2

# Rotary Damper

A rotary type damper utilizing oil viscosity resistance or hydraulic resistance
Provides a soft opening/closing action of doors and lids and creates a touch of quality
for furniture, automotive interiors, and equipment.

# Read these instructions before use

This owner's manual contains various safety cautions regarding the proper handling of this product, and preventing danger to the operator as well as damage to the plant and the machine. Please read this manual thoroughly before using the product.

## ⚠ Warning

**Definition of Warning** "Warning" applies to situations in which death or serious injuries may occur to the user, etc. if the potential dangers of the products are not avoided.

### A person who designs the equipment or determines the specification shall determine the compatibility of a rotary damper.

● A person who designs the equipment or determines the specification shall determine the compatibility of a rotary damper with the equipment as necessary after carrying out a performance verification and a life test because there are a variety of conditions for applications.

### Please do not use outside the specification range of a rotary damper.

● Any use outside the specification range will cause a malfunction or damage to product.

### Enforcement of safety measures for applications as follows

● Please enforce a safety measure when using in the conditions and environments listed below, and consult our company beforehand for determining the adequacy of use.

1) The use in such places as an environment outside the specification not clarified in the catalogs or owner's manuals, outdoors or direct sunlight
2) The use for those devices and applications such as nuclear power equipment, the devices directly or indirectly related with the services of railroad, boats and ships and the running of vehicles, aerospace devices, military devices, medical devices, devices contacting with beverages and foods, combustion equipment, amusement devices influencing human or property, emergency shut down circuit, press devices, etc., a serious influence on humans or property is anticipated and special safety is requested.

### Do not throw into an open flame

● Throwing into an open flame poses a risk of injury by explosion or ignition of encapsulated oil.

## ⚠ Caution

**Definifinition of "Caution"** "Caution" applies to situations in which minor injuries or property damage may result if the operation or maintenance procedures are not strictly followed.

### Do not operate without sufficient mounting strength

●Operating with insufficient mounting strength may damage the main machine and cause injuries.

●Ensure sufficient mounting strength of load torque x safety factor

### Do not operate without an external stopper

●Use within the damper's range of operating angle. Do not use the damper itself as a stopper by setting the rotational limit position of the rotating shaft as the resting position of the rotating object. Using the damper itself as a stopper may damage the damper and consequently damage the main machine, and it may also result in injuries.

●Set the external stopper to the operating angle before use.

### Do not use when the maximum operating torque is exceeded

●Using this product beyond the maximum operating torque may cause an oil leak, reduced durability, and damage to the shaft This may damage the damper and consequently damage the main machine, and it may also result in injuries. Do not exceed the maximum operating torque when using this product.

### Do not operate outside the operating temperature range

●Using this product outside the operating temperature range may cause an oil leak and torque problems. Use this product within the operating temperature range.

### Usage enviornment

●This product cannot be used in a vaccum or under high pressure, as this will cause damage to the main machine.

●Do not use in an environment where chips, cutting oil, water, etc. can come in contact with the linear damper. This will result in a malfunction due to an oil leak caused by damage.

### Do not discard oil more than is necesssary

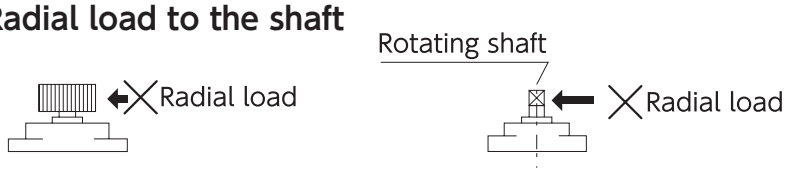
●Discarding the oil contained in dampers more than is necessary will pollute the environment.

●Dispose the oil according to laws concerning waste management and cleaning.

### Remodeling of the product is prohibited

● Any remodeling on the product (additional working, coating, welding, hardening, etc.) will void all warranties by our company.

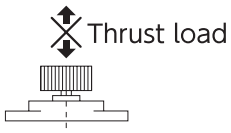
## Radial load to the shaft



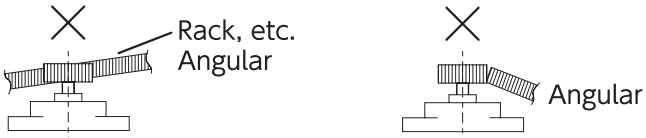

●Applying load to the rotating shaft (gear) in a radial direction may cause an oil leak, torque problems, and damage to the shaft (or to the gear if the gear is used).

## Thrust load to the shaft

●Applying load to the rotating shaft (gear) in a thrust direction may cause an oil leak, torque problems, and damage to the main unit (or to the gear, or cause the gear to become disengaged, if the gear is used).




★ When assembling, attach the damper's gear to the opposing arm (gear) as parallel as possible.




## Using the product above its maximum rotations

●Using this product above its maximum rotations may cause an oil leak, torque problems, and damage to the rotating shaft.
★ Please refer to the catalogue for the product's maximum rotations.
(*If you are going to exceed the maximum rotations when using this product, please contact our sales department.)

## Using the product outside its operating temperature range

●Using this product outside the operating temperature range may cause an oil leak and torque problems.
★ Please refer to the catalogue for the product's operating temperature range.
(*If you are going to use this product outside its operating temperature range, please contact our sales department.)

## Using the product above its maximum cycles

●Using this product above its maximum cycles may cause torque down and an oil leak.
★ Please refer to the catalogue for the product's maximum cycles.
(*If you are going to exceed the maximum rotations when using this product, please contact our sales department.)

## Over-tightening of mounting screws

●Over-tightening the mounting screws when installing a rotary damper may cause damage to the main unit.
★ Based on the types and sizes of the screws used, please apply an appropriate tightening torque to tighten the screws.

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## Disposal

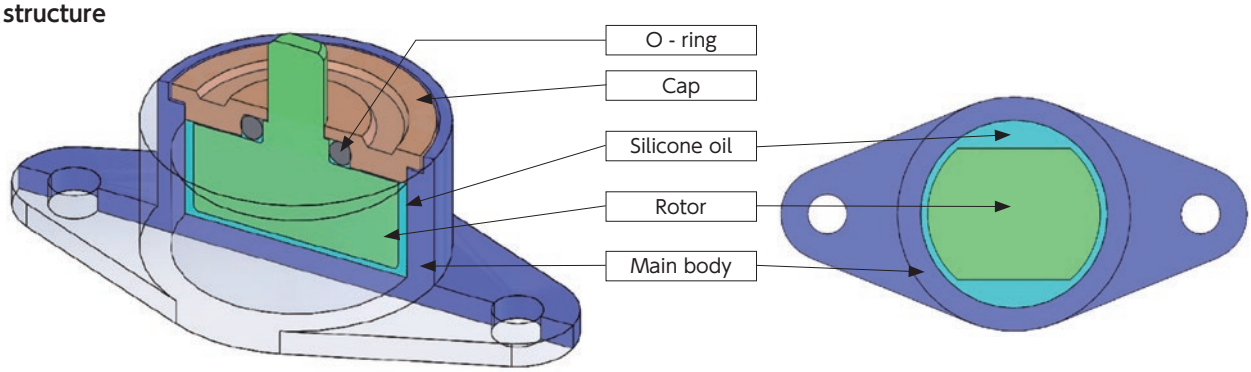
● When a rotary damper is no more necessary, please take a proper disposal procedure in accordance with the local ordinance, rules, etc. as an industrial waste.

**Fuji Latex is not responsible for any secondary accidents caused by a rotary damper. The user should implement preventative measures against such secondary accidents.**

# Basic Structure and Principle

## 1. Rotary Damper

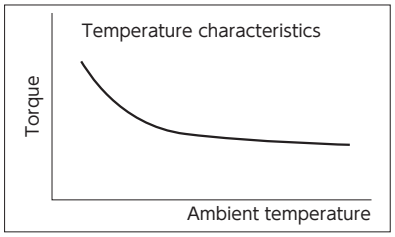
**Basic structure**




This is a rotary damper that utilizes the braking force generated by the oil's viscosity resistence. The braking force generated by oil viscosity, clearance between the rotor and the main body, and the oil's contact area varies based on the structure shown above.

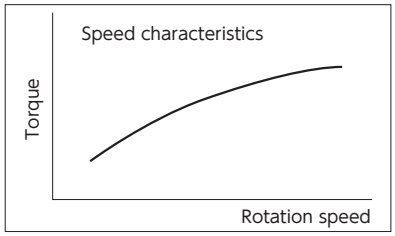
**1−1) Temperature characteristics**

The torque of a rotary damper varies according to the ambient temperature. This is because the viscosity of the oil inside the damper changes according to the temperature.




**1−2) Speed characteristics**

The braking torque of a rotary damper varies according to the cycle rate. In general, the torque increases when the cycle rate increases, and the torque decreases when the cycle rate decreases. The rated torque listed in the catalogue is the torque generated when the cycle rate is 20rpm.

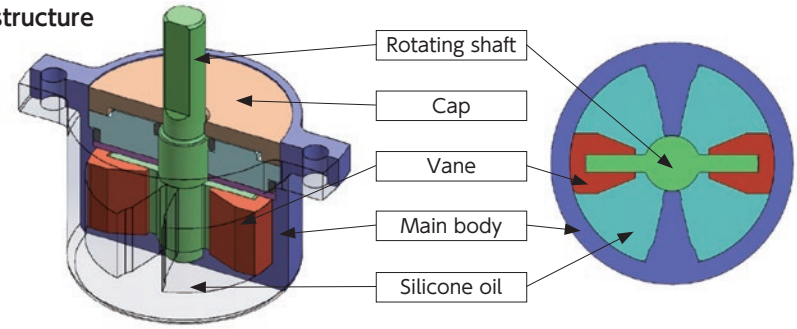



**1-3) Direction of Torque Generation**

The torque is generated in both directions in principle, but one-way rotary dampers are available for some of the models with an implemented one-way clutch

## 2. Vane Damper

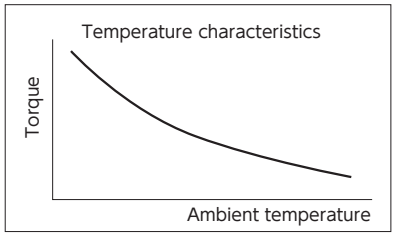
**Basic structure**

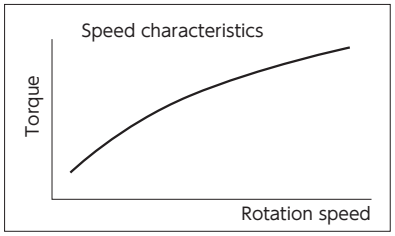



This is a rotating-type damper that utilizes the oil pressure. The braking force generated by oil viscosity, clearance between the rotor and the main body, and the vane's pressure-receiving area varies based on the structure shown above.

**Basic characteristics**

Similar to the rotary damper, the torque varies according to the ambient temperature. Its basic structure is a dashpot structure (single orifice). The internal pressure of a damper increases as the ratation speed increases, which consequently increases the torque.



# Selection / Key to Model Number



## Selection of Rotary Damper and Vane Damper

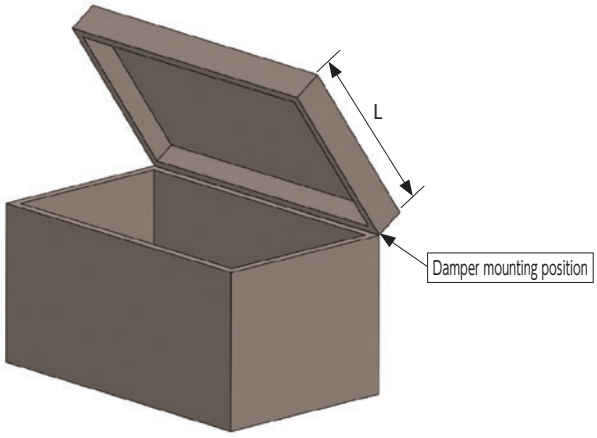
1) If the rotating shaft and the damper's axis are directly connected, the approximate torque can be calculated based on the following equation if the lid size and the weight are known.

Torque $T = M \times 9.8 \times \frac{L}{2}$ (N·m)

M : Weight of the lid (kg)

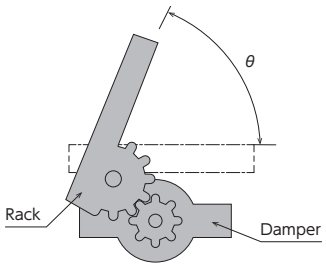
L : Dimensions of the lid (m)

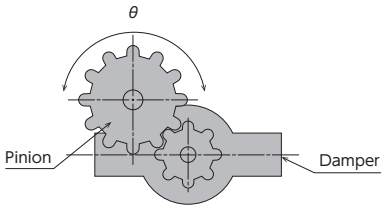
( $\frac{L}{2}$ is assumed as the lid gravity center position)




Using the above equation, determine the maximum torque generaged immediately prior to the closing of the lid. Use a prototype to confirm its performance in an actual machine, and determine the torque required. Fine adjustment of the torque can be done by varying the viscosity of the oil inside the damper.

2) If the damper's rotating shaft and the lid's rotating shaft are connected by a lever or a gear, the results of the aforementioned torque calculation will vary according to the lever ratio or gear ratio.




There is no exact method for determining whether a damper is suitable for the application or not. In the event that closing time is chosen as a factor, an apparent damper effect can be observed if it takes 2 seconds or longer for the lid to fully close after it is allowed to free-fall from a 60° angle. However, it is ultimately up to the user as to whether the damper is suitable for the application or not.

## Key to Model Number

**<Rotary damper, Disc damper**

FRN–F2–R 203 G □

- Series name: FRT : Bi-directional rotary damper / FRN : Uni-directional rotary damper / FDT : Bi-directional disc damper / FDN : Uni-directional disc damper
- Model name
- Damping direction: R : Torque is generated in a clockwise direction / L : Torque is generated in a counter-clockwise direction
- Torque: The last digit indicates the power, and the torque is expressed as below. 203=20×10³ =20,000gf·cm =2N·m(20Kgf·cm)
- With or without gear: G : With gear, Blank : without gear
- Gear specification

**Vane Damper**

FYN–H1–R 104

- Series name: FYT : Bi-directional vane damper / FYN : Uni-directional vane damper
- Model name
- Damping direction: R : Torque is generated in a clockwise direction / L : Torque is generated in a counter-clockwise direction
- Torque: The last digit indicates the power, and the torque is expressed as below. 104=10×10⁴ =100,000gf·cm =10N·m(100kgf·cm)

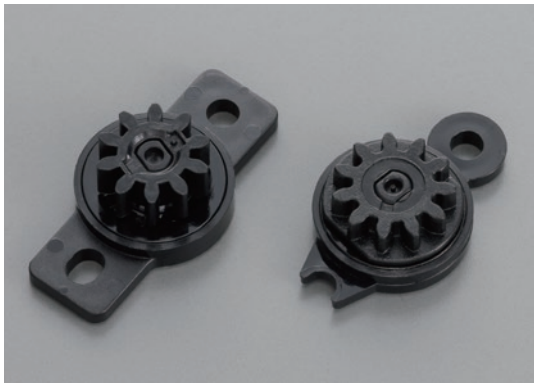
# Rotary Damper

Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

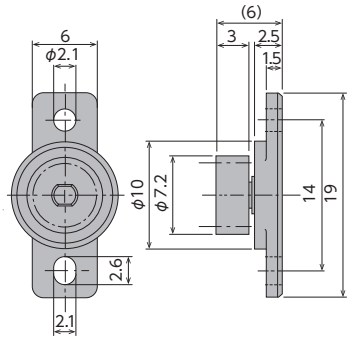
## FRT-E2/E9 Series

RoHS Compliant

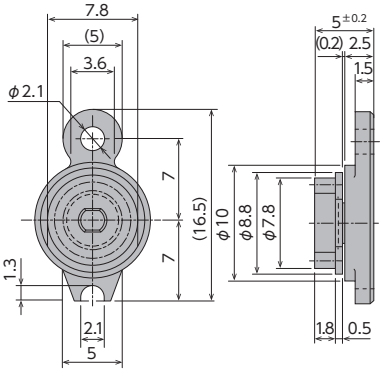
●Products specification might be changed without notice.



〈FRT-E2-※※※G1〉




〈FRT-E9-※※※G2〉




## Specifications

| Model | Rated torque |
|---|---|
| FRT-E2-100G1 | (1±0.5)×10$^{-3}$N·m |
| FRT-E9-100G2 | 10±5 gf·cm |
| FRT-E2-200G1 | (2±0.7)×10$^{-3}$N·m |
| FRT-E9-200G2 | 20±7 gf·cm |
| FRT-E2-300G1 | (3±0.8)×10$^{-3}$N·m |
| FRT-E9-300G2 | 30±8 gf·cm |
| FRT-E2-400G1 | (4±1)×10$^{-3}$N·m |
| FRT-E9-400G2 | 40±10 gf·cm |

Note 1) Rated torque measured at a rotation speed of 20rpm at 23˚C
Note 2) Gear model number has G1 and G2 at the end

- ∗ Max. rotation speed 50rpm
- ∗ Max. cycle rate 10cycle/min
- ∗ Operating temperature 0～50℃
- ∗ Weight FRT-E2 : with gear : 0.41g
  FRT-E9 : with gear : 0.38g
- ∗ Body and cap material Polycarbonate (PC)
- ∗ Rotating shaft material Polyacetal (POM)
- ∗ Gear material Polyacetal (POM)
- ∗ Oil type Silicone oil

Note 3) Torque can be customized by changing the oil viscosity (see Customizable Torque Chart on page 178)
Note 4) Model E9 is a customized product with a one-sided mounting

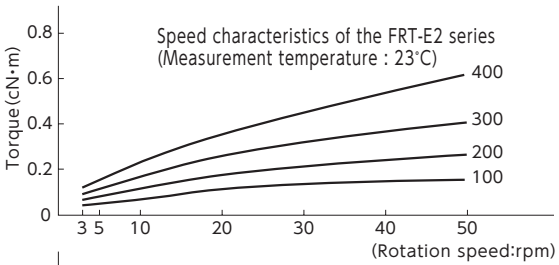
## Gear Specifications

| Model | G1 (for E2) | G2 (for E9) |
|---|---|---|
| Type | Standard spur gear | Standard spur gear |
| Tooth profile | Involute | |
| Module | 0.6 | |
| Pressure angle | 20˚ | |
| Number of teeth | 10 | 11 |
| Pitch circle diameter | φ6 | φ6.6 |

## Damper Characteristics

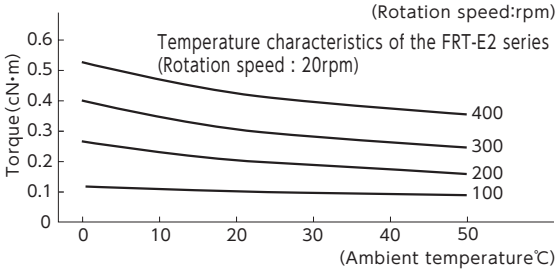
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.




**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



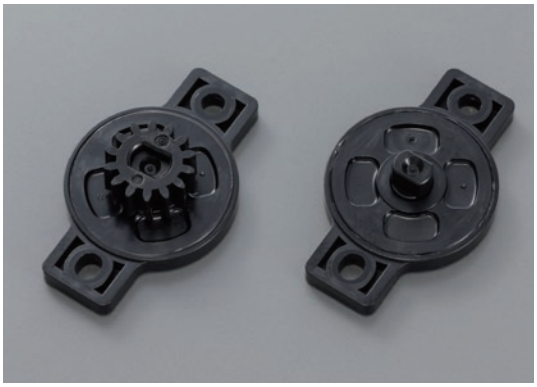
# Rotary Damper

Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

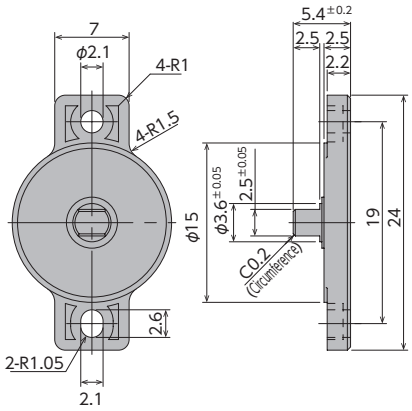
## FRT-G2 Series

RoHS Compliant

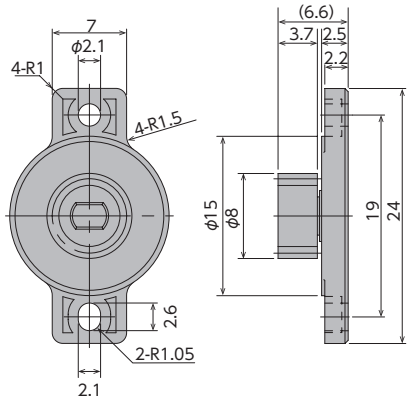
●Products specification might be changed without notice.



〈FRT-G2-※※※〉




〈FRT-G2-※※※G※〉



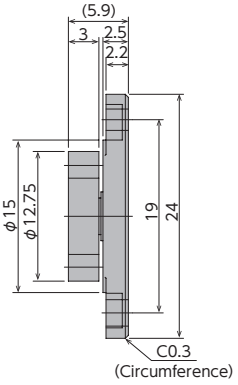

## Specifications

| Model | Rated torque |
|---|---|
| FRT-G2-200(G*) | (2±0.7)×10$^{-3}$N·m 20±7 gf·cm |
| FRT-G2-300(G*) | (3±0.8)×10$^{-3}$N·m 30±8 gf·cm |
| FRT-G2-450(G*) | (4.5±1)×10$^{-3}$N·m 45±10 gf·cm |
| FRT-G2-600(G*) | (6±1.2)×10$^{-3}$N·m 60±12 gf·cm |
| FRT-G2-101(G*) | (10±2)×10$^{-3}$N·m 100±20 gf·cm |

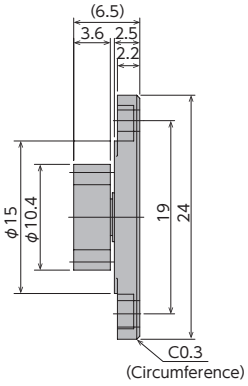
Note 1) Rated torque measured at a rotation speed of 20rpm at 23°C
Note 2) Models with gear bears G1, G2, or G3 at the end of their model numbers
Note 3) Torque can be customized by changing the oil viscosity (see Customizable Torque Chart on page 178)
Note 4) The diagrams above are outline drawings of FRT-G2-****. Please refer to the diagrams at the right for G2 and G3.

