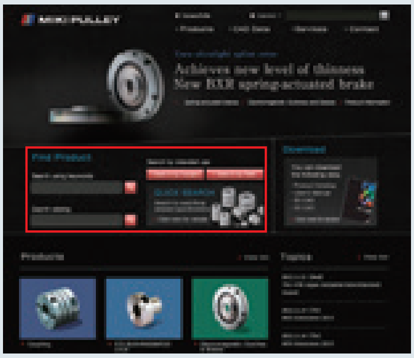

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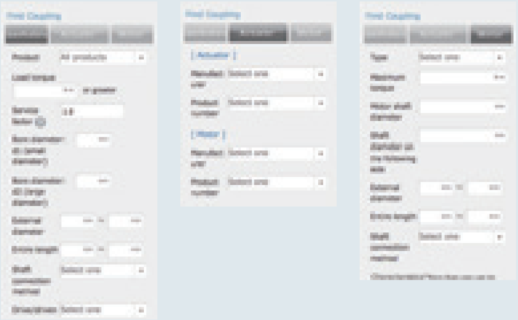

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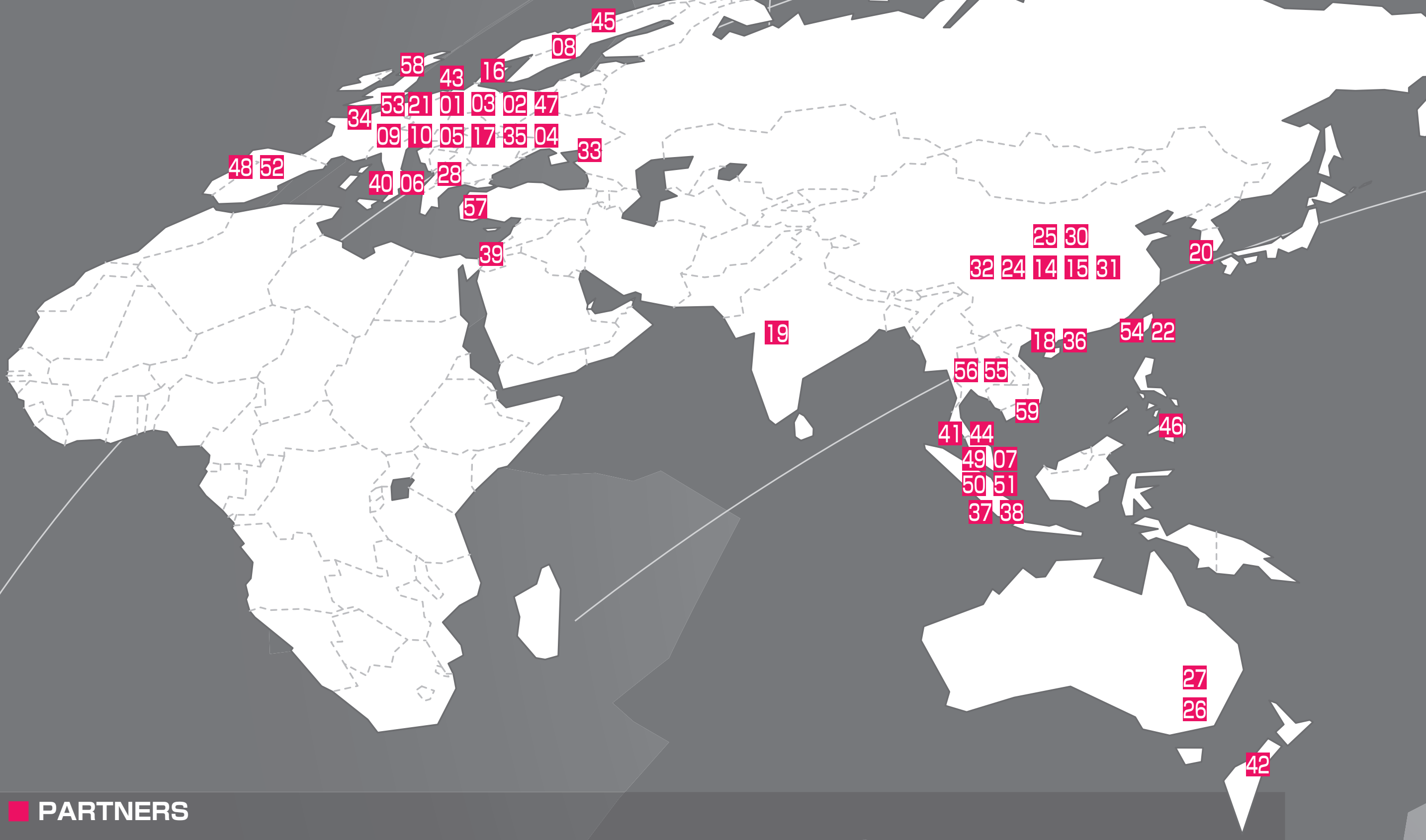

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