* Max. rotation speed 50rpm
* Max. cycle rate 10cycle/min
* Operating temperature 0～50℃
* Weight 0.6g(with gear : G1 : 0.8g G2 : 1.0g G3 : 0.9g)
* Body and cap material Polycarbonate (PC)
* Rotating shaft material Polyacetal (POM)
* Gear material Polyacetal (POM)
* Oil type Silicone oil

〈FRT-G2-※※※G2〉




〈FRT-G2-※※※G3〉




## Gear Specifications

| | G1 | G2 | G3 |
|---|---|---|---|
| Type | Standard spur gear | Profile shifted spur gear | Standard spur gear |
| Tooth profile | Involute | | |
| Module | 0.5 | 1.0 | 0.8 |
| Pressure angle | 20° | | |
| Number of teeth | 14 | 10 | 11 |
| Pitch circle diameter | φ7 | φ10 | φ8.8 |
| Addendum modification | – | +0.375 | – |

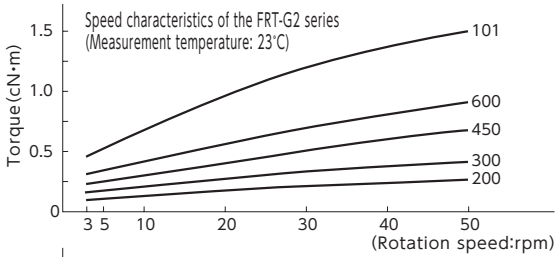
## Damper Characteristics

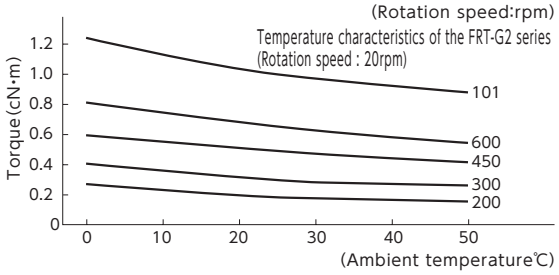
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.

**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



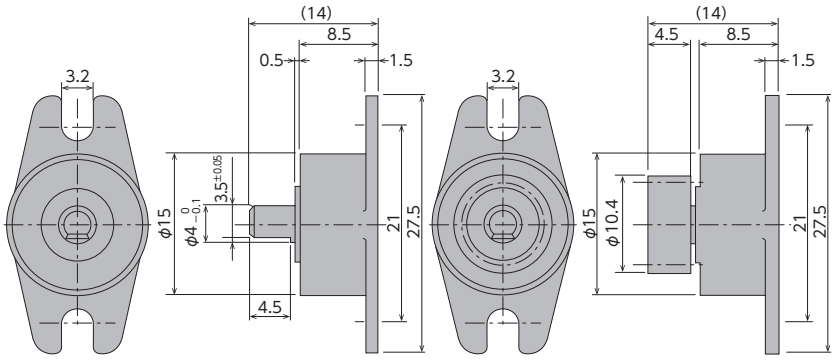
# Rotary Damper

Bi-Directional Uni-Directional
Fixed Type Adjustable type Self-adjusting

## FRT/FRN-C2 Series

RoHS Compliant

●Products specification might be changed without notice.




## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FRT-C2-201 (G1) | (20±6)×10$^{-3}$N·m 200±60 gf·cm | Both directions |
| FRT-C2-301 (G1) | (30±8)×10$^{-3}$N·m 300±80 gf·cm | Both directions |
| FRN-C2-R301 (G1) | (30±8)×10$^{-3}$N·m 300±80 gf·cm | Clockwise |
| FRN-C2-L301 (G1) | | Counter-clockwise |

Note 1) Rated torque measured at a rotation speed of 20rpm at 23°C
Note 2) Gear model number has G1 at the end
Note 3) Torque can be customized by changing the oil viscosity (see Customizable Torque Chart on page 178)
● There are dampers that generate torque in both directions and one-way torque in the CW direction or CCW direction when the rotating axle is viewed from the top.

| | |
|---|---|
| ∗ Max. rotation speed | 50rpm |
| ∗ Max. cycle rate | 10cycle /min |
| ∗ Operating temperature | 0 ~50℃ |
| ∗ Weight | FRT-C2 : 2.1g (with gear : 2.4g) |
| | FRN-C2 : 3.2g (with gear : 3.5g) |
| ∗ Body and cap material | Polycarbonate (PC) |
| ∗ Rotating shaft material | Polyacetal (POM) |
| | metal (FRT: POM, FRN: SUS) |
| ∗ Gear material | Polyacetal (POM) |
| ∗ Oil type | Silicone oil |

## Gear Specifications

| Type | Profile shifted spur gear |
|---|---|
| Tooth profile | Involute |
| Module | 0.8 |
| Pressure angle | 20° |
| Number of teeth | 11 |
| Pitch circle diameter | φ8.8 |

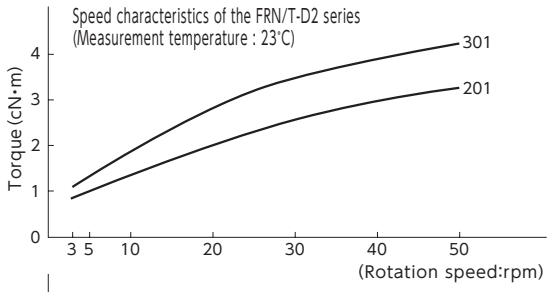
## Damper Characteristics

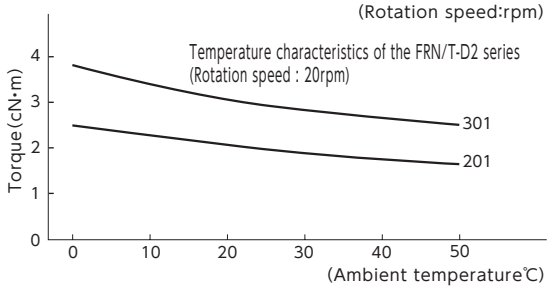
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.

**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



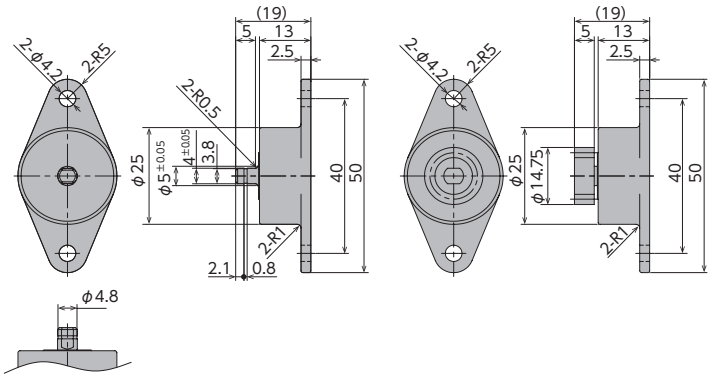
# Rotary Damper

Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

## FRT/FRN-D3 Series

RoHS Compliant

●Products specification might be changed without notice.




## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FRT-D3-501(G1) | (50±10)×10⁻³N·m 500±100 gf·cm | Both directions |
| FRT-D3-102(G1) | (100±20)×10⁻³N·m 1,000±200 gf·cm | Both directions |
| FRT-D3-152(G1) | (150±30)×10⁻³N·m 1,500±300 gf·cm | Both directions |
| FRT-D3-202(G1) | (200±40)×10⁻³N·m 2,000±400 gf·cm | Both directions |
| FRT-D3-252(G1) | (250±50)×10⁻³N·m 2,500±500 gf·cm | Both directions |
| FRN-D3-R501(G1) | (50±10)×10⁻³N·m 500±100 gf·cm | Clockwise |
| FRN-D3-L501(G1) | | Counter-clockwise |
| FRN-D3-R102(G1) | (100±20)×10⁻³N·m 1,000±200 gf·cm | Clockwise |
| FRN-D3-L102(G1) | | Counter-clockwise |
| FRN-D3-R152(G1) | (150±30)×10⁻³N·m 1,500±300 gf·cm | Clockwise |
| FRN-D3-L152(G1) | | Counter-clockwise |
| FRN-D3-R202(G1) | (200±40)×10⁻³N·m 2,000±400 gf·cm | Clockwise |
| FRN-D3-L202(G1) | | Counter-clockwise |
| FRN-D3-R252(G1) | (250±50)×10⁻³N·m 2,500±500 gf·cm | Clockwise |
| FRN-D3-L252(G1) | | Counter-clockwise |

Note 1) Rated torque measured at a rotation speed of 20rpm at 23℃
Note 2) Gear model number has G1 at the end

* Max. rotation speed 50rpm
* Max. cycle rate 10cycle/min
* Operating temperature 0～50℃
* Weight FRT-D3 : 8.3g(with gear : 9g)
  FRN-D3 : 12.3g(with gear : 13g)
* Body and cap material * Oil type
* Rotating shaft material Polyacetal (POM)
  metal (FRN : SUS)
* Gear material Polyacetal (POM)
* Oil type Silicone oil
* Cap color FRT : Gray
  FRN(R) : Black
  FRN(L) : White

## Gear Specifications

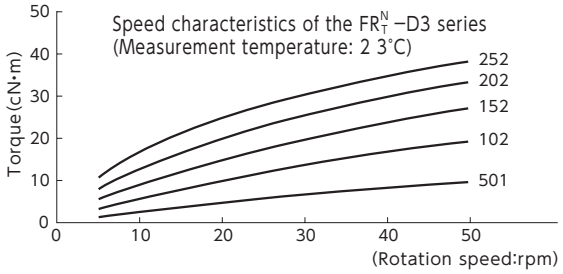
| Type | Profile shifted spur gear |
|---|---|
| Tooth profile | Involute |
| Module | 1.0 |
| Pressure angle | 20° |
| Number of teeth | 12 |
| Pitch circle diameter | φ12 |
| Rack shift coefficient | +0.375 |

Note 3) Torque can be customized by changing the oil viscosity (see Customizable Torque Chart on page 178)
● There are dampers that generate torque in both directions and one-way torque in the CW direction or CCW direction when the rotating axle is viewed from the top.

## Damper Characteristics

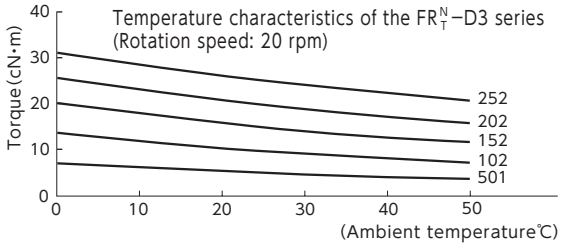
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.




**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



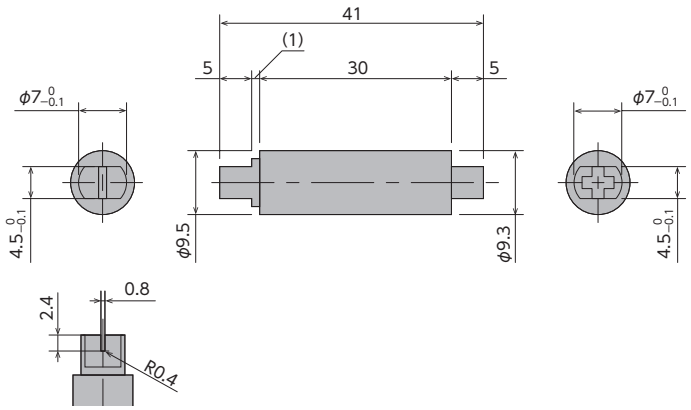
# Rotary Damper

Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

## FRT-S1 Series

RoHS Compliant

●Products specification might be changed without notice.




## Specifications

| Model | Rated torque |
|---|---|
| FRT-S1-201 | (20±6)×10$^{-3}$N·m<br>200±60 gf·cm |
| FRT-S1-301 | (30±8)×10$^{-3}$N·m<br>300±80 gf·cm |

Note 1) Rated torque measured at a rotational speed of 20 rpm at 23℃
Note 2) Torque can be customized by changing the oil viscosity.
(See Customizable Torque Chart on page 178.)

| | |
|---|---|
| ＊Max. rotational speed | 50rpm |
| ＊Max. cycle rate | 10cycle /min |
| ＊Operating temperature | 0 ~50℃ |
| ＊Weight | 3g |
| ＊Main body material | Polyacetal(POM) |
| ＊Rotating shaft material | Polyacetal(POM) |
| ＊Oil type | Silicone oil |

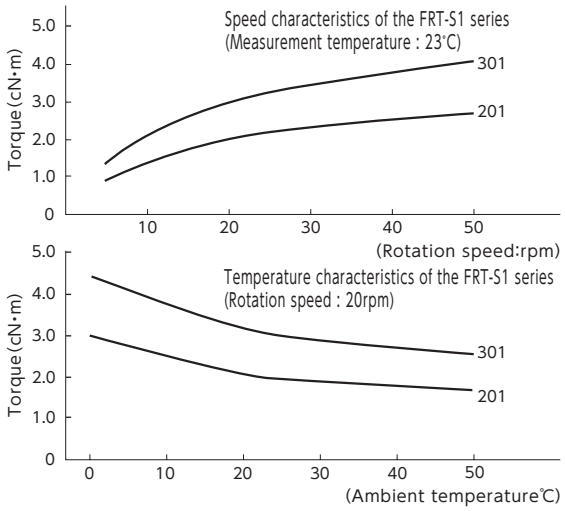
## Damper Characteristics

**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.

**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



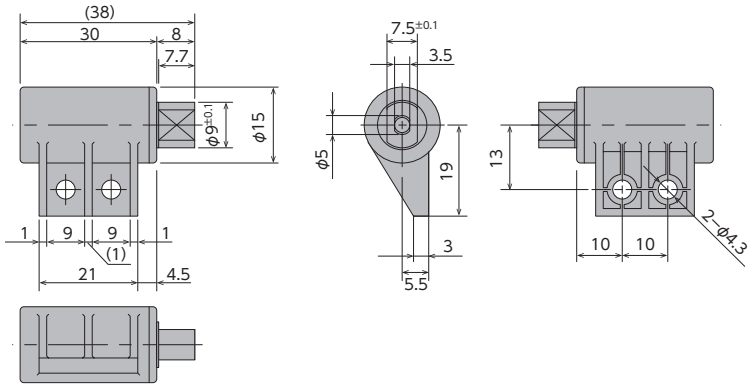
# Rotary Damper

Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

## FRT-N1 Series

RoHS Compliant

●Products specification might be changed without notice.




## Specifications

| Model | Rated torque |
|---|---|
| FRT-N1-102 | (100±20)×10$^{-3}$N·m<br>1,000±200 gf·cm |
| FRT-N1-182 | (180±36)×10$^{-3}$N·m<br>1,800±360 gf·cm |

Note 1) Rated torque measured at a rotational speed of 20 rpm at 23℃
Note 2) Torque can be customized by changing the oil viscosity.
(See Customizable Torque Chart on page 178.)

| | |
|---|---|
| ∗ Max. rotational speed | 50rpm |
| ∗ Max. cycle rate | 10cycle /min |
| ∗ Operating temperature | 0 ~50℃ |
| ∗ Weight | 8.2g |
| ∗ Main body material | Polyacetal(POM) |
| ∗ Cap material | Polyacetal(POM) |
| ∗ Rotating shaft material | Polyacetal(POM) |
| ∗ Oil type | Silicone oil |

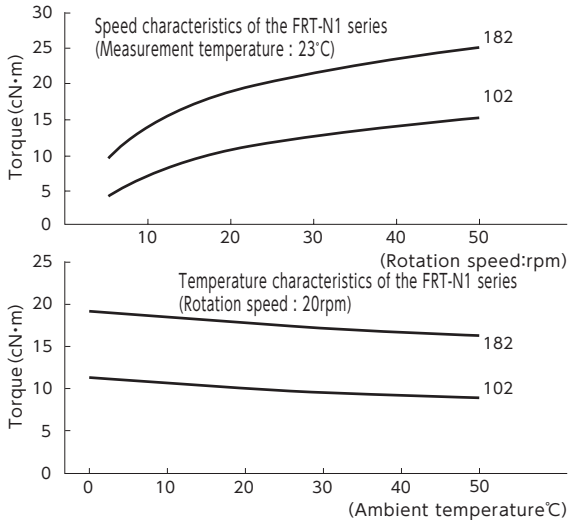
## Damper Characteristics

**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.

**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



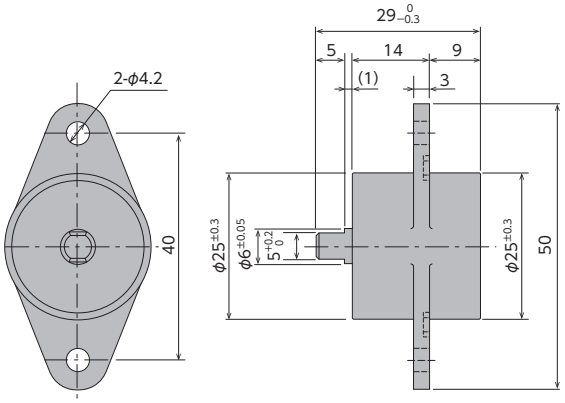
# Rotary Damper

Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

## FRT-L1 Series

RoHS Compliant

●Products specification might be changed without notice.




## Specifications

| Model | Rated torque |
|---|---|
| FRT-L1-202 | (200±40)×10⁻³N·m<br>2,000±400 gf·cm |
| FRT-L1-302 | (300±60)×10⁻³N·m<br>3,000±600 gf·cm |

Note 1) Rated torque measured at a rotational speed of 20 rpm at 23℃
Note 2) Torque can be customized by changing the oil viscosity.
(See Customizable Torque Chart on page 178.)

| | |
|---|---|
| ∗Max. rotational speed | 50rpm |
| ∗Max. cycle rate | 10cycle/min |
| ∗Operating temperature | 0～50℃ |
| ∗Weight | 14.1g |
| ∗Main body material | Polycarbonate(PC) |
| ∗Rotating shaft material | Polyacetal(POM) |
| ∗Oil type | Silicone oil |

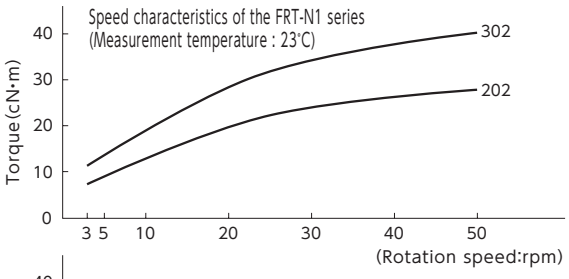
## Damper Characteristics

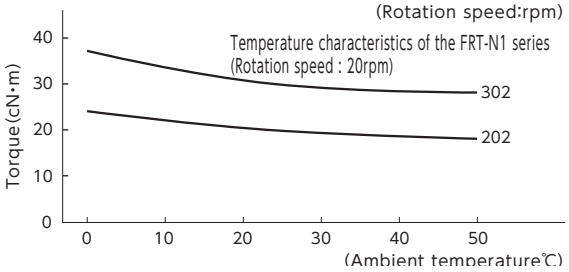
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.

**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



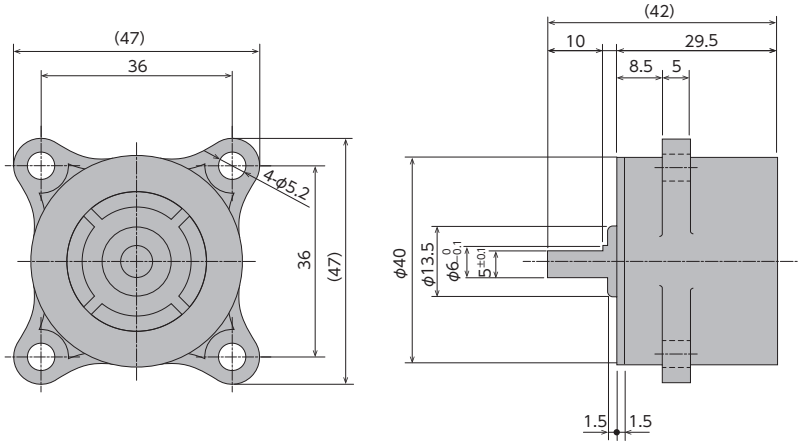
# Rotary Damper

Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

## FRT/FRN-K2 Series

RoHS Compliant

●Products specification might be changed without notice.




## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FRT-K2-103 | 1±0.2 N·m (10±2 kgf·cm) | Both directions |
| FRN-K2-R103 | 1±0.2 N·m (10±2 kgf·cm) | Clockwise |
| FRN-K2-L103 | | Counter-clockwise |

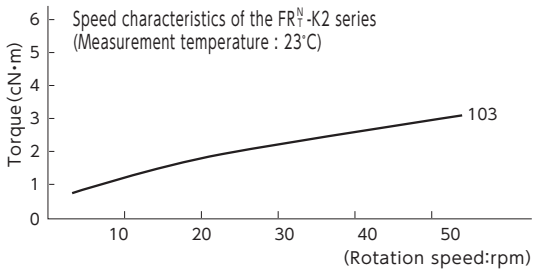
Note 1) Rated torque measured at a rotation speed of 20rpm at 23˚C
Note 2) Torque can be customized by changing the oil viscosity
(see Cutomizable Torque Chart on page 178)
Note 3) Dampers with gear can also be custom ordered.
● An FRT type damper generates torque in both directions and an FRN type generates one-way torque in the CW direction (R) or CCW direction (L) when the rotating axle is viewed from the top.

| | |
|---|---|
| ∗ Max. rotational speed | 50rpm |
| ∗ Max. cycle rate | 10cycle /min |
| ∗ Operating temperature | 0 ~50℃ |
| ∗ Weight | FRT-K2 : 78.3g |
| | FRN-K2 : 56.6g |
| ∗ Main body material | Polycarbonate + glass fiber |
| ∗ Rotating shaft material | Metal (SUS) |
| ∗ Oil type | Silicone oil |

## Damper Characteristics

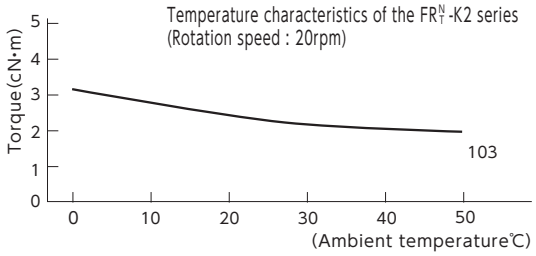
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.




**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



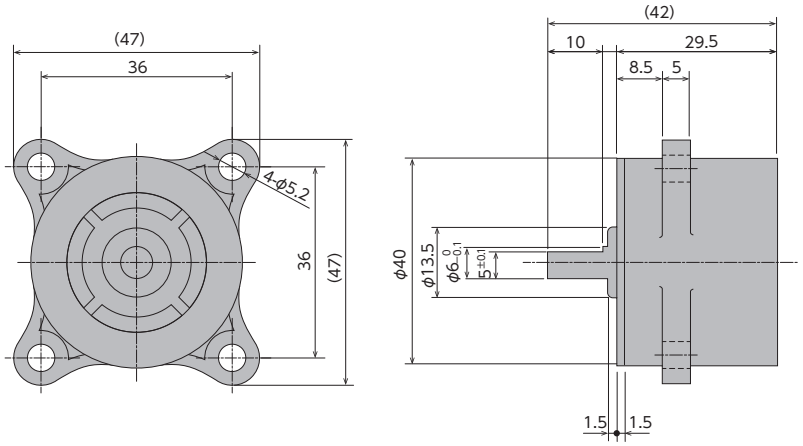
# Rotary Damper

Bi-Directional Uni-Directional
Fixed Type Adjustable type Self-adjusting

## FRT/FRN-F2 Series

RoHS Compliant

●Products specification might be changed without notice.




## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FRT-F2-203 | 2±0.4 N·m (20±4 kgf·cm) | Both directions |
| FRT-F2-303 | 3±0.8 N·m (30±8 kgf·cm) | Both directions |
| FRT-F2-403 | 4±1 N·m (40±10 kgf·cm) | Both directions |
| FRN-F2-R203 | 2±0.4 N·m (20±4 kgf·cm) | Clockwise |
| FRN-F2-L203 | | Counter-clockwise |

Note 1) Rated torque measured at a rotation speed of 20rpm at 23°C
Note 2) Torque can be customized by changing the oil viscosity
(see Cutomizable Torque Chart on page 178)
Note 3) Dampers with gear can also be custom ordered.
● An FRT type damper generates torque in both directions and an FRN type generates one-way torque in the CW direction (R) or CCW direction (L) when the rotating axle is viewed from the top.

| | |
|---|---|
| ∗ Max. rotational speed | 50rpm |
| ∗ Max. cycle rate | 10cycle /min |
| ∗ Operating temperature | 0 ~50℃ |
| ∗ Weight | FRT-K2 : 115.6g |
| | FRN-K2 : 93.2g |
| ∗ Main body material | Polycarbonate + glass fiber |
| ∗ Rotating shaft material | Metal (SUS) |
| ∗ Oil type | Silicone oil |

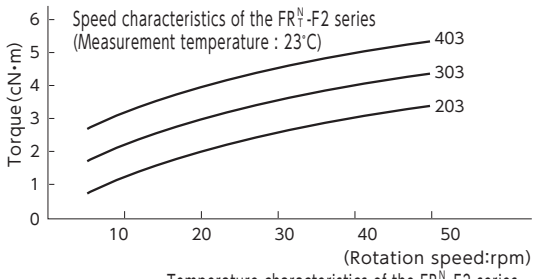
## Damper Characteristics

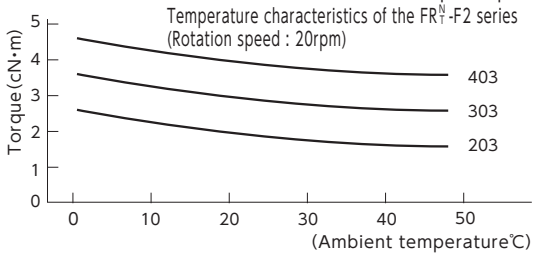
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.

**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



# MEMO

# Rotary Damper

## FRN-P2 Series(Adjustable Types: Variable Torque Models)

- Max. rotation speed 50rpm
- Max. cycle rate 10cycle/min
- Operating temperature 0～50℃
- Weight 64g
- Body and cap material PBT
- Rotating shaft material SUS
- Gear, adjustment knob POM
- Oil type Silicone oil

## Specifications

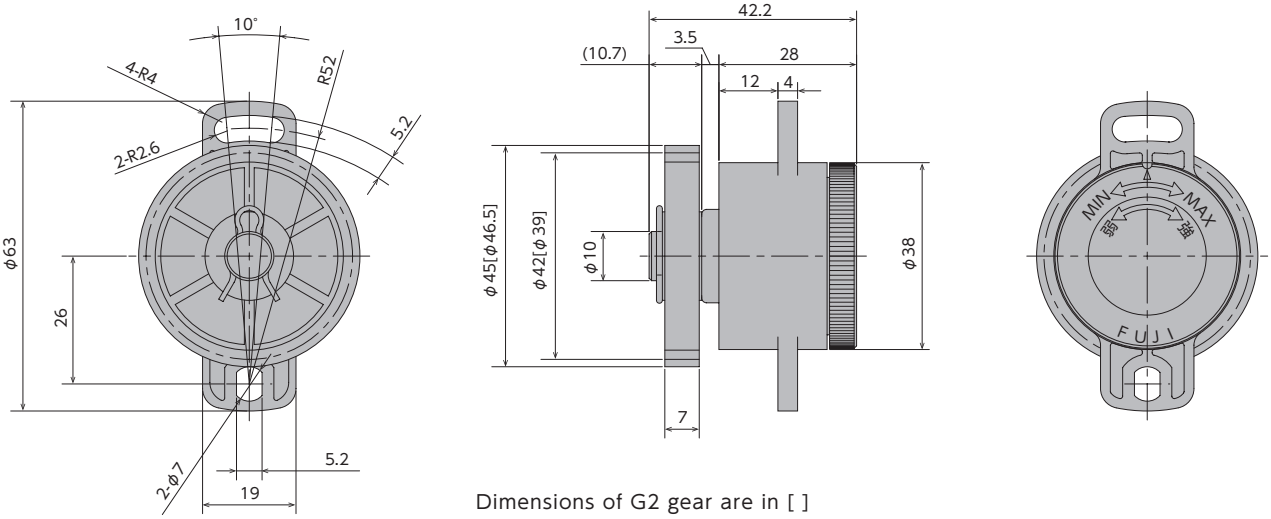
| Model | Rated torque | Damping direction |
|---|---|---|
| FRN-P2-R501G* | 0.05±0.01 N·m (0.5±0.1 kgf·cm) | Clockwise direction |
| FRN-P2-L501G* | | Counter-clockwise direction |
| FRN-P2-R102G* | 0.10±0.02 N·m (1.0±0.2 kgf·cm) | Clockwise direction |
| FRN-P2-L102G* | | Counter-clockwise direction |
| FRN-P2-R202G* | 0.20±0.04 N·m (2.0±0.4 kgf·cm) | Clockwise direction |
| FRN-P2-L202G* | | Counter-clockwise direction |

Note 1) Rated torque is measured at a rotation speed of 20rpm at 23℃ (adjustment knob set at MAX)

● There are dampers that generate torque in the CW direction or CCW direction when the rotating axle is viewed from the top.

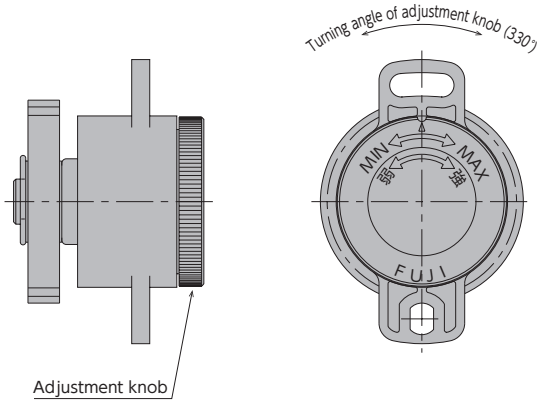
## Gear Specifications

| Model | G1 | *G2 |
|---|---|---|
| Type | Standard spur gear | Shifted spur gear |
| Tooth profile | Involute | |
| Module | 1.5 | 3.0 |
| Pressure angle | 20° | |
| Number of teeth | 28 | 13 |
| Pitch circle diameter | ϕ42 | ϕ39 |
| Addendum modification coefficient | – | +0.25 |

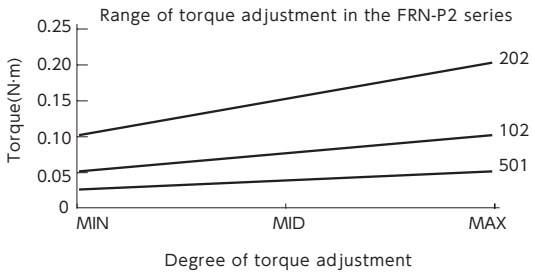



Dimensions of G2 gear are in [ ]

## How to Adjust Torque




## Range of Torque Adjustment



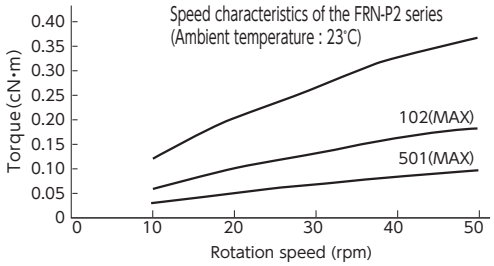

Turn the adjustment knob clockwise to increase damper torque and counterclockwise to decrease it.

●Products specification might be changed without notice.

# Characteristics

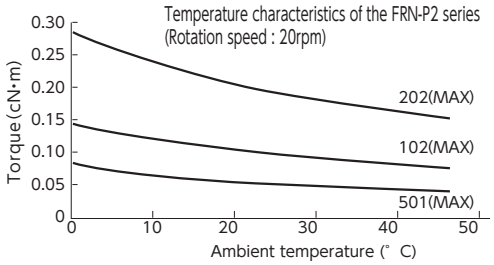
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.

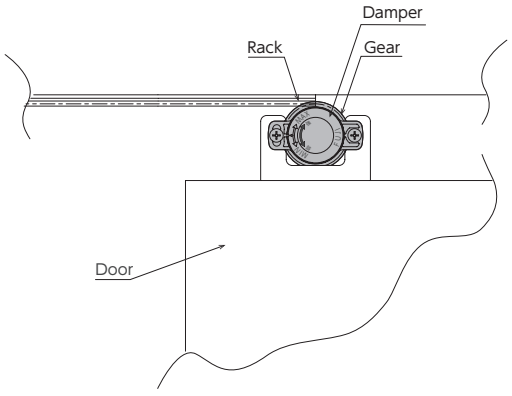



**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.




# Example of Using a Damper



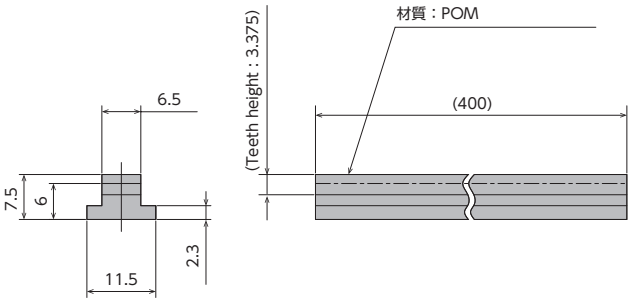

Application of the FRN-P2 Series

# Option Rack

G1 Rack : ROP-020P2-1

| Applicable Models | Model |
|---|---|
| FRN-P2 | ROP-020P2-1 |

Rack specifications : m=1.5
Pressure angle 20° (full depth tooth)
Z=85




There is no provision for option racks complying with the gear specification G2 (shifted spur gear) of FRN-P2

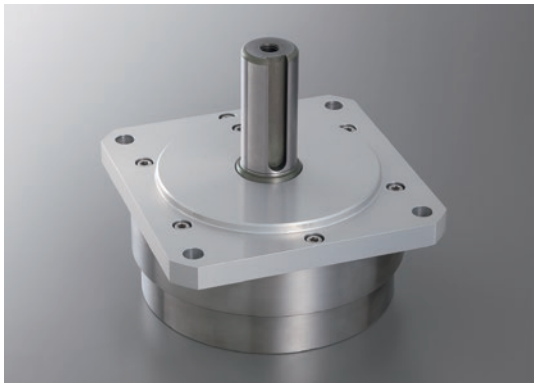
# Rotary Damper

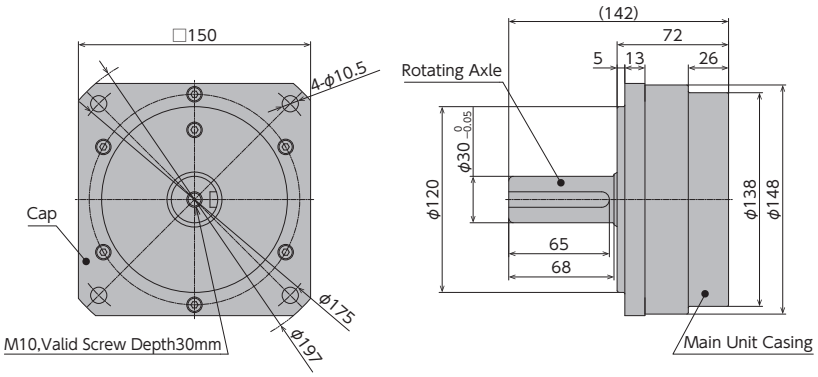
Customized orders | Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

## FRT-W1

RoHS Compliant

●Products specification might be changed without notice.






## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FRT-W1-105 | 100±20N·m | Both directions |
| FRT-W1-185 | 180±40N·m | Both directions |

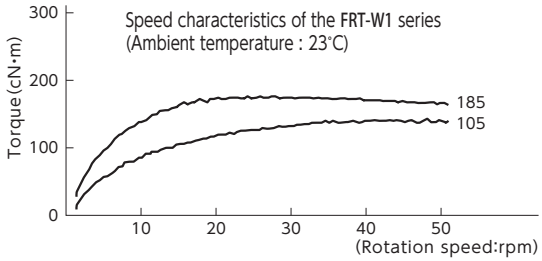
Note 1) Rated torque measured at a rotation speed of 20rpm at 23℃

| | |
|---|---|
| ∗ Max. rotation speed | 50rpm |
| ∗ Max. cycle rate | 1.5cycle /min |
| ∗ Operating temperature | −20 ~60℃ |
| ∗ Weight | 6Kg |
| ∗ Main body material | SUS304 |
| ∗ Cap material | A2017 |
| ∗ Rotating (shaft) material | SUS420 |
| ∗ Oil typel | Silicone oil |

## Damper Characteristics

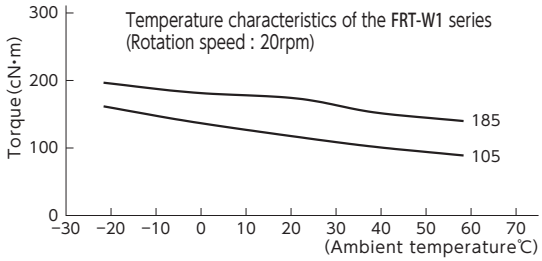
**1. Speed characteristics**

A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the rated torque.




**2. Temperature characteristics**

A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.



# MEMO

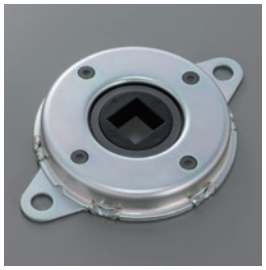
# Disk Damper

Bi-Directional Uni-Directional
Fixed Type Adjustable type Self-adjusting

## FDT-47A/FDN-47A Series

RoHS Compliant

●Products specification might be changed without notice.

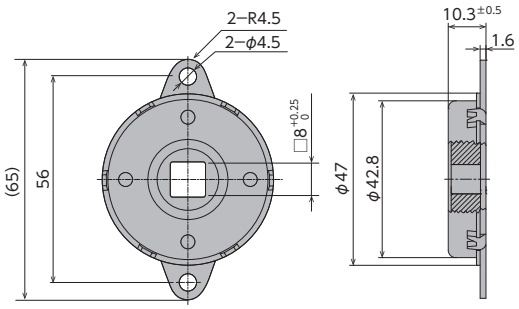



* Max. rotation speed 50rpm
* Max. cycle rate 12cycle /min
* Operating temperature −10～50℃
* Weight FDT- 47A : 50g
  FDN- 47A : 55g
* Main body material Iron (SPFC)
* Rotating (shaft) material Nylon (with glass)
* Oil typel Silicone oil

## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FDT-47A-502 | 0.5±0.15 N·m(5±1.5 kgf·cm) | Both directions |
| FDT-47A-103 | 1±0.2 N·m(10±2 kgf·cm) | Both directions |
| FDT-47A-163 | 1.6±0.3 N·m(16±3 kgf·cm) | Both directions |
| FDT-47A-203 | 2±0.3 N·m(20±3 kgf·cm) | Both directions |
| FDN-47A-R502 | 0.5±0.15 N·m (5±1.5 kgf·cm) | Clockwise direction |
| FDN-47A-L502 | | Counter-clockwise direction |
| FDN-47A-R103 | 1±0.2 N·m (10±2 kgf·cm) | Clockwise direction |
| FDN-47A-L103 | | Counter-clockwise direction |
| FDN-47A-R163 | 1.6±0.3 N·m (16±3 kgf·cm) | Clockwise direction |
| FDN-47A-L163 | | Counter-clockwise direction |
| FDN-47A-R203 | 2±0.3 N·m (20±3 kgf·cm) | Clockwise direction |
| FDN-47A-L203 | | Counter-clockwise direction |

Note) Rated torque is measured at a rotation speed of 20rpm at 23°C±3°C

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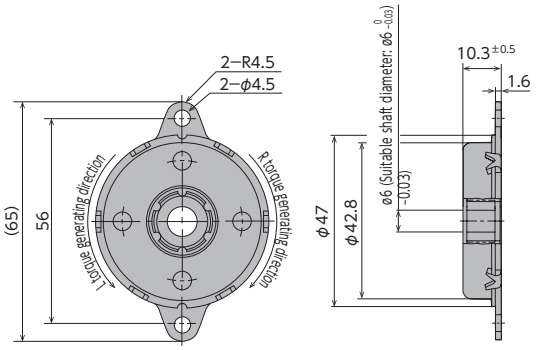


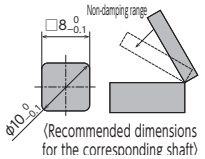

<FDN-47A-R／L※※※>

## How to Use the Damper

1. Dampers may generate torque in both directions, clockwise, or counter-clockwise.
2. Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
3. Please refer to the recommended dimensions below when creating a shaft for FDN-47A. Not using the recommended shaft dimensions may cause the shaft to slip out.

| Shaft's external dimensions | ϕ 6 0 -0.03 |
|---|---|
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) | C0.2～C0.3 (orR0.2～R0.3) |

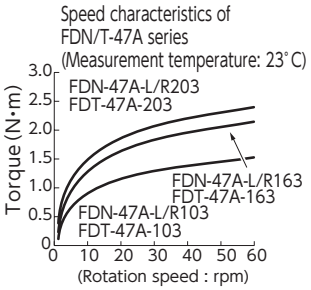
4. To insert a shaft into FDN-47A, insert the shaft while spinning it in the idling direction of the one-way clutch. (Do not force the shaft in from the regular direction. This may damage the oneway clutch.)
5. When using FDT-47A, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. A wobbling shaft and damper shaft may not allow the lid to slow down properly when closing. Please see the diagrams to the right for the recommended shaft dimensions for a damper.
6. Please contact us when a continuous rotation is planned.




## Damper Characteristics

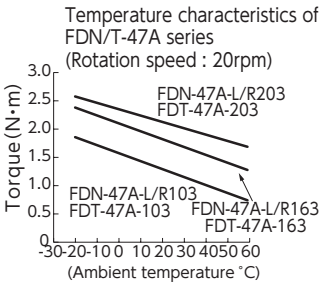
**1. Speed characteristics**

A disk damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. Torque at 20rpm is shown in this catalogue. In a closing lid, the rotation speed is slow when the lid begins to close, resulting in the generation of torque that is smaller than the rated torque.




**2. Temperature characteristics**

Damper torque (rated torque in this catalogue) varies according to the ambient temperature. As the temperature increases, the torque decreases, and as the temperature decreases, the torque increases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. The graph to the right illustrates the temperature characteristics



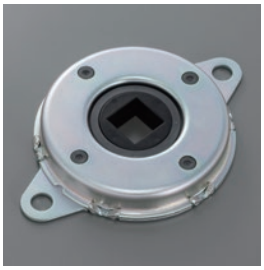
# Disk Damper

Fixed Type | Bi-Directional | Uni-Directional | Adjustable type | Self-adjusting

## FDT-57A/FDN-57A Series

RoHS Compliant

●Products specification might be changed without notice.

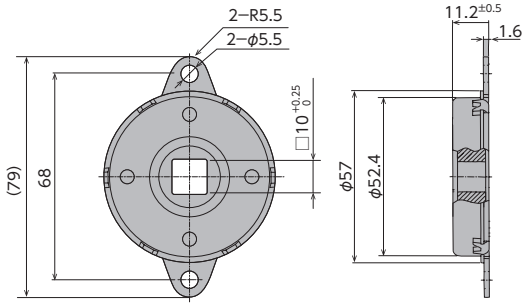


- ∗ Max. rotation speed 50rpm
- ∗ Max. cycle rate 12cycle /min
- ∗ Operating temperature −10～50℃
- ∗ Weight FDT-57A : 75g
  FDN-57A : 94g
- ∗ Main body material Iron (SPFC)
- ∗ Rotating (shaft) material Nylon (with glass)
- ∗ Oil typel Silicone oil

## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FDT-57A-303 | 3±0.4 N·m (30±4 kgf·cm) | Both directions |
| FDT-57A-403 | 4±0.5 N·m (40±5 kgf·cm) | Both directions |
| FDT-57A-503 | 4.7±0.5 N·m (47±5 kgf·cm) | Both directions |
| FDN-57A-R303 | 3±0.4 N·m (30±4 kgf·cm) | Clockwise direction |
| FDN-57A-L303 | | Counter-clockwise direction |
| FDN-57A-R403 | 4±0.5 N·m (40±5 kgf·cm) | Clockwise direction |
| FDN-57A-L403 | | Counter-clockwise direction |
| FDN-57A-R553 | 5.5±0.6 N·m (55±6 kgf·cm) | Clockwise direction |
| FDN-57A-L553 | | Counter-clockwise direction |

Note) Rated torque is measured at a rotation speed of 20rpm at 23°C±3°C

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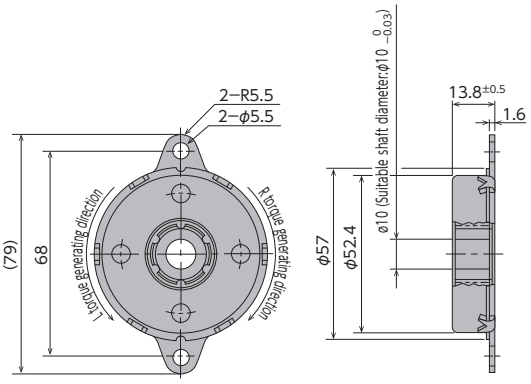


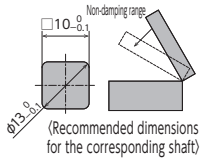

<FDN-57A-R／L※※※>

## How to Use the Damper

1. Dampers may generate torque in both directions, clockwise, or counter-clockwise.
2. Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
3. Please refer to the recommended dimensions below when creating a shaft for FDN-57A. Not using the recommended shaft dimensions may cause the shaft to slip out.

| Shaft's external dimensions | ϕ 10 −0 −0.03 |
|---|---|
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) | C0.2～C0.3 (orR0.2～R0.3) |

4. To insert a shaft into FDN-57A, insert the shaft while spinning it in the idling direction of the one-way clutch. (Do not force the shaft in from the regular direction. This may damage the oneway clutch.)
5. When using FDT-57A, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. A wobbling shaft and damper shaft may not allow the lid to slow down properly when closing. Please see the diagrams to the right for the recommended shaft dimensions for a damper.
6. Please contact us when a continuous rotation is planned.

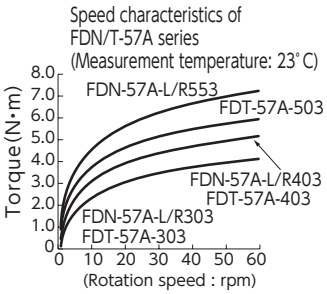



(Recommended dimensions for the corresponding shaft)

## Damper Characteristics

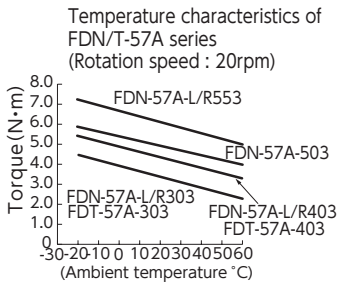
**①1. Speed characteristics**

A disk damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. Torque at 20rpm is shown in this catalogue. In a closing lid, the rotation speed is slow when the lid begins to close, resulting in the generation of torque that is smaller than the rated torque.




**2. Temperature characteristics**

Damper torque (rated torque in this catalogue) varies according to the ambient temperature. As the temperature increases, the torque decreases, and as the temperature decreases, the torque increases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. The graph to the right illustrates the temperature characteristics



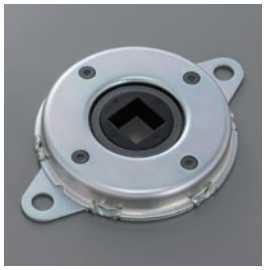
# Disk Damper

Bi-Directional | Uni-Directional
Fixed Type | Adjustable type | Self-adjusting

## FDT-63A/FDN-63A Series

RoHS Compliant

●Products specification might be changed without notice.

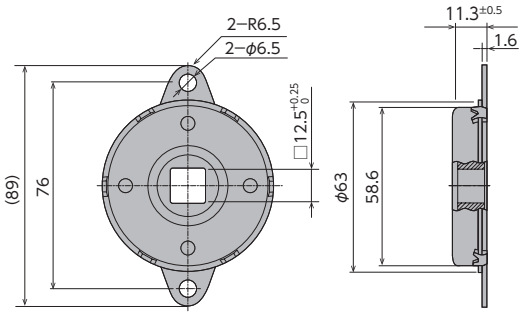



* Max. rotation speed 50rpm
* Max. cycle rate 12cycle /min
* Operating temperature −10～50℃
* Weight FDT-63A : 92g
  FDN-63A : 115g
* Main body material Iron (SPFC)
* Rotating (shaft) material Nylon (with glass)
* Oil typel Silicone oil

## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FDT-63A-403 | 4±0.5 N·m (40±5 kgf·cm) | Both directions |
| FDT-63A-533 | 5.3±0.6 N·m (53±6 kgf·cm) | Both directions |
| FDT-63A-703<br>FDT-63B-703 | 6.7±0.7 N·m (67±7 kgf·cm) | Both directions |
| FDN-63A-R453 | 4.5±0.5 N·m (45±5 kgf·cm) | Clockwise direction |
| FDN-63A-L453 | | Counter-clockwise direction |
| FDN-63A-R603 | 6±0.6 N·m (60±6 kgf·cm) | Clockwise direction |
| FDN-63A-L603 | | Counter-clockwise direction |
| FDN-63A-R903 | 8.5±0.8 N·m (85±8 kgf·cm) | Clockwise direction |
| FDN-63A-L903 | | Counter-clockwise direction |

Note) Rated torque is measured at a rotation speed of 20rpm at 23°C±3°C
63B has a slotted rotating shaft opening

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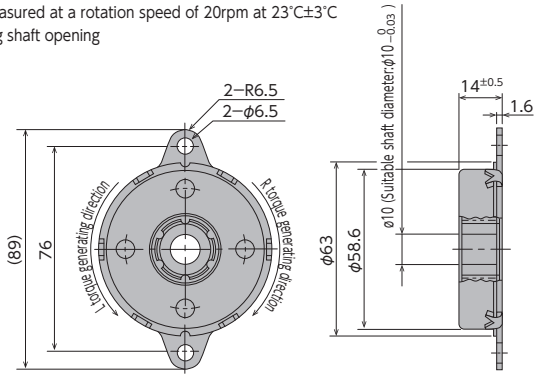


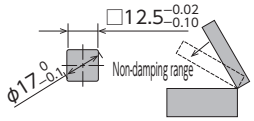

<FDN-63A-R／L※※※>

## How to Use the Damper

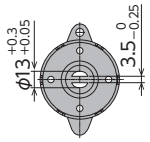
1. Dampers may generate torque in both directions, clockwise, or counter-clockwise.
2. Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
3. Please refer to the recommended dimensions below when creating a shaft for FDN-63A. Not using the recommended shaft dimensions may cause the shaft to slip out.
4. To insert a shaft into FDN-63A, insert the shaft while spinning it in the idling direction of the one-way clutch. (Do not force the shaft in from the regular direction. This may damage the one-way clutch.)

| | |
|---|---|
| Shaft's external dimensions | $\phi$ 10 $^{0}_{-0.03}$ |
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) | C0.2~C0.3 (orR0.2~R0.3) |

5. When using FDT-63A, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. A wobbling shaft and damper shaft may not allow the lid to slow down properly when closing. Please see the diagrams to the right for the recommended shaft dimensions for a damper.
6. A damper shaft connecting to a part with slotted groove is also available. The slotted groove type is excellent for usage with spiral springs
7. Please contact us when a continuous rotation is planned.




〈Recommended dimensions for the corresponding shaft〉

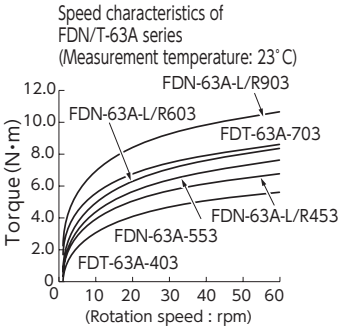



〈FDT-63B-703〉

## Damper Characteristics

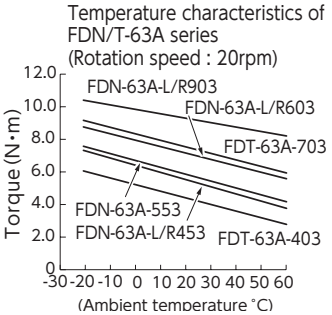
### 1. Speed characteristics

A disk damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. Torque at 20rpm is shown in this catalogue. In a closing lid, the rotation speed is slow when the lid begins to close, resulting in the generation of torque that is smaller than the rated torque.




### 2. Temperature characteristics

Damper torque (rated torque in this catalogue) varies according to the ambient temperature. As the temperature increases, the torque decreases, and as the temperature decreases, the torque increases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. The graph to the right illustrates the temperature characteristics



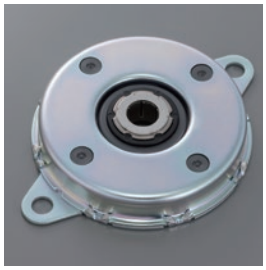
# Disk Damper

Fixed Type | Bi-Directional | Uni-Directional | Adjustable type | Self-adjusting

## FDT-70A/FDN-70A Series

RoHS Compliant

●Products specification might be changed without notice.

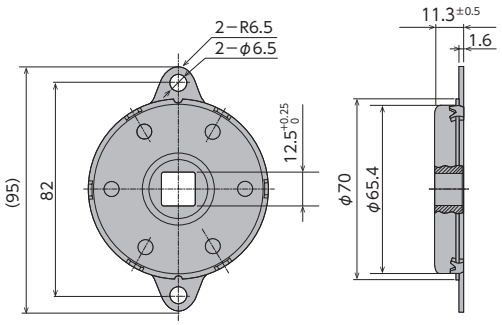


- ∗ Max. rotation speed 50rpm
- ∗ Max. cycle rate 12cycle /min
- ∗ Operating temperature −10～50℃
- ∗ Weight FDT-70A : 112g
  FDN-70A : 136g
- ∗ Main body material Iron (SPFC)
- ∗ Rotating (shaft) material Nylon (with glass)
- ∗ Oil typel Silicone oil

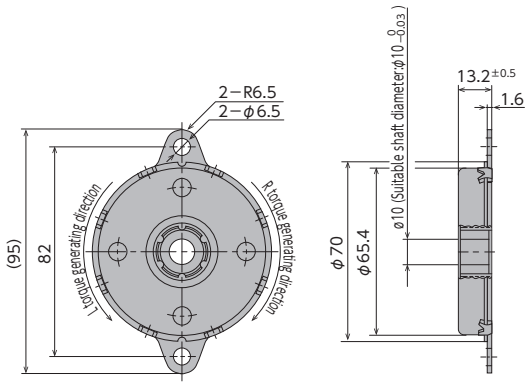
## Specifications

| Model | Rated torque | Damping direction |
|---|---|---|
| FDT-70A-903 | 8.7±0.8 N·m (87±8 kgf·cm) | Both directions |
| FDT-70B-903 | | |
| FDN-70A-R114 | 11±1.1 N·m (110±11 kgf·cm) | Clockwise direction |
| FDN-70A-L114 | | Counter-clockwise direction |

Note) Rated torque is measured at a rotation speed of 20rpm at 23°C±3°C
70B has a slotted rotating shaft opening




<FDT-70A-903>



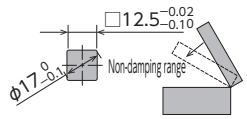

<FDN-70A-R／L114>

## How to Use the Damper

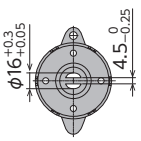
1. Dampers may generate torque in both directions, clockwise, or counter-clockwise.
2. Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
3. Please refer to the recommended dimensions below when creating a shaft for FDN-70A. Not using the recommended shaft dimensions may cause the shaft to slip out.
4. To insert a shaft into FDN-70A, insert the shaft while spinning it in the idling direction of the one-way clutch. (Do not force the shaft in from the regular direction. This may damage the one-way clutch.)

| Shaft's external dimensions | φ10 0 −0.03 |
|---|---|
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) | C0.2～C0.3 (orR0.2～R0.3) |

5. When using FDT-70A, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. A wobbling shaft and damper shaft may not allow the lid to slow down properly when closing. Please see the diagrams to the right for the recommended shaft dimensions for a damper.
6. A damper shaft connecting to a part with slotted groove is also available. The slotted groove type is excellent for usage with spiral springs
7. Please contact us when a continuous rotation is planned.




〈Recommended dimensions for the corresponding shaft〉

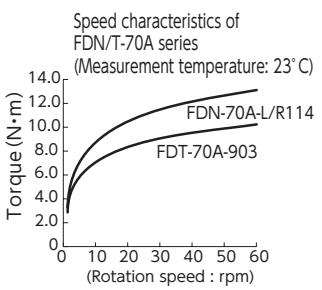



〈FDT-70B-903〉

## Damper Characteristics

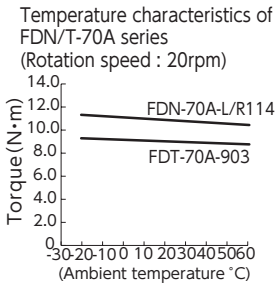
### 1. Speed characteristics

A disk damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. Torque at 20rpm is shown in this catalogue. In a closing lid, the rotation speed is slow when the lid begins to close, resulting in the generation of torque that is smaller than the rated torque.




### 2. Temperature characteristics

Damper torque (rated torque in this catalogue) varies according to the ambient temperature. As the temperature increases, the torque decreases, and as the temperature decreases, the torque increases. This is because the viscosity of the silicone oil inside the damper varies according to the temperature. The graph to the right illustrates the temperature characteristics



# Vane Damper

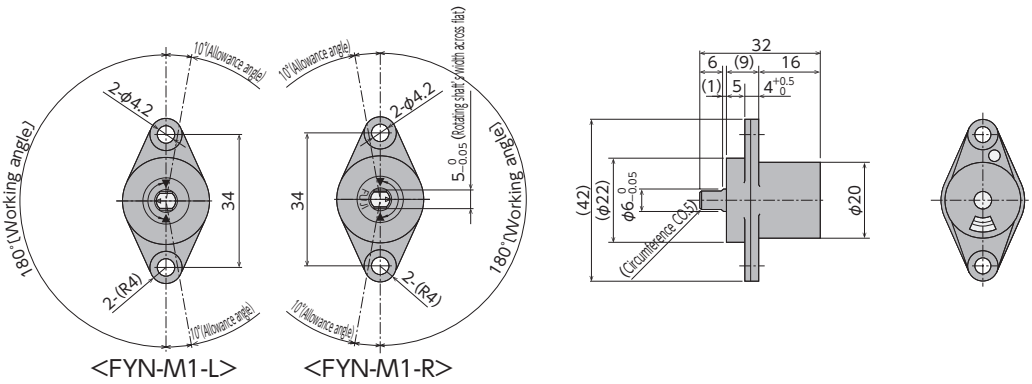
## FYN-M1 Series

## Specifications

| Model | Max. torque | Reverse torque | Damping direction |
|---|---|---|---|
| FYN-M1-R152 | 0.15 N·m (1.5 kgf·cm) | 0.1 N·m or lower (1kgf·cm or lower) | Clockwise |
| FYN-M1-L152 | | | Counter-clockwise |
| FYN-M1-R252 | 0.25 N·m (2.5 kgf·cm) | 0.2 N·m or lower (2 kgf·cm or lower) | Clockwise |
| FYN-M1-L252 | | | Counter-clockwise |
| FYN-M1-R352 | 0.35 N·m (3.5 kgf·cm) | 0.2 N·m or lower ( 2 kgf·cm or lower) | Clockwise |
| FYN-M1-L352 | | | Counter-clockwise |
| FYN-M1-R602 | 0.60 N·m (6.0kgf·cm) | 0.4 N·m or lower ( 4 kgf·cm or lower) | Clockwise |
| FYN-M1-L602 | | | Counter-clockwise |

Note) Measured at 23°C±2°C

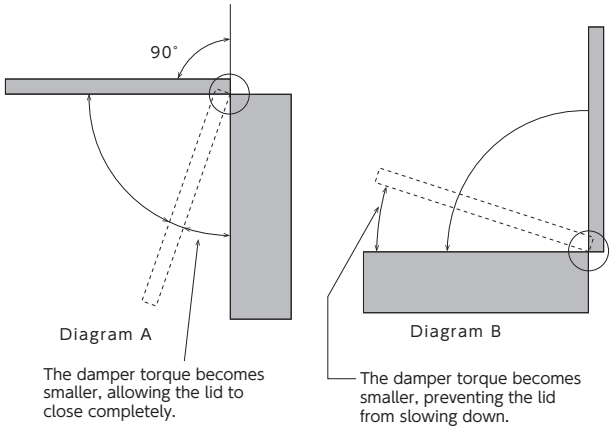
- ∗ Max. angle 180°
- ∗ Max. cycle rate 6cycle /min
- ∗ Operating temperature −5～50℃
- ∗ Weight 17±2g
- ∗ Main body Polybutylene terephthalate (PBT)
- ∗ Cap material Polybutylene terephthalate (PBT)
- ∗ Rotating shaft material Zinc die-cast (ZDC)
- ∗ Oil type Silicone oil
- ∗ Cap colour R: Black L: Gray



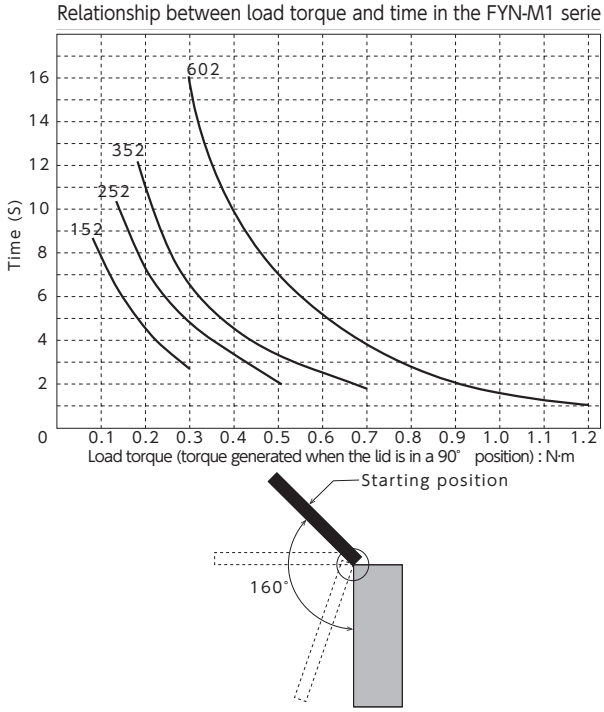

<FYN-M1-L> <FYN-M1-R>

## How to Use the Damper

1. The FYN-M1 Series is designed to generate a large torque up to 90° in a closing lid, as shown in Diagram A, and the lid is able to close completely. However, when the lid is closed from a vertical position, as shown in Diagram B, the lid cannot be slowed down, as the torque becomes small just before the lid is completely closed.

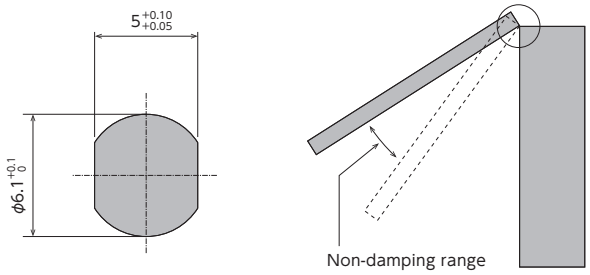



2. Below is a graph showing the relationship between the load torque and the time when a lid is closed from a 160° angle, as shown in the diagram.



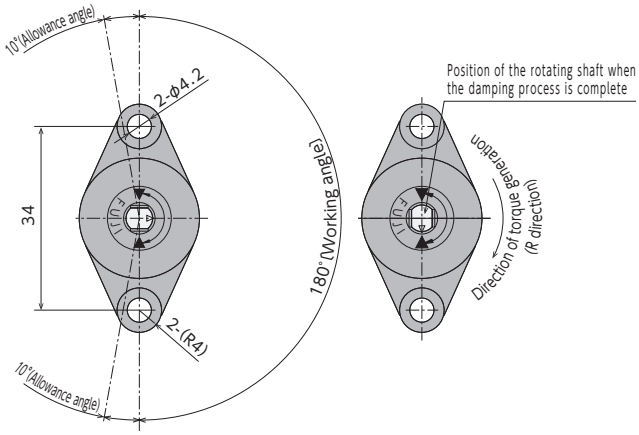
●Products specification might be changed without notice.

3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing.




<Recommended dimensions for a rotating shaft opening>

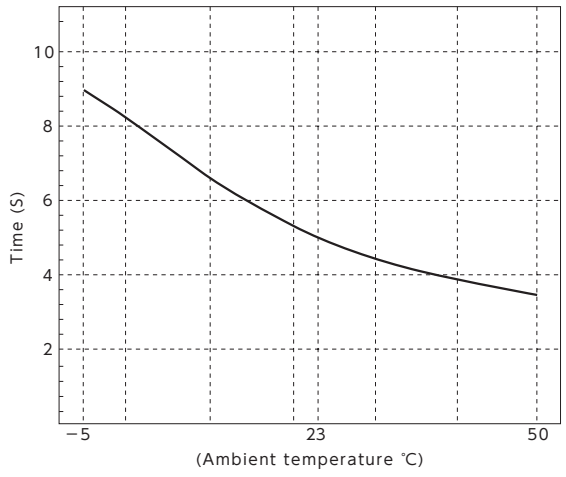
5. The standard for a damper's working angle is 180° with respect to the main body's attachment flange. Rotating the damper beyond this angle will cause damage to the damper. Please make sure that an external stopper is in place.




<FYN-M1-R>

4. The time it takes for a lid with a damper to close variesaccording to the ambient temperature. As the temperature increases, it takes less time, and as the temperature decreases, it will take longer for the lid to close. This is because the viscosity of the oil inside the damper changes according to the temperature. When the temperature returns to normal, the required time will return to normal as well. The temperature characteristics are shown in the graph below.

Temperature characteristics of the FYN-M1 Series




6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

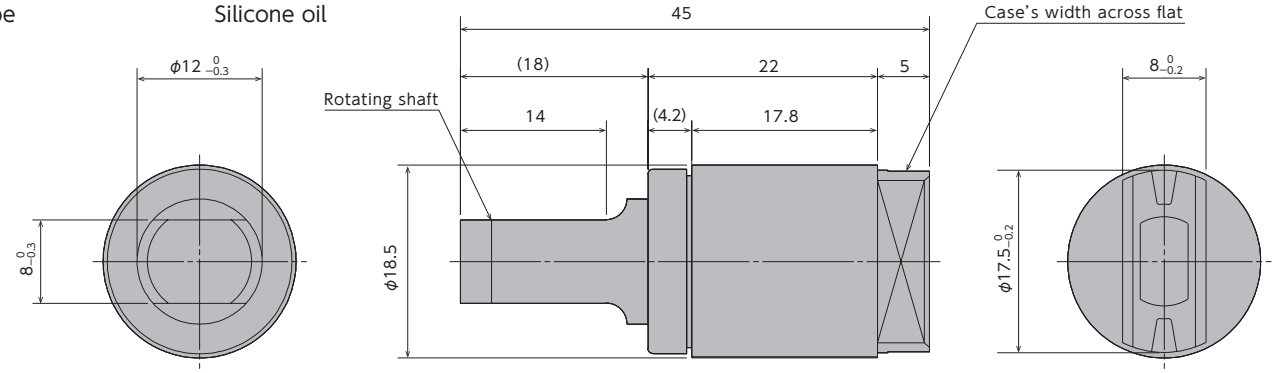
## FYN-P1 Series

## Specifications

| Model | Max. torque | Reverse torque | Damping direction |
|---|---|---|---|
| FYN-P1-R103 | 1 N·m (10 kgf·cm) | 0.3 N·m or lower (3 kgf·cm or lower) | Clockwise |
| FYN-P1-L103 | | | Counter-clockwise |
| FYN-P1-R153 | 1.5 N·m (15 kgf·cm) | 0.5 N·m or lower (5 kgf·cm or lower) | Clockwise |
| FYN-P1-L153 | | | Counter-clockwise |
| FYN-P1-R183 | 1.8 N·m (18 kgf·cm) | 0.8 N·m or lower (8 kgf·cm or lower) | Clockwise |
| FYN-P1-L183 | | | Counter-clockwise |

Note) Measured at 23°C±2°C

* Max. angle 115°
* Operating temperature −5～50℃
* Weight 10. 5±1g
* Body and cap material Polybutylene terephthalate (PBT)
* Rotating shaft material Polybutylene terephthalate (PBT)
* Oil type Silicone oil




## How to Use the Damper

1. FYN-P1 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly.

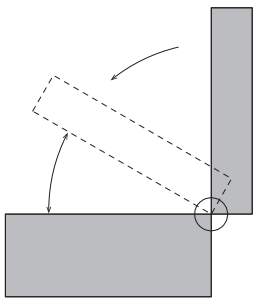


Diagram A

The damper torque becomes larger, preventing the lid from slowing down.

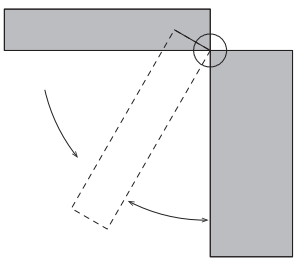
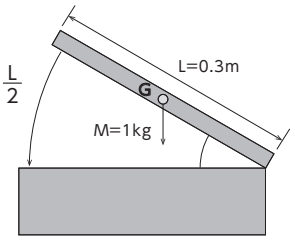


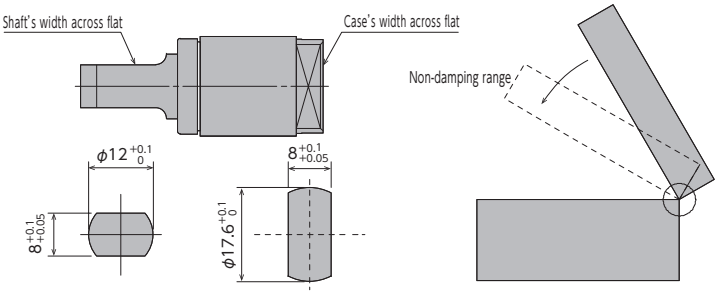
Diagram B

The damper torque becomes larger, preventing the lid from closing completely.

2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.
Example)
Lid mass M: 1kg
Lid dimensions L: 0.3m
Gravity Center Position : Assumed as $\frac{L}{2}$
Load torque : T=1×9.8×0.3÷2
=1.47N·m
Based on the above calculation,
FYN-P1-*153 is selected.



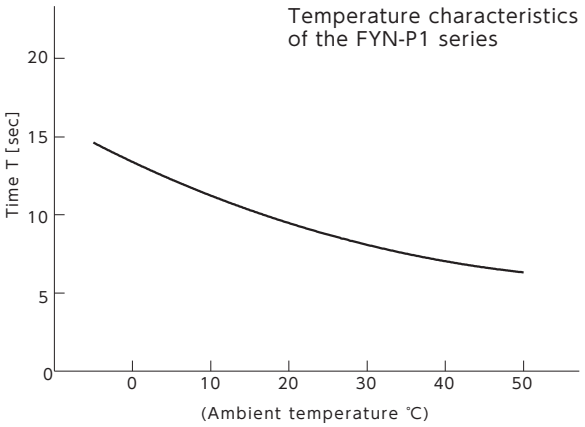

3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.



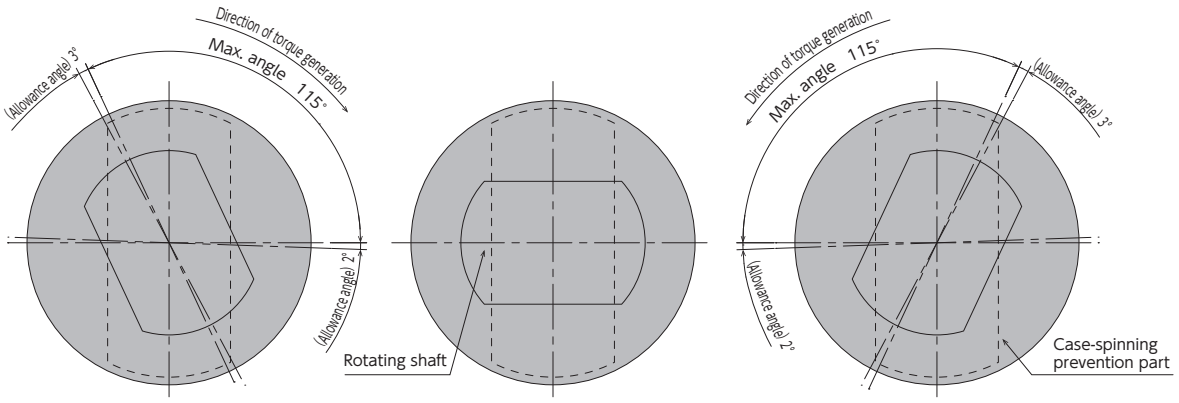
●Products specification might be changed without notice.

4. Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The time it takes for the lid to close is shown in the graph to the right.

Temperature characteristics of the FYN-P1 series




5. The damper's working angle is 115°, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place. The working angle is based on the width across flat for fixing, located towards the rear end of the main body. The position where the rotation is complete is at 90° with respect to the width across flat.




Rotation Start Position
FYN-P1-R

Rotation End Position
* Rotational position of rotating axle at shipping

Rotation Start Position
FYN-P1-L

6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

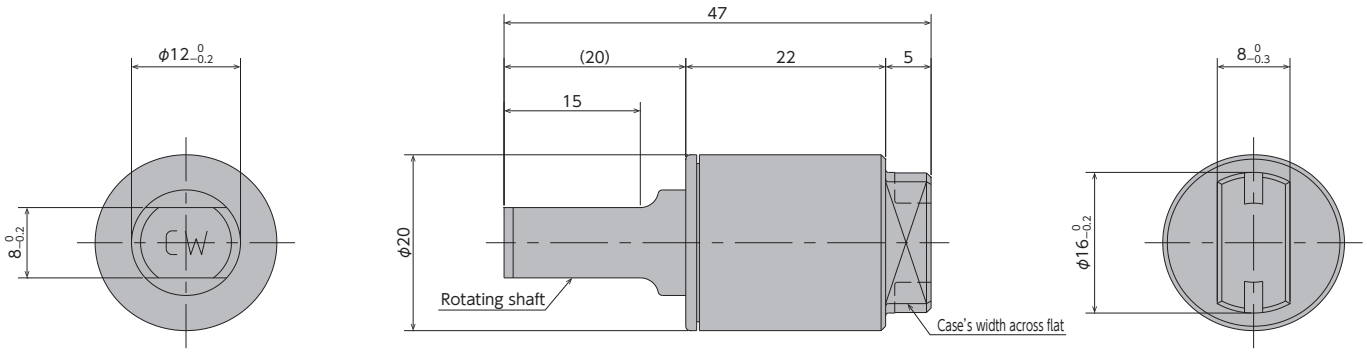
## FYN-N2 Series

## Specifications

| Model | Max. torque | Reverse torque | Directions |
|---|---|---|---|
| FYN-N2-R103 | 1 N·m (10kgf·cm) | 0.2 N·m or lower (2 kgf·cm or lower) | Clockwise (CW) |
| FYN-N2-L103 | | | Counterclockwise (CCW) |
| FYN-N2-R203 | 2 N·m (20 kgf·cm) | 0.4 N·m or lower (4 kgf·cm or lower) | Clockwise (CW) |
| FYN-N2-L203 | | | Counterclockwise (CCW) |
| FYN-N2-R303 | 3 N·m (30 kgf·cm) | 0.8 N·m or lower (8 kgf·cm or lower) | Clockwise (CW) |
| FYN-N2-L303 | | | Counterclockwise (CCW) |

Note) Measured at 23°C±2°C

* Max. angle 110°
* Operating temperature −5∼50℃
* Weight 13 ±1g
* Body and cap material Polybutylene terephthalate (PBT)
* Rotating shaft material Polyamide (PA)
* Oil type Silicone oil




## How to Use the Damper

1. FYN-N2 series has been designed so that when a lid is closing from a vertical position, as shown in Figure A, high torque is generated just before it closes completely. For a lid that closes from a horizontal position, as shown in Figure B, the strong torque generated just prior to a complete closure may prevent the lid from becoming fully closed.

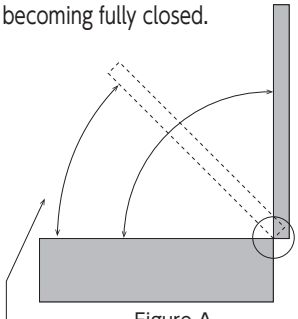


Figure A

Stronger damper torque allows the lid to close gently until it is fully closed.

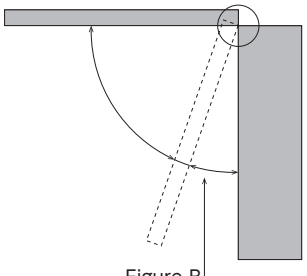
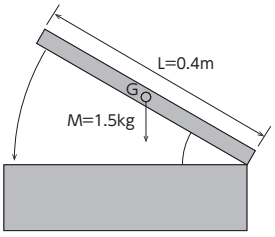


Figure B

Stronger damper torque prevents the lid from being fully closed.

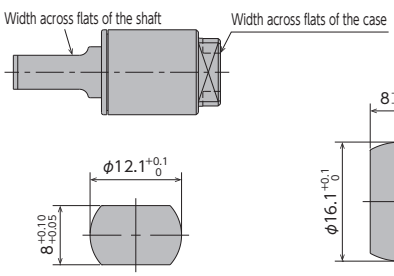
2. When using a damper with a lid shown in the diagram, determine the damper torque based on the following selection calculation.

Example)
Lid weight M: 1.5 kg
Lid dimension L: 0.4 m
Gravity Center Position G: Assumed as $\frac{L}{2}$
Load torque: T = 1.5 × 9.8 × 0.4 ÷ 2
=2.94N·m

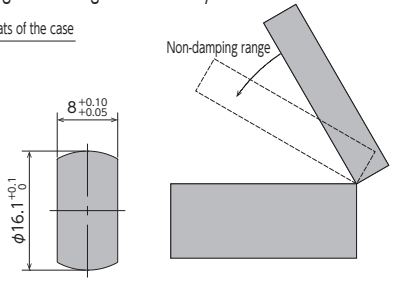



Based on the above calculation, select FYN-N2-*303.

3. When connecting parts that are joined to the rotating shaft, ensure a snug fit. The lid will not decelerate as designed when closing if these parts are not connected properly. The dimensional tolerance for fixing the rotating shaft and body case is shown below.



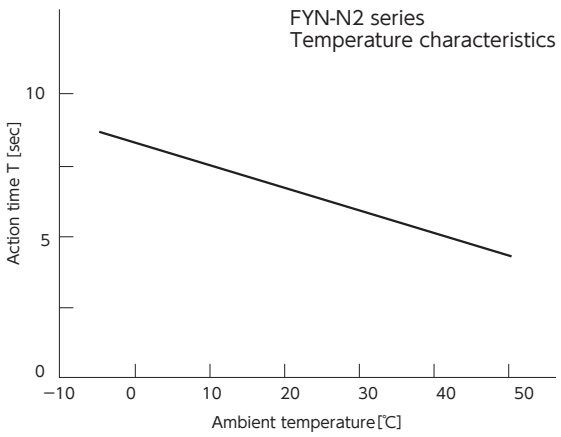

〈Recommended dimensions for mounting the rotating shaft〉



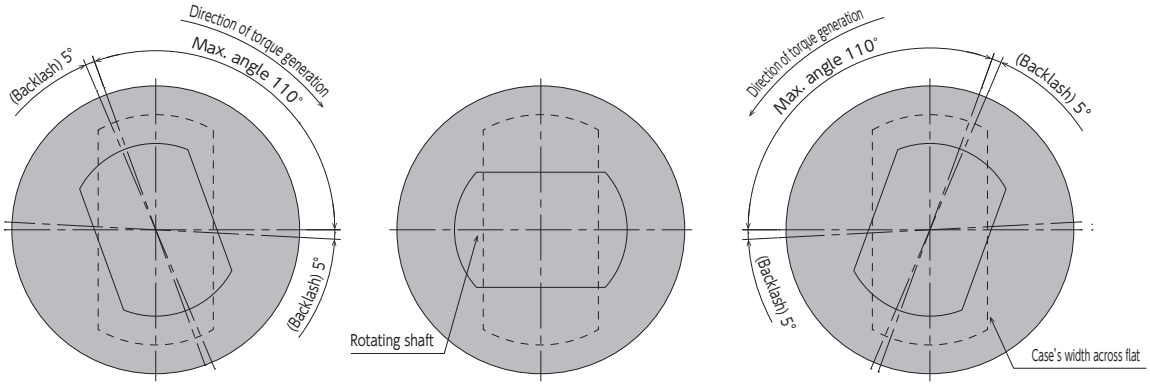

〈Recommended dimensions for mounting the body case〉

Products specification might be changed without notice.

4. Damper characteristics vary according to the ambient temperature. In general, damper characteristics weaken as the temperature goes up, and become stronger as the temperature goes down.
This occurs because the viscosity of oil inside the damper is affected by the temperature change. Once the temperature returns to normal, so will the damper characteristics. Please refer to the right diagram for change in the action time for a free-closing lid.




5. The damper action angle is 110° as shown below. Rotating it beyond this angle will cause the damper to break. Ensure that an external stopper is in place. The action angle is based on the width across flats of the case on the back of the body. The rotation end point is at 90° on the basis of the width across flats of the case. (Refer to the figure below.)




Rotation starting point
FYN-N2-R

Rotation end point
*Rotating shaft angle for shipment

Rotation starting point
FYN-N2-L

6. There are dampers that generate torque in either the clockwise or counterclockwise direction when the rotating shaft is seen from the above. Select a model according to use.

# Vane Damper

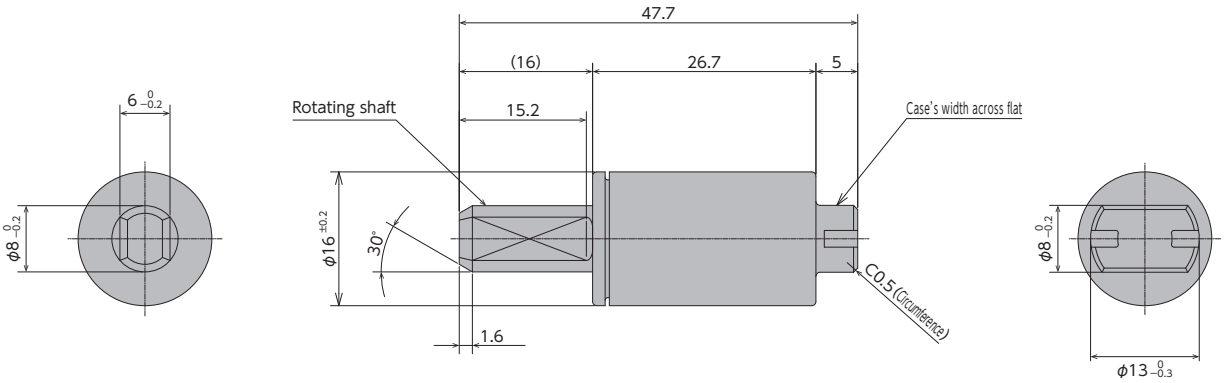
## FYN-B1 Series

## Specifications

| Model | Max. torque | Reverse torque | Damping direction |
|---|---|---|---|
| FYN-B1-R502 | 0.5N·m (5kgf·cm) | 0.3N·m or lower (3kgf·cm) or lower | Clockwise |
| FYN-B1-L502 | | | Counter-clockwise |
| FYN-B1-R103 | 1N·m (10kgf·cm) | 0.4N·m or lower (4kgf·cm) or lower | Clockwise |
| FYN-B1-L103 | | | Counter-clockwise |
| FYN-B1-R153 | 1.5N·m (15kgf·cm) | 0.5N·m or lower (5kgf·cm) or lower | Clockwise |
| FYN-B1-L153 | | | Counter-clockwise |

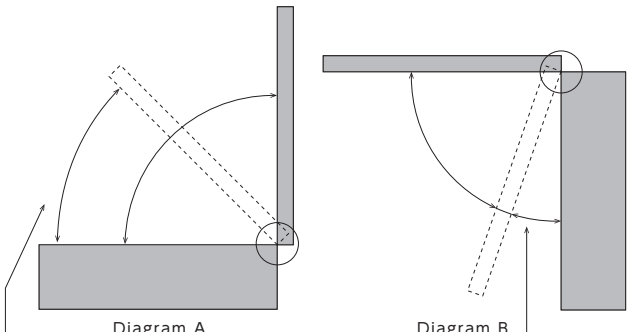
Note) Measured at 23°C±2°C

∗Max. angle 110°
∗Operating temperature −5～50℃
∗Weight 9±1g
∗Body and cap material Polybutylene terephthalate (PBT)
∗Rotating shaft material Polyphenylene Sulphide (PPS)
∗Oil type Silicone oil
∗R type has Black shaft / L type has white shaft




## How to Use the Damper

1. FYN-B1 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly.

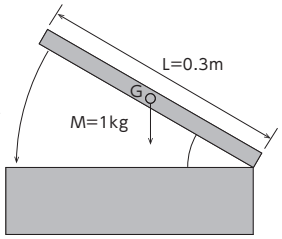



he damper torque becomes larger, preventing the lid from slowing down.

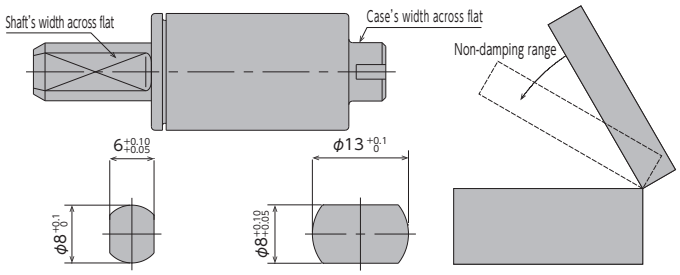
The damper torque becomes larger, preventing the lid from closing completely.

2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example)
Lid mass M : 1kg
Lid dimensions L: 0.3m
Gravity Center Position : Assumed as $\frac{L}{2}$
Load torque : T =1.5×0.4×9.8÷2
= 2.94N·m
Based on the above calculation,
FYN-B1-*153 is selected.




3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.

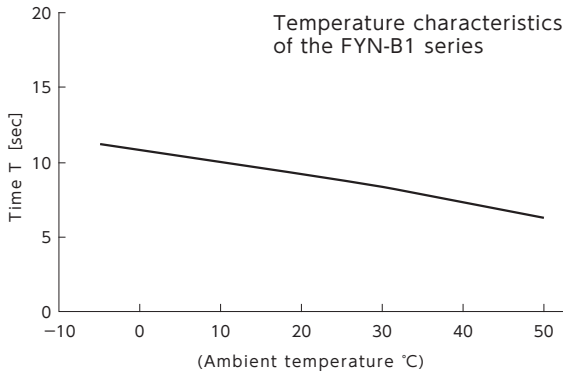



<Recommended dimensions for mounting a rotating shaft>

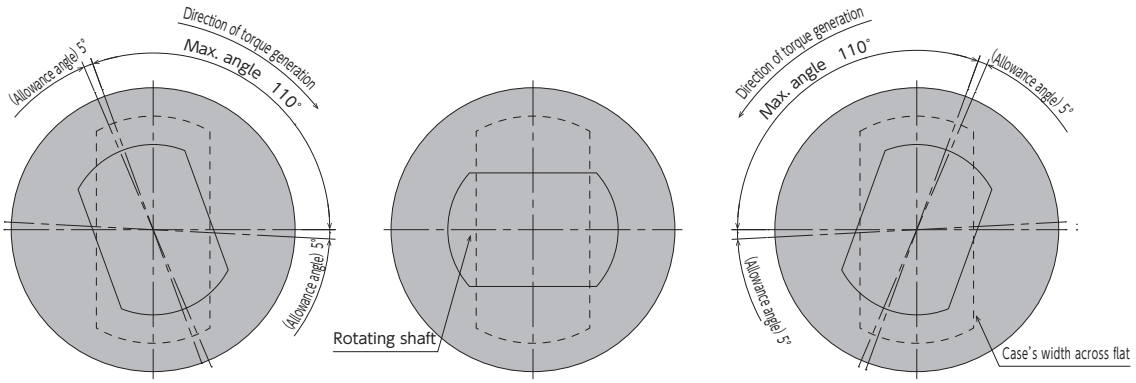
<Recommended dimensions for mounting the main body>

●Products specification might be changed without notice.

4. Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The changes in the time it takes for the lid to close are shown in the graph to the right.




5. The damper's working angle is 110˚, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place. The working angle is based on the width across flat for fixing, located towards the rear end of the main body. The position where the rotation is complete is at 90˚ with respect to the width across flat.




Rotation Start Position
FYN-B1-R

Rotation End Position
* Rotational position of rotating axle at shipping

Rotation Start Position
FYN-B1-L

6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

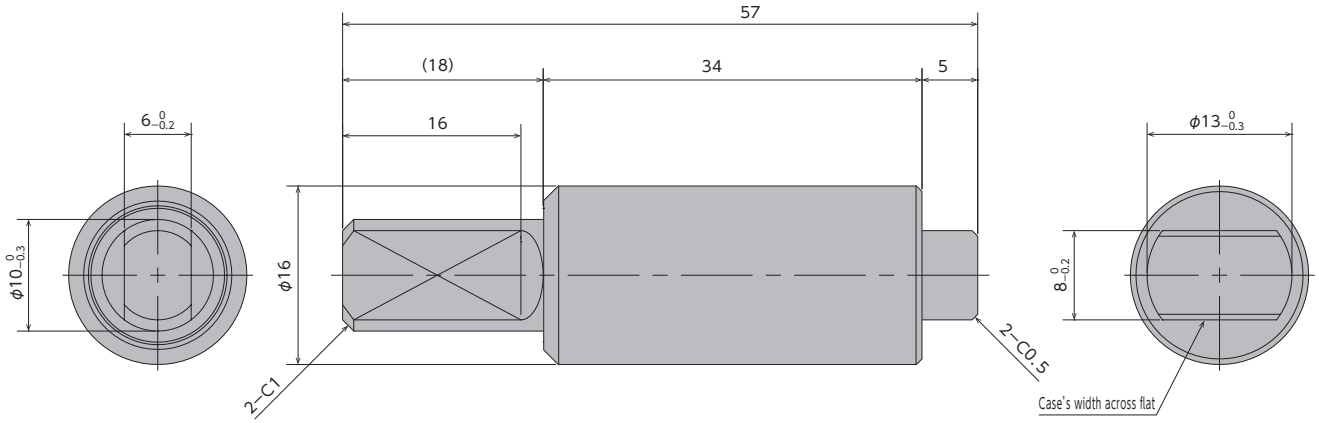
## FYN-U1 Series

## Specifications

| Model | Max. torque | Reverse torque | Damping direction |
|---|---|---|---|
| FYN-U1-R103 | 1 N·m (10 kgf·cm) | 0.5 N·m or lower (5 kgf·cm or lower) | Clockwise |
| FYN-U1-L103 | | | Counter-clockwise |
| FYN-U1-R203 | 2 N·m (20 kgf·cm) | 0.7 N·m or lower (7 kgf·cm or lower) | Clockwise |
| FYN-U1-L203 | | | Counter-clockwise |
| FYN-U1-R303 | 3 N·m (30 kgf·cm) | 0.9 N·m以下 (9 kgf·cm or lower) | Clockwise |
| FYN-U1-L303 | | | Counter-clockwise |

Note) Measured at 23°C±2°C

* Max. angle 115°
* Operating temperature −5～50℃
* Weight 40±4g
* Main body, rotating shaft materials Zinc die-cast (ZDC)
* Cap material Polyphenylene Sulphide (PPS)
* Oil type Silicone oil




## How to Use the Damper

1. FYN-U1 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly.

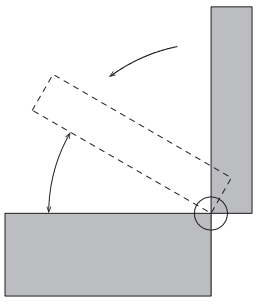


Diagram A

he damper torque becomes larger, preventing the lid from slowing down.

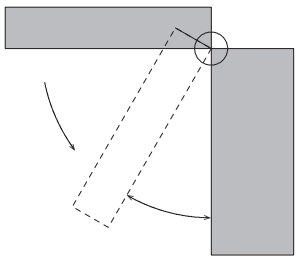
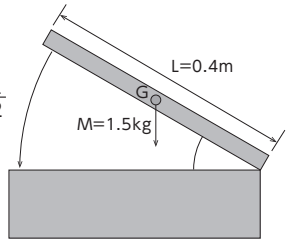


Diagram B

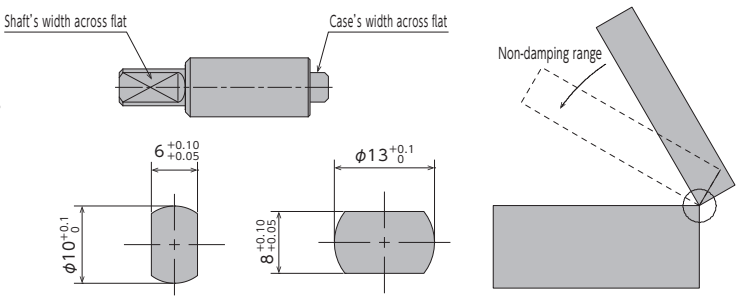
The damper torque becomes larger, preventing the lid from closing completely.

2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

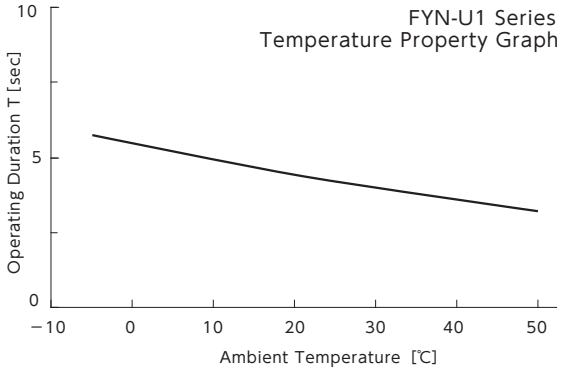
Example)
Lid mass M : 1.5kg
Lid dimensions L : 0.4m
Gravity Center Position : Assumed as $\frac{L}{2}$
Load torque : T = 1.5×9.8×0.4÷2
= 2.94N·m
Based on the above calculation,
FYN-U1-*303 is selected.



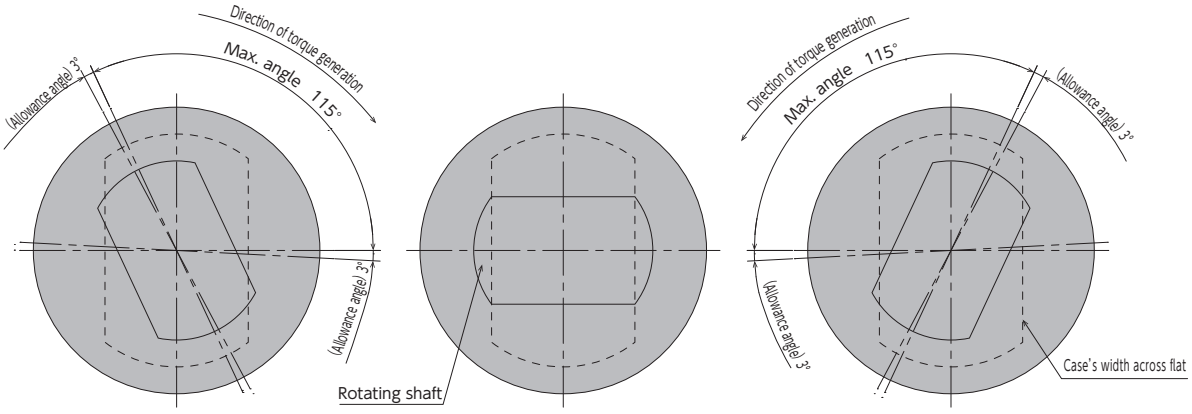

3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.



4. Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The changes in the time it takes for the lid to close are shown in the graph to the right.




5. The damper's working angle is 110°, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place. The working angle is based on the width across flat for fixing, located towards the rear end of the main body. The position where the rotation is complete is at 90° with respect to the width across flat.




Rotation Start Position
FYN-U1-R

Rotation End Position
* Rotational position of rotating axle at shipping

Rotation Start Position
FYN-U1-L

6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

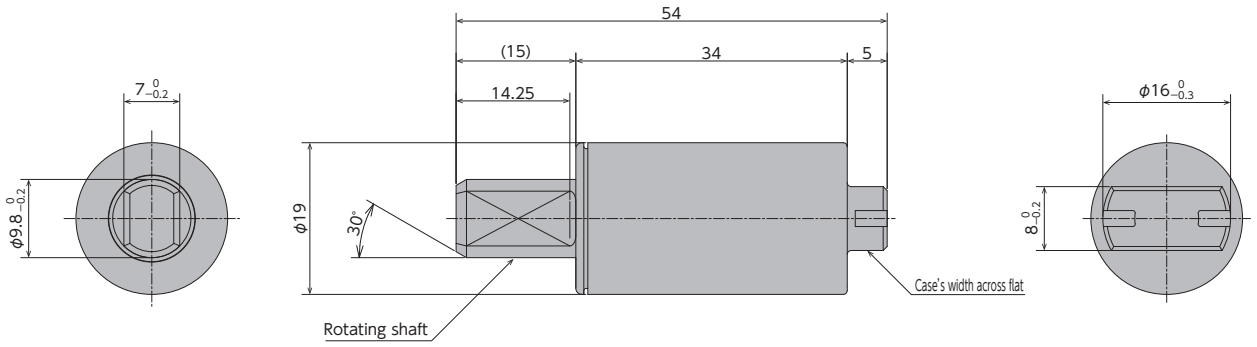
## FYN-C1 Series

## Specifications

| Model | Max. torque | Reverse torque | Directions |
|---|---|---|---|
| FYN-C1-R203 | 2N·m (20kgf·cm) | 0.3 N·m or lower (3 kgf·cm or lower) | Clockwise (CW) |
| FYN-C1-L203 | | | Counterclockwise (CCW) |
| FYN-C1-R253 | 2.5N·m (25kgf·cm) | 0.5 N·m or lower (5 kgf·cm or lower) | Clockwise (CW) |
| FYN-C1-L253 | | | Counterclockwise (CCW) |
| FYN-C1-R303 | 3N·m (30kgf·cm) | 0.7 N·m or lower (7 kgf·cm or lower) | Clockwise (CW) |
| FYN-C1-L303 | | | Counterclockwise (CCW) |
| FYN-C1-R353 | 3.5N·m (35kgf·cm) | 0.9 N·m or lower (9 kgf·cm or lower) | Clockwise (CW) |
| FYN-C1-L353 | | | Counterclockwise (CCW) |
| FYN-C1-R403 | 4N·m (40kgf·cm) | 1.1 N·m or lower (11 kgf·cm or lower) | Clockwise (CW) |
| FYN-C1-L403 | | | Counterclockwise (CCW) |

Note) Measured at 23°C±2°C

* Max. angle 110°
* Operating temperature −5～50℃
* Weight 30±2g
* Body and cap material Polybutylene terephthalate (PBT)
* Rotating shaft material Zinc die-cast (ZDC)
* Oil type Silicone oil




## How to Use the Damper

1. The FYN-C1 series has been designed so that when a lid is closing from a vertical position, as shown in Figure A, high torque is generated just before it closes completely.
For a lid that closes from a horizontal position, as shown in Figure B, the strong torque generated just prior to a complete closure may prevent the lid from becoming fully closed.

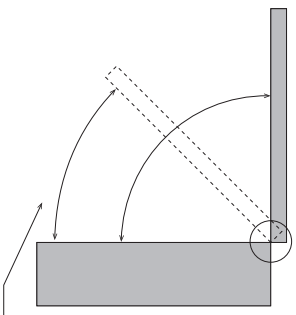


Figure A

Stronger damper torque allows the lid to close gently until it is fully closed.

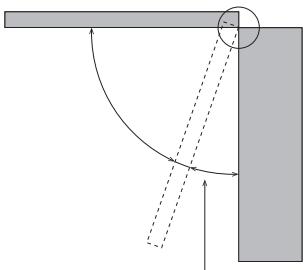
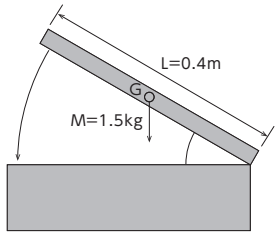


Figure B

Stronger damper torque prevents the lid from being fully closed.

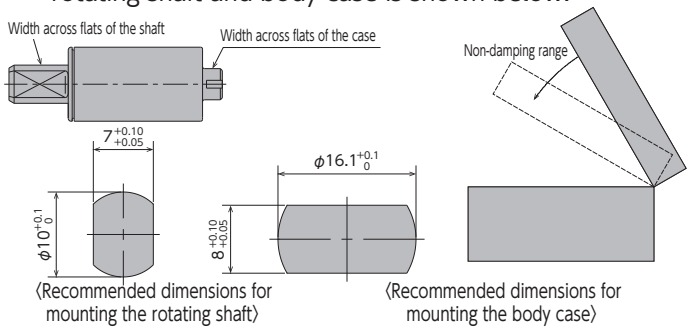
2. When using a damper with a lid shown in the diagram, determine the damper torque based on the following selection calculation.

Example)
Lid weight M : 2kg
Lid dimension L : 0.4m
Gravity Center Position G: Assumed as $\frac{L}{2}$
Load torque : T=2×9.8×0.4÷2
=3.92N·m




Based on the above calculation, select FYN-C1-*403.

3. When connecting parts that are joined to the rotating shaft, ensure a snug fit. The lid will not decelerate as designed when closing if these parts are not connected properly. The dimensional tolerance for fixing the rotating shaft and body case is shown below.

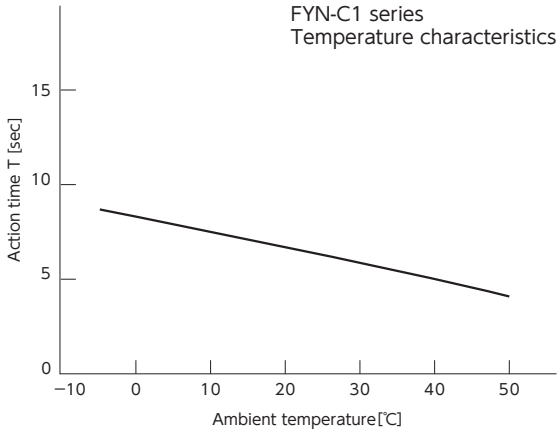



〈Recommended dimensions for mounting the rotating shaft〉

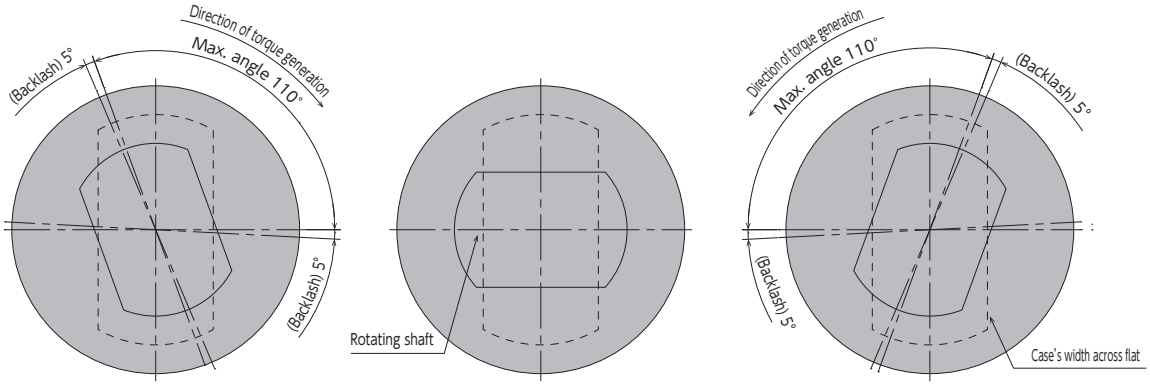
〈Recommended dimensions for mounting the body case〉

●Products specification might be changed without notice.

4.Damper characteristics vary according to the ambient temperature. In general, damper characteristics weaken as the temperature goes up, and become stronger as the temperature goes down.
This occurs because the viscosity of oil inside the damper is affected by the temperature change. Once the temperature returns to normal, so will the damper characteristics. Please refer to the right diagram for change in the action time for a free-closing lid.




5.The damper action angle is 110° as shown below. Rotating it beyond this angle will cause the damper to break. Ensure that an external stopper is in place. The action angle is based on the width across flats of the case on the back of the body. The rotation end point is at 90° on the basis of the width across flats of the case. (Refer to the figure below.)




Rotation starting point
FYN-C1-R

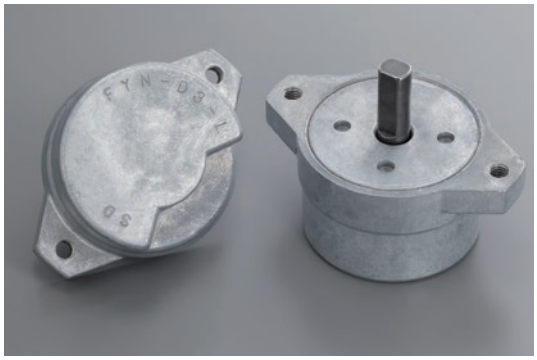
Rotation end point
*Rotating shaft angle for shipment

Rotation starting point
FYN-C1-L

6.There are dampers that generate torque in either the clockwise or counterclockwise direction when the rotating shaft is seen from the above. Select a model according to use.

# Vane Damper

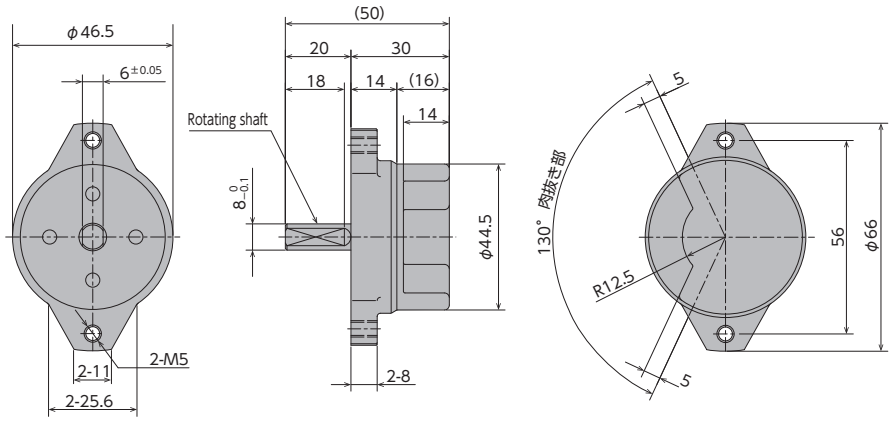
## FYN-D3 Series



## Specifications

| Model | Max. torque | Reverse torque | Damping direction |
|---|---|---|---|
| FYN-D3-R503 | 5 N·m (50 kgf·cm) | 1 N·m or lower (10 kgf·cm or lower) | Clockwise |
| FYN-D3-L503 | | | Counter-clockwise |
| FYN-D3-R703 | 7 N·m (70 kgf·cm) | 1 N·m or lower (10 kgf·cm or lower) | Clockwise |
| FYN-D3-L703 | | | Counter-clockwise |
| FYN-D3-R104 | 10 N·m (100 kgf·cm) | 2 N·m or lower (20 kgf·cm or lower) | Clockwise |
| FYN-D3-L104 | | | Counter-clockwise |

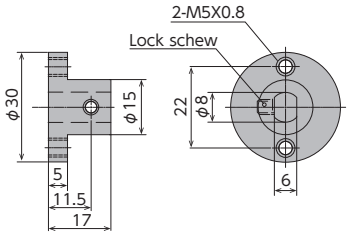
* Max. angle 180°
* Operating temperature −5～50℃
* Weight 215±10g
* Body and cap material Zinc die-cast (ZDC)
* Rotating shaft materia S25C
* Oil type Silicone oil




## Optional Parts

**Rotating shaft flange ROP-010H1**

| Applicable model | Model |
|---|---|
| FYN-D3 | ROP-010H1 |




Rotating shaft flange
ROP−010H1

## How to Use the Damper

1. FYN-D3 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly.

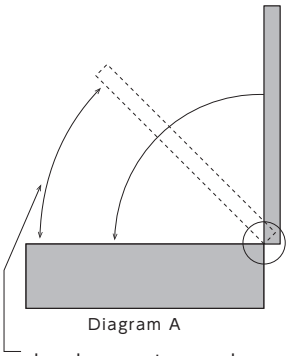


Diagram A

he damper torque becomes larger, preventing the lid from slowing down.

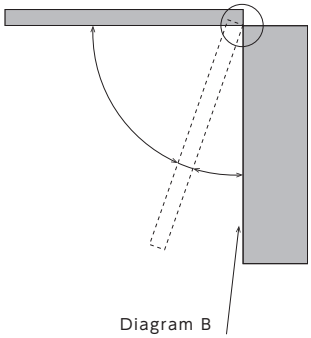


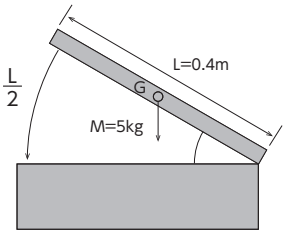
Diagram B

The damper torque becomes larger, preventing the lid from closing completely.

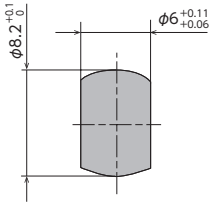
The angle in which the damper torque becomes large can be customized by modifying the inside orifice.

2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

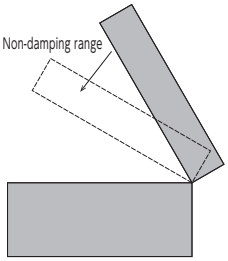
Example)
Lid mass M : 5kg
Lid dimensions L: 0.4m
Gravity Center Position : Assumed as $\frac{L}{2}$
Load torque : T = 5×9.8×0.4÷2
= 9.8N·m
Based on the above calculation,
FYN-D3-*104 is selected.



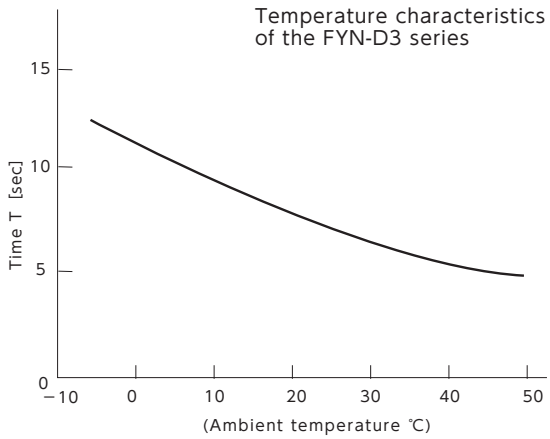

3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.



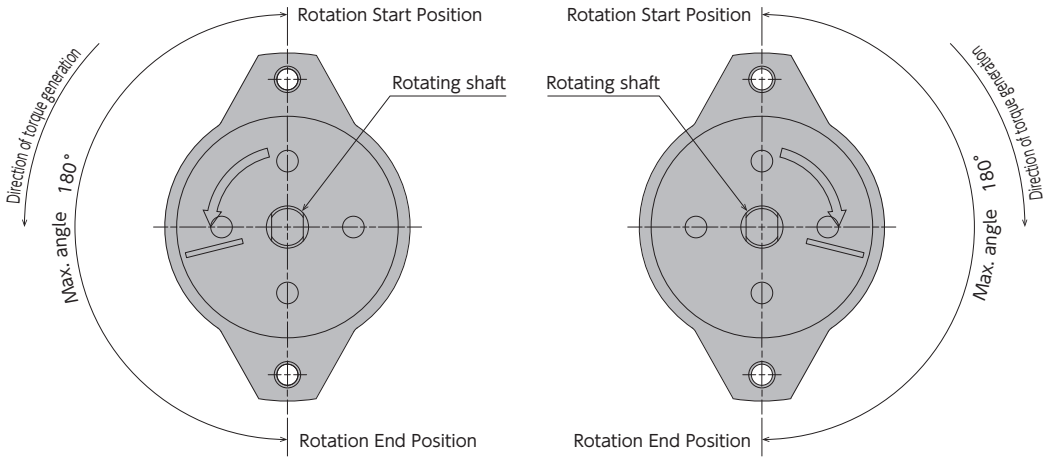

<Recommended dimensions for mounting a rotating shaft>



4. Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The changes in the time it takes for the lid to close are shown in the graph to the right.



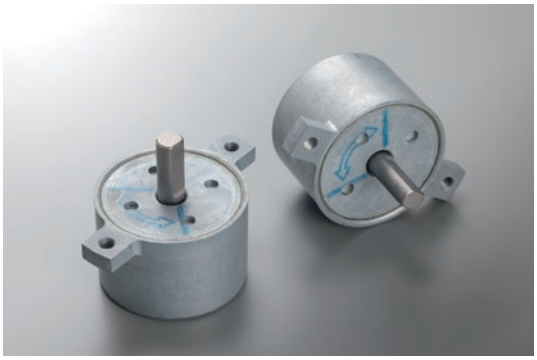

5. The damper's working angle is 110°, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place. The working angle is based on the width across flat for fixing, located towards the rear end of the main body. The position where the rotation is complete is at 90° with respect to the width across flat.




6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

## FYT/FYN-D1(D2) Series

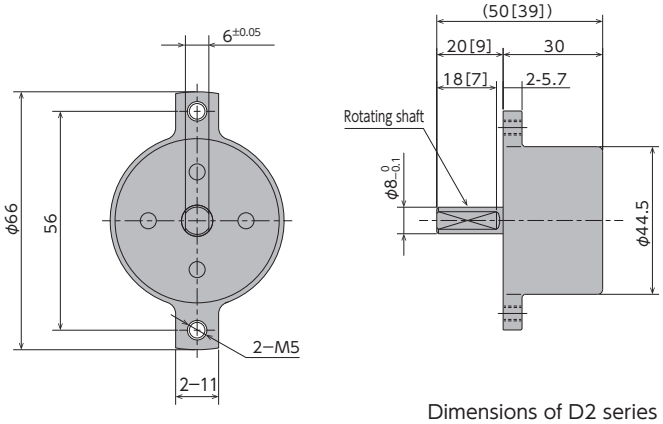


## Specifications

| Model | Max. torque | Reverse torque | Damping direction |
|---|---|---|---|
| FYT-D1(2)-104 | 10 N·m (100 kgf·cm) | — | Both directions |
| FYN-D1(2)-R104 | 10 N·m (100 kgf·cm) | 0.5 N·m or lower ( 5 kgf·cm or lower) | Clockwise |
| FYN-D1(2)-L104 | | | Counter-clockwise |

Note) Measured at 23˚C±2˚C
The FYT/N-D2 series has a shorter shaft length.

* Max. angle 105˚
* Operating temperature −5∼50℃
* Weight D1 : 215±10g, D2 : 210±10g
* Body and cap material Zinc die-cast (ZDC)
* Rotating shaft material S25C
* Oil type Silicone oil

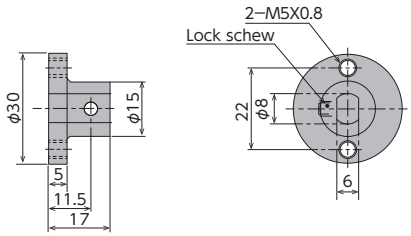



Dimensions of D2 series are in [ ]

## Optional Parts

**Rotating shaft flange ROP-010H1**

| Model |
|---|
| ROP-010H1 |




Rotating shaft flange
ROP-010H1

## How to Use the Damper

1. The uni-directional FYN-D1 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly. Torque is generated in both clockwise and counterclockwise directions in the FTY-D1 series. Unlike the FYN-D1 series, it does not have a fixed orifice for adjusting torque. Therefore, torque remains constant at any angle.

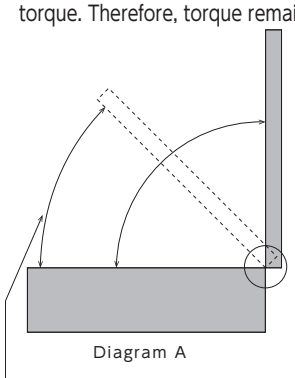


Diagram A

he damper torque becomes larger, preventing the lid from slowing down.

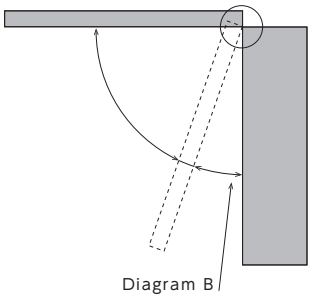
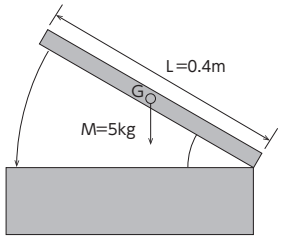


Diagram B

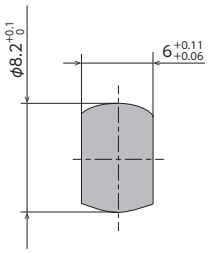
The damper torque becomes larger, preventing the lid from closing completely.

The angle in which the damper torque becomes large can be customized by modifying the inside orifice.

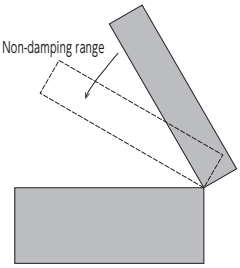
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.
Example)
Lid mass M : 5kg
Lid dimensions L : 0.4m
Gravity Center Position : Assumed as $\frac{L}{2}$
Load torque : T = 5×9.8×0.4÷2
= 9.8N·m
Based on the above calculation,
FYN-D1-*104 is selected.



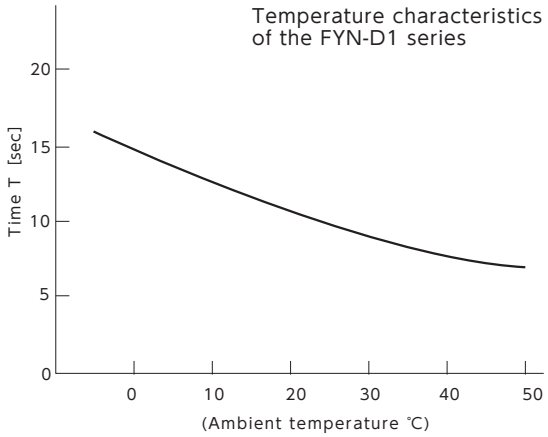

3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.



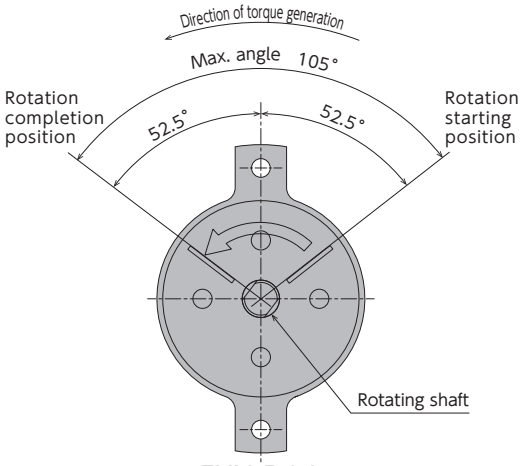

<Recommended dimensions for mounting a rotating shaft>



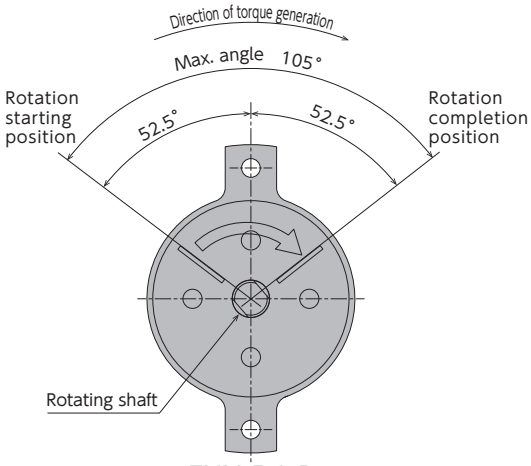
4. Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The changes in the time it takes for the lid to close are shown in the graph to the right.




5. The damper's working angle is 110°, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place. The working angle is based on the width across flat for fixing, located towards the rear end of the main body. The position where the rotation is complete is at 90° with respect to the width across flat.




FYN-D1-L
FYN-D2-L



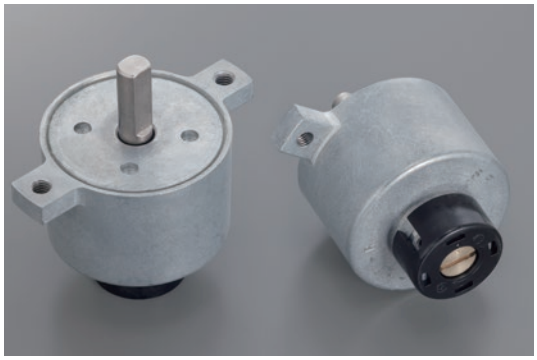

FYN-D1-R
FYN-D2-R

6. The FYN-D1 series is a fixed type; its torque is non-adjustable. However, a customized order for a torque between the range of 2 ~20N·m is possible by changing the oil viscosity.

7. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

## FYT/FYN-H1(H2) Series

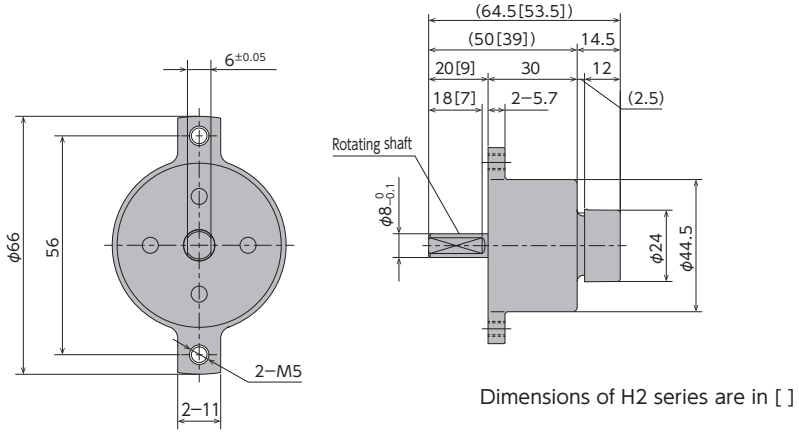


## Specifications

| Model | Max. torque | Reverse torque | Damping direction |
|---|---|---|---|
| FYT-H1(2)-104 | 10 N·m (100 kgf·cm) | — | Both directions |
| FYN-H1(2)-R104 | 10 N·m (100 kgf·cm) | 0.5 N·m or lower ( 5 kgf·cm or lower) | Clockwise |
| FYN-H1(2)-L104 | | | Counter-clockwise |

Note) Measured at 23˚C ± 2˚C
The FYT/N-H2 series has shorter shaft length.

* Max. angle 105˚
* Operating temperature −5~50℃
* Weight H1 : 240±10g, H 2 : 235±10g
* Body and cap material Zinc die-cast (ZDC)
* Rotating shaft material S25C
* Oil type Silicone oil

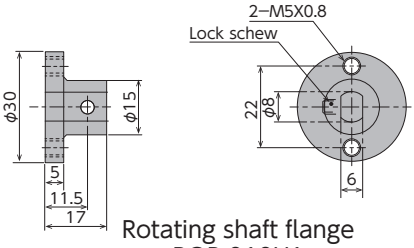



Dimensions of H2 series are in [ ]

## Optional Parts

**Rotating shaft flange ROP-010H1**

| Model |
|---|
| ROP-010H1 |




Rotating shaft flange
ROP-010H1

## How to Use the Damper

1. The uni-directional FYN-H1 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly. Torque is generated in both clockwise and counterclockwise directions in the FTY-H1 series. Unlike the FYN-H1 series, it does not have a fixed orifice for adjusting torque. Therefore, torque remains constant at any angle.

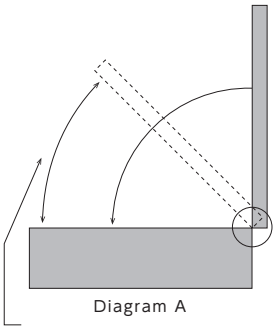


Diagram A

he damper torque becomes larger, preventing the lid from slowing down.

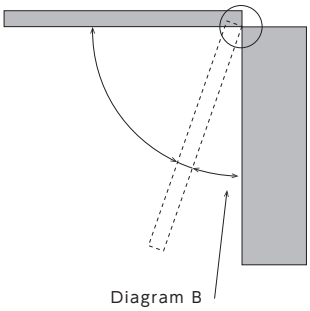
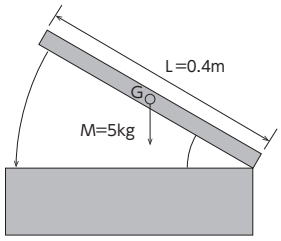


Diagram B

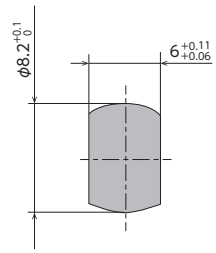
The damper torque becomes larger, preventing the lid from closing completely.

The angle in which the damper torque becomes large can be customized by modifying the inside orifice.

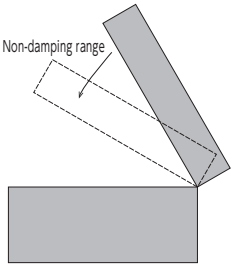
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.
Example)
Lid mass M : 5kg
Lid dimensions L : 0.4m
Gravity Center Position : Assumed as $\frac{L}{2}$
Load torque : T = 5×9.8×0.4÷2
= 9.8N·m
Based on the above calculation,
FYN-H1-*104 is selected.



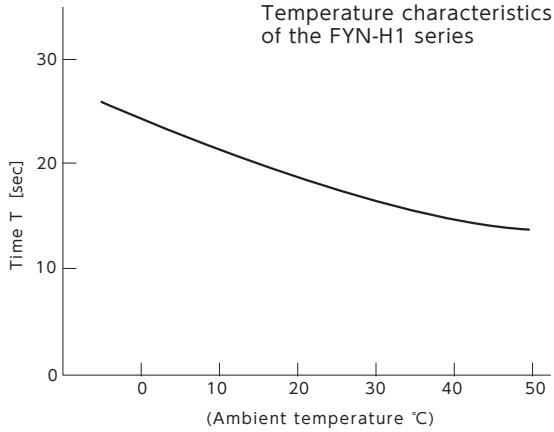

3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.



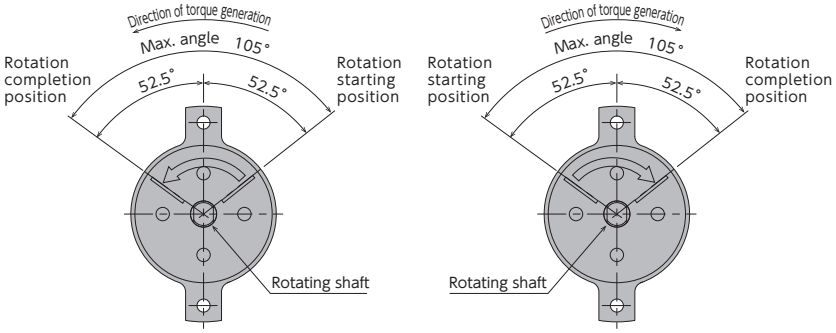

<Recommended dimensions for mounting a rotating shaft>



4. Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The changes in the time it takes for the lid to close are shown in the graph to the right.

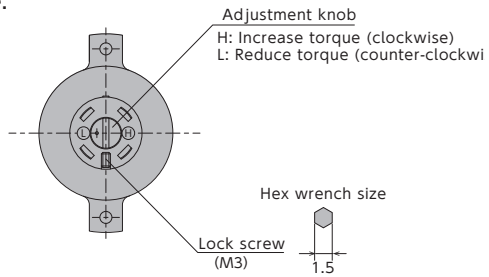



5. The damper's working angle is 110°, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place. The working angle is based on the width across flat for fixing, located towards the rear end of the main body. The position where the rotation is complete is at 90° with respect to the width across flat.




6. How to adjust the damper

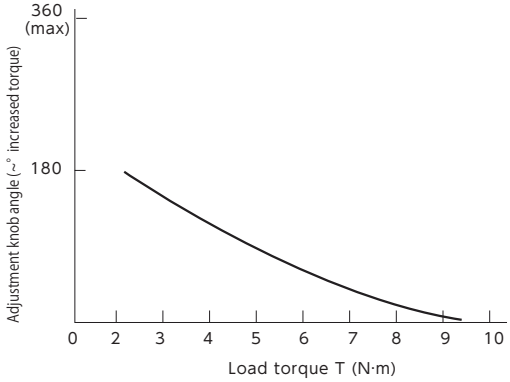
1) In the FYT-H1 (H2) and FYN-H1 (H2) series, the amount of generated torque can be adjusted with the adjustment knob located towards the rear of the main body. Insert a screwdriver in the minus groove to turn.
2) Turn the adjustment knob in the H direction to increase torque.
3) Turn the adjustment knob in the L direction to reduce torque.
4) Do not turn the adjustment knob more than 360°. Turning the knob more than 360° causes the adjustment shaft to slip out, resulting in oil leakage.
5) Once the adjustment is complete, secure with a lock screw. Using the damper without securing it may result in fluctuating torque.




7. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

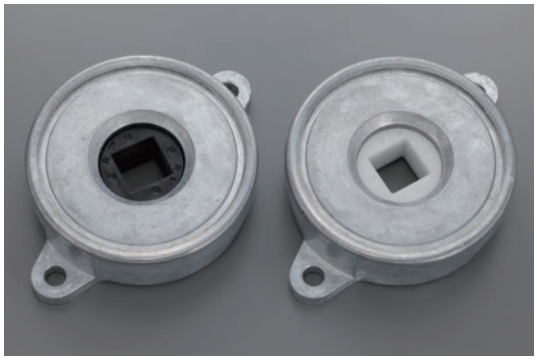
**<Range of torque adjustment>**

Please refer to the graph below for the relationship between torque and the adjustment knob.



# Vane Damper

## FYN-S1 Series

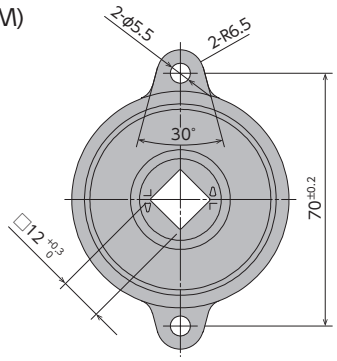


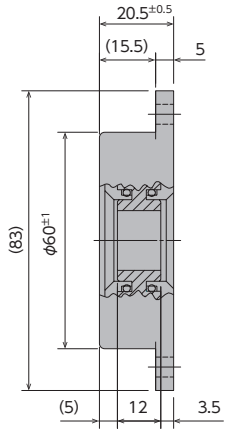
## Specifications

| Model | Max. torque | Reverse torque | Damping direction |
|---|---|---|---|
| FYN-S1-R104 | 10 N·m (100 kgf·cm) | 1.5 N·m or lower ( 15 kgf·cm or lower) | Clockwise |
| FYN-S1-L104 | | | Counter-clockwise |

Note) Measured at 23° C ± 2° C

- Max. angle 130°
- Operating temperature −5～50℃
- Weight 220±10g
- Main body material Zinc die-cast (ZDC)
- Cap material Zinc die-cast (ZDC)
- Rotor material Polyacetal (POM)
- Oil type Silicone oil

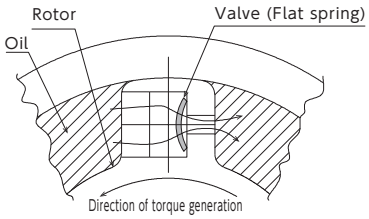



## How to Use the Damper

1. Operating characteristics of self-adjusting oil pressure dampers

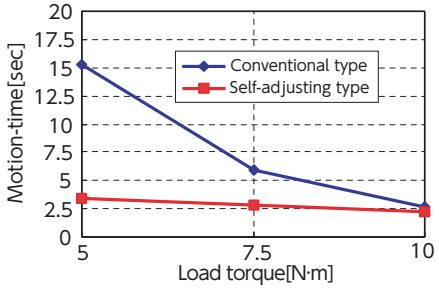
In a conventional vane damper, the damping strength (damping constant) does not change regardless of the load torque used. Because of this, its working speed is slower when the load torque is small, and faster when the load torque is large. However, because the self-adjusting FYN-S1 series is designed to self-adjust the damping force (damping constant) according to the applied load, the working speed fluctuates less compared to conventional dampers when the applied load is altered. The acceptable range or torque is 5 ～10N·m. Please select your damper by referring to the motion-time graph below.



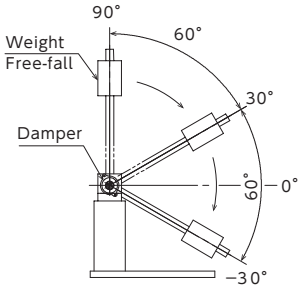

**[Operating principles of the self-adjusting type]**

As shown in the diagram to the left, by changing the shape of the valve (flat spring), the amount of oil flow is altered, adjusting the damper's generated torque. (PAT.P)

**[Motion time graph]**



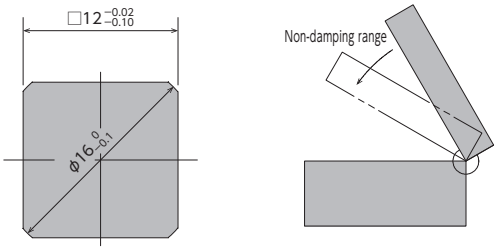

**[Measurement conditions for th e motion-time graph]**



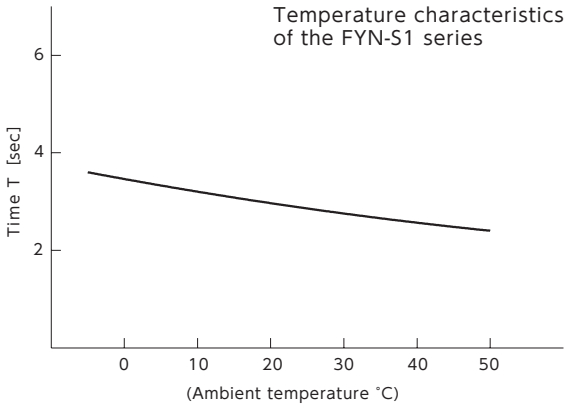

- Load torque T 5˜10N·m
- Measured angle 30° ～ -30°
- Measurement temperature 23° C±2° C

As the level of self-adjustment may vary depending on the range of the working angle of the actual work, please verify under actual working conditions before you select your damper.

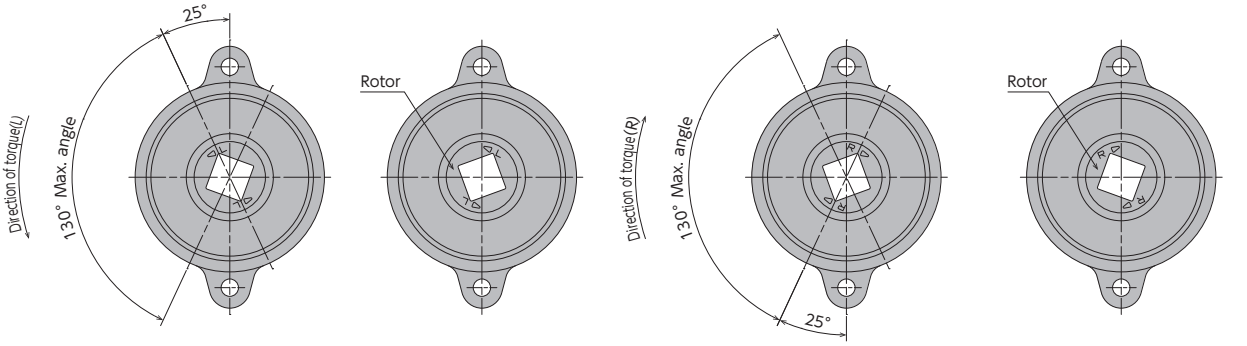
2. When using the damper, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. Also, please ensure a tight fit between the shaft and the damper shaft's opening. Without a tight fit, the non-damping range becomes larger in a closing motion, etc., and it may not slow down properly. Please see the diagrams to the right for the recommended shaft dimensions for a damper.




3. Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The time it takes for the lid to close is shown in the graph to the right.




4. The damper's working angle is 130°, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place.

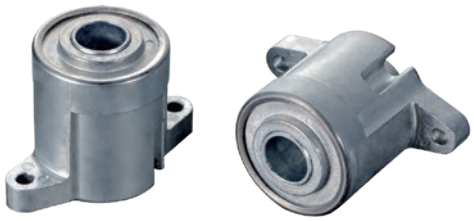



5. Because the FYN-S1 series is a self-adjusting type, the torque cannot be adjusted manually. However, by altering the viscosity of the oil, its damper characteristics can be modified. (Please contact us, as this is a custom order.)

6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

## FYN-X2 Series

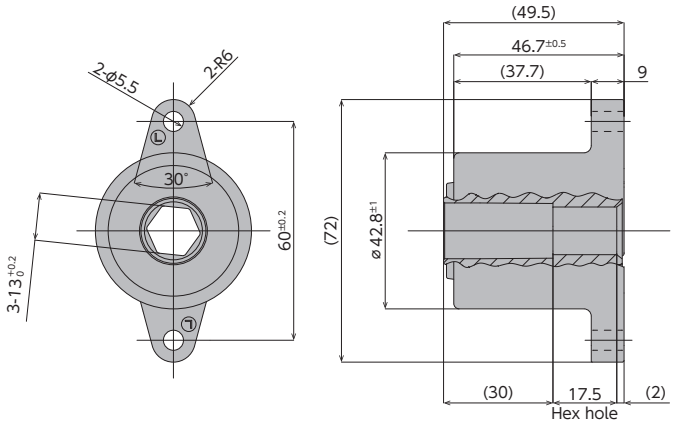


## Specifications

| Model | Max. torque | Reverse torque | Directions |
|---|---|---|---|
| FYN-X2-R154 | 15N·m (150kgf·cm) | 2 N·m or lower (20kgf·cm以下) | Clockwise |
| FYN-X2-L154 | | | Counterclockwise |
| FYN-X2-R254 | 25N·m (250kgf·cm) | 3 N·m or lower (30 kgf·cm or lower) | Clockwise |
| FYN-X2-L254 | | | Counterclockwise |

Note) Measured at 23°C±2°C

∗Max. angle 106°
∗Operating temperature −5～50℃
∗Weight 287±10g
∗Body material Zinc die-cast (ZDC)
∗Cap material Zinc die-cast (ZDC)
∗Rotor material Zinc die-cast (ZDC)
∗Oil type Silicone oil



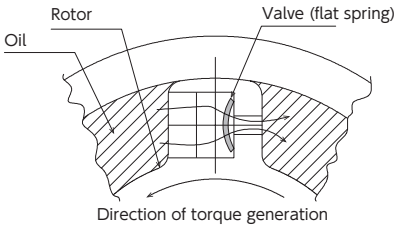

## How to Use the Damper

1.Operating characteristics of self-adjusting oscillating dampers

In a conventional oscillating damper, the damping strength (damping constant) does not change regardless of the load torque used. Therefore, the operating speed is slower when the load torque is small, and faster when the load torque is large.

However, since the self-adjusting FYN-X2 series is designed to self-adjust the damping strength (damping constant) according to the applied load, its motion-time fluctuates less than that of conventional dampers when the load changes.

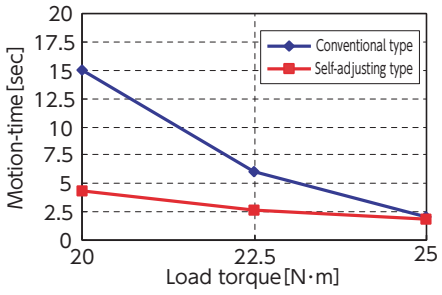
The acceptable range of torque is 10 to 15N•m or 20 to 25N•m. Please select your damper by referring to the motion-time graph below.

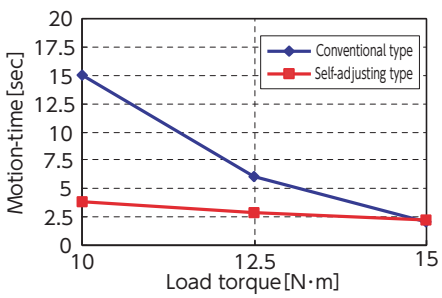



**【Operating principles of the self-adjusting type】**

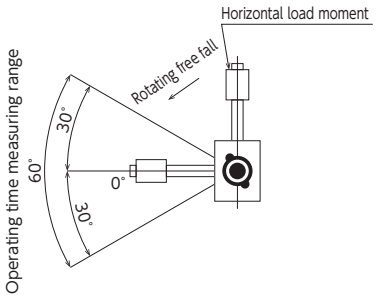
As shown in the diagram to the left, by changing the shape of the valve (flat spring), the amount of oil flow is altered, adjusting the damper's generated torque. (PAT.P)

**【Motion time graph】**

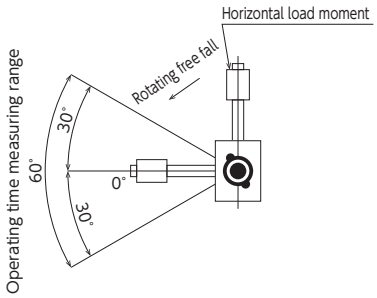



**【Measurement conditions for the motion-time graph】**




FYN-X2 25N·m specification
- Measuring temperature : Room temperature (23±3℃)
- Load torque : 20～25N·m
- Measuring angle : +30°～−30°

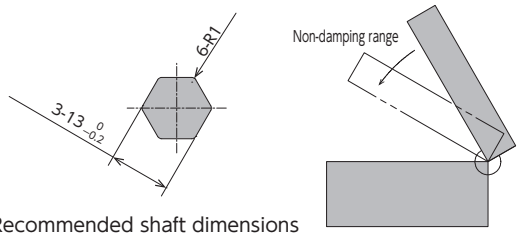



FYN-X2 15N·m specification
- Measuring temperature : Room temperature (23±3℃)
- Load torque : 10～15N·m
- Measuring angle : +30°～−30°

As the level of self-adjustment may vary depending on the range of the working angle of the actual work, please verify under actual working conditions before you select your damper.

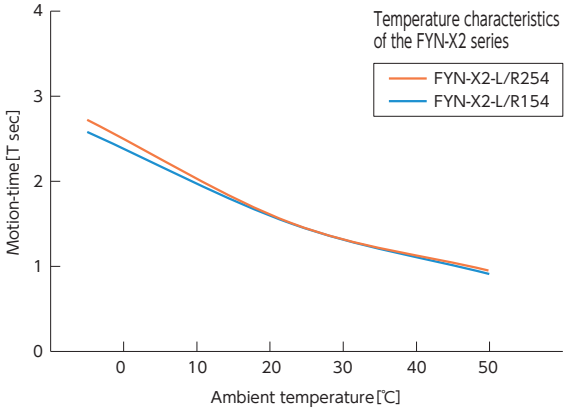
●Products specification might be changed without notice.

2.When using the damper, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. Also, please ensure a tight fit between the shaft and the damper shaft's opening. Without a tight fit, the play becomes larger in a closing motion, etc., and the lid may not slow down properly. Please see the diagrams to the right for the recommended shaft dimensions for a damper.

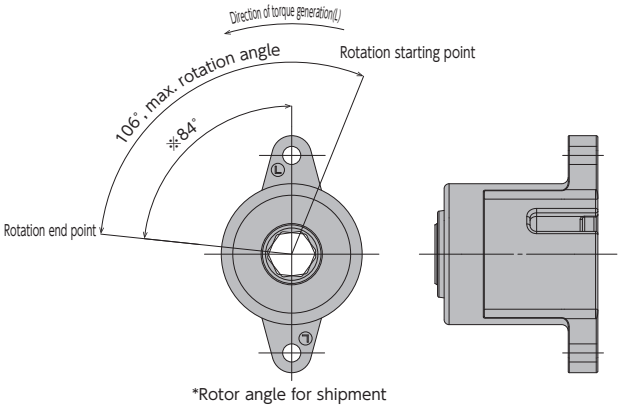



Recommended shaft dimensions

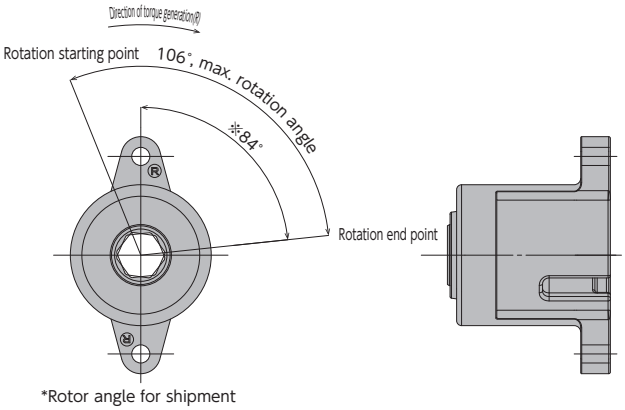
3.Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases.
This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The time it takes for the lid to close is shown in the graph to the right.




4.The damper's working angle is 106° as shown below. Rotating the damper beyond this angle will cause the damage to the damper. Please ensure that an external stopper is in place.




FYN-X2-L154
FYN-X2-L254



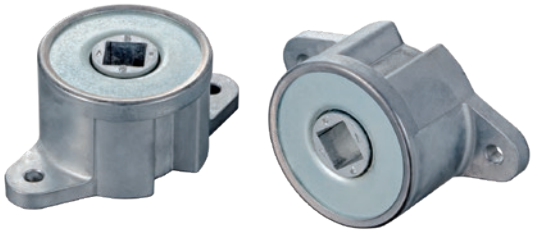

FYN-X2-R154
FYN-X2-R254

5. Because the FYN-X2 series is a self-adjusting type, the torque cannot be adjusted manually. However, by altering the viscosity of the oil, its damper characteristics can be modified.
* Please contact us, as this is a custom order,

6.The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

## FYN-Z2 Series

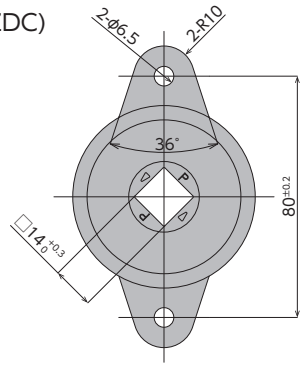


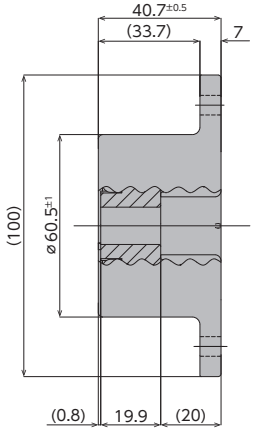
## Specifications

| Model | Max. torque | Reverse torque | Directions |
|---|---|---|---|
| FYN-Z2-R354 | 35N·m (350kgf·cm) | 3 N·m or lower (30 kgf·cm or lower) | Clockwise |
| FYN-Z2-L354 | | | Counterclockwise |

Note) Measured at 23°C±2°C

∗Max. angle 94°
∗Operating temperature −5～50℃
∗Weight 506±10g
∗Body material Zinc die-cast (ZDC)
∗Cap material Iron (SPFC)
∗Rotor material Zinc die-cast (ZDC)
∗Oil type Silicone oil



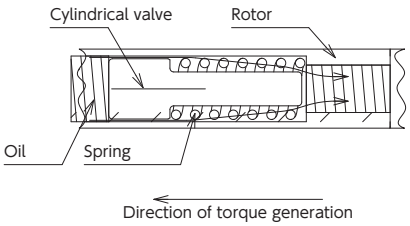

## How to Use the Damper

1. Operating characteristics of self-adjusting oscillating dampers

In a conventional oscillating damper, the damping strength (damping constant) does not change regardless of the load torque used. Therefore, the operating speed is slower when the load torque is small, and faster when the load torque is large.

However, since the self-adjusting FYN-X2 series is designed to self-adjust the damping strength (damping constant) according to the applied load, its motion-time fluctuates less than that of conventional dampers when the load changes.

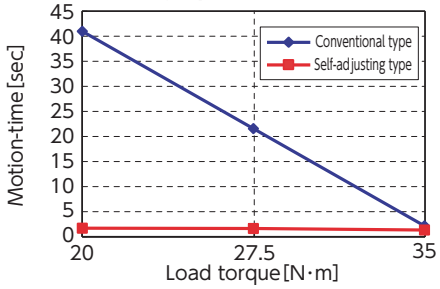
The acceptable range of torque is 20 to 35 N•m. Please select your damper by referring to the motion-time graph below.



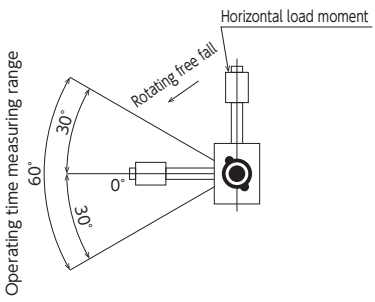

**[Operating principles of the self-adjusting type]**

As shown in the diagram to the left, the spring compressed by the movement of the cylindrical valve alters the amount of oil flow so as to adjust the generated torque of the damper. (Patent pending)

**[Motion time graph]**



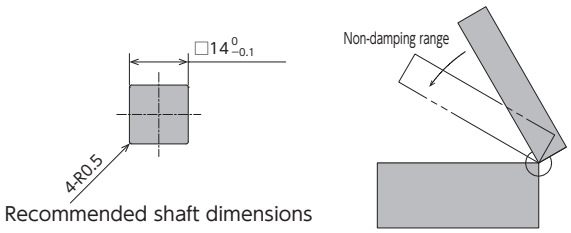

**[Measurement conditions for the motion-ime graph]**




- Measuring temperature : Room temperature (23±3℃)
- Load torque : 20～35N·m
- Measuring angle: +30°～−30°

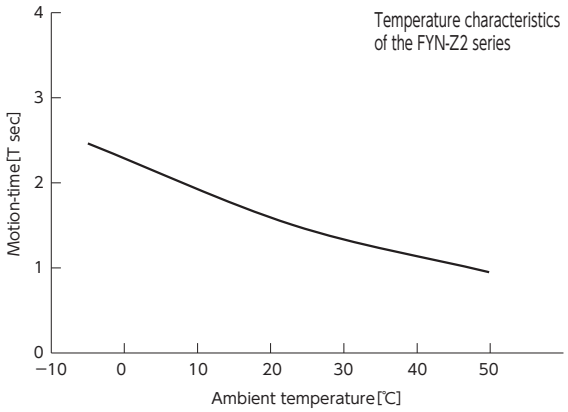
As the level of self-adjustment may vary depending on the range of the working angle of the actual work, please verify under actual working conditions before you select your damper.

2.When using the damper, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. Also, please ensure a tight fit between the shaft and the damper shaft's opening. Without a tight fit, the play becomes larger in a closing motion, etc., and the lid may not slow down properly. Please see the diagrams to the right for the recommended shaft dimensions for a damper.

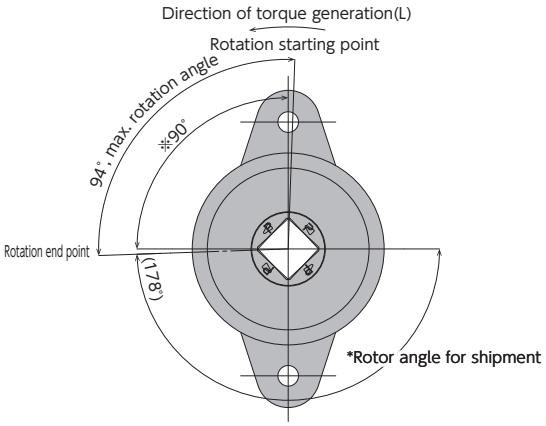


Recommended shaft dimensions

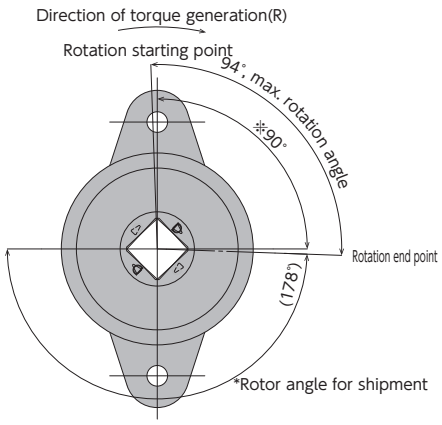
3.Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases.
This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well. The time it takes for the lid to close is shown in the graph to the right.




4.The damper's working angle is 94° as shown below. Rotating the damper beyond this angle will cause the damage to the damper. Please ensure that an external stopper is in place.



FYN-Z2-L354



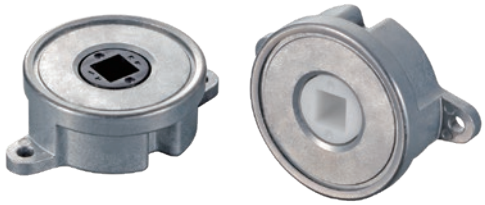
FYN-Z2-R354

5. Because the FYN-Z2 series is a self-adjusting type, the torque cannot be adjusted manually. However, by altering the viscosity of the oil, its damper characteristics can be modified.
* Please contact us, as this is a custom order,

6.The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

# Vane Damper

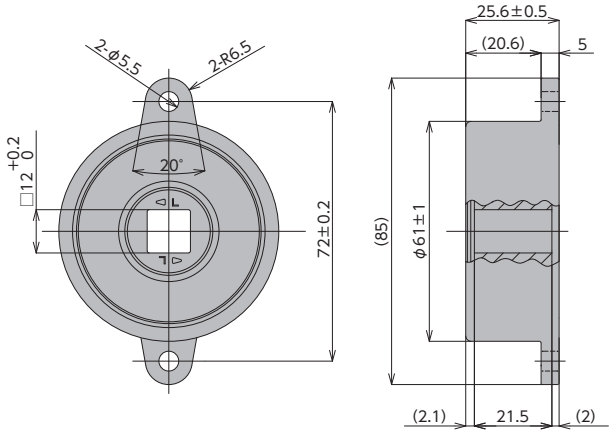
## FYN-A2 Series



- Max. angles 120°
- Operating temperature -5 ~50° C
- Weight 222 ± 11g
- Body material Zinc die - cast (ZDC)
- Cap material Zinc die - cast (ZDC)
- Rotor material Zinc die - cast (ZDC)
- Oil type Silicone oil
- Rotary color L: Black R: White

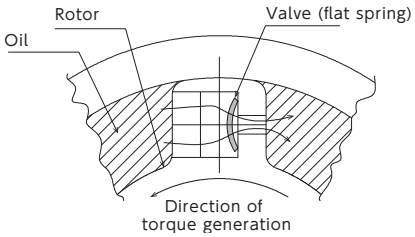
## Specifications

| Model | Max. torque | Reverse torque | Directions |
|---|---|---|---|
| FYN-A2-R204 | 20N·m (200kgf·cm) | 2N·m or lower (20kgf·cm lower) | Clockwise |
| FYN-A2-L204 | | | Counterclockwise |

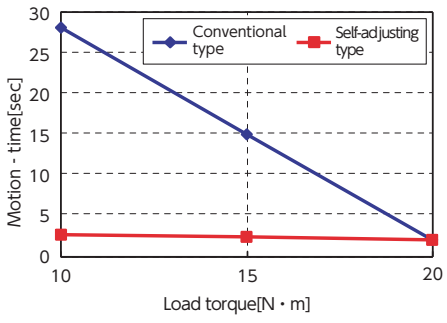



## How to Use the Damper

1. Operating characteristics of self-adjusting oscillating dampers
in a conventional oscillating damper, the damping strength (damping constant) does not change regardless of the load torque used.
Therefore, the operating speed is slower when the load torque is small, and faster when the load torque is large.
However, since the self-adjusting FYN-A2 series is designed to self-adjustable the damping strength (damping constant) according to the applied load, its motion-time fluctuates less than that of conventional dampers when the load changes.
The acceptable range of torque is 10 to 15N·m or 20 to 25N·m. Please select your damper by referring to the motion graph below.



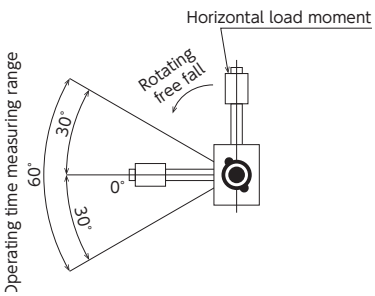

**【Motion time graph】**




**【Operating principles of the self-adjusting type】**

As shown in the diagram to the left, by changing the shape of the valve (flat spring), the amount of oil flow is altered, adjusting the damper's generated torque. (PAT.P)

**【Measurement conditions for the motion-time graph】**



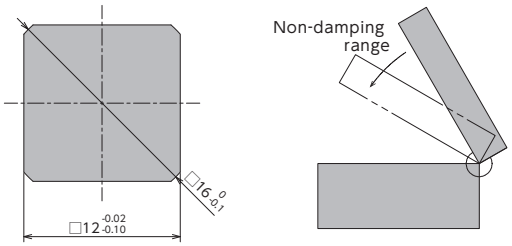

- Measuring temperature : Room temperature(23±3°C)
- Load torque : 10~20N·m
- Measuring angle : +30°~−30°

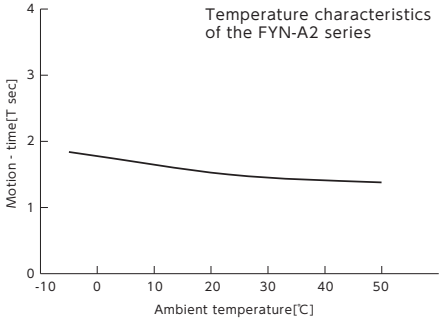
As the level of self-adjustment may vary depending on the range of the working angle of the actual work, please verify under actual working conditions before you select your damper.

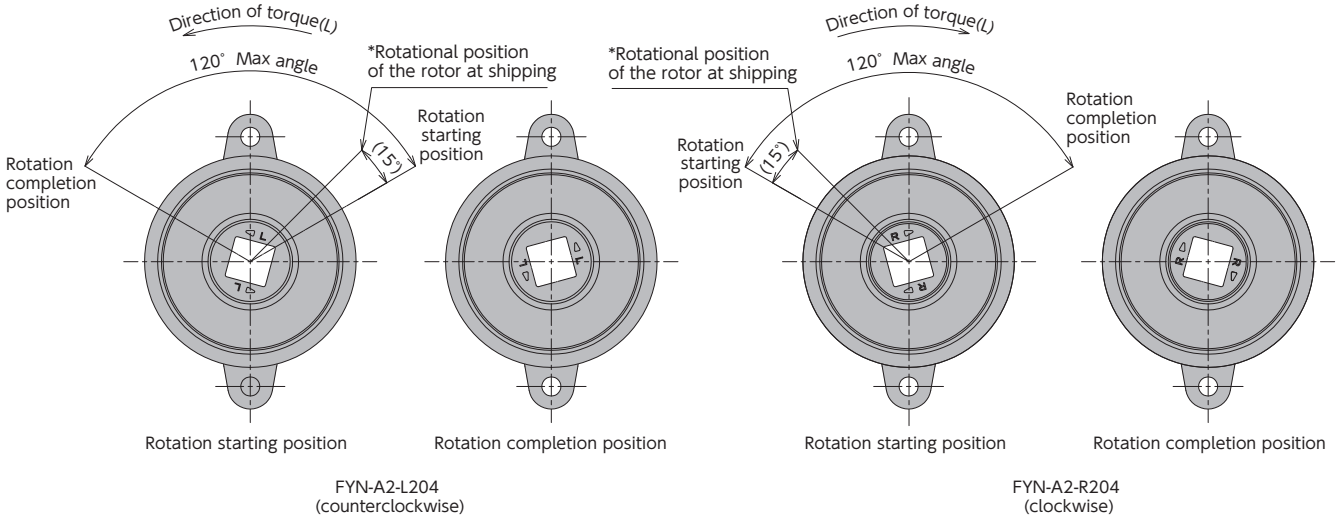
2. When using the damper, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. Also, please ensure a tight fit between the shaft and the damper shaft's opening. Without a tight fit, the play becomes larger in a closing motion, etc., and the lid may not slow down properly. Please see the diagrams to the right for the recommended shaft dimensions for a damper.

3. Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature decreases.This is because the viscosity of the temperature. When the temperature returns to normal, The damper characteristics will return to normal as well. The time it takes for the lid to close is shown in the graph to the right.

4. The damper's working angle is 120˚as shown below. Rotating the damper beyond this angle will cause the damage to the damper. Please ensure that an external stopper is in place.



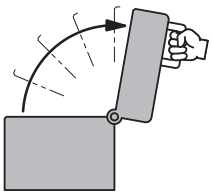




5. Because the FYN-A2 series is a self-adjusting type, the torque cannot be adjusted manually. However, by altering the viscosity of the oil, its damper characteristics can be modified. (Please contact us, as this is a custom order.)6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

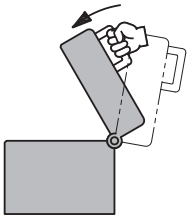
6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

## Precautions for Use

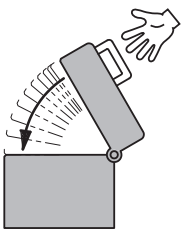
* When using the vane damper, ensure that after having fully opened the lid, move the lid to a point where free fall starts, and then release the hand from the lid. If the lid is slightly opened and in this state the hand is released, the lid may not be able to sufficiently slow down and the lid may be closed with force, which could result in an injury such as getting the hand caught by the lid.



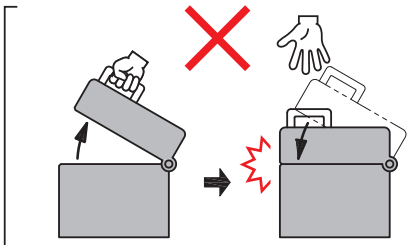
(1) Open the lid fully.



(2) Move the lid to a point where free fall starts.



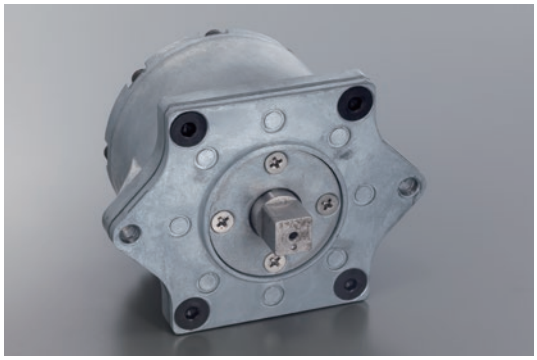
(3) Release the hand (the lid slows down).



(4) If the lid is released without fully opening it, it does not slow down.

# Vane Damper

## FYT/FYN-LA3 Series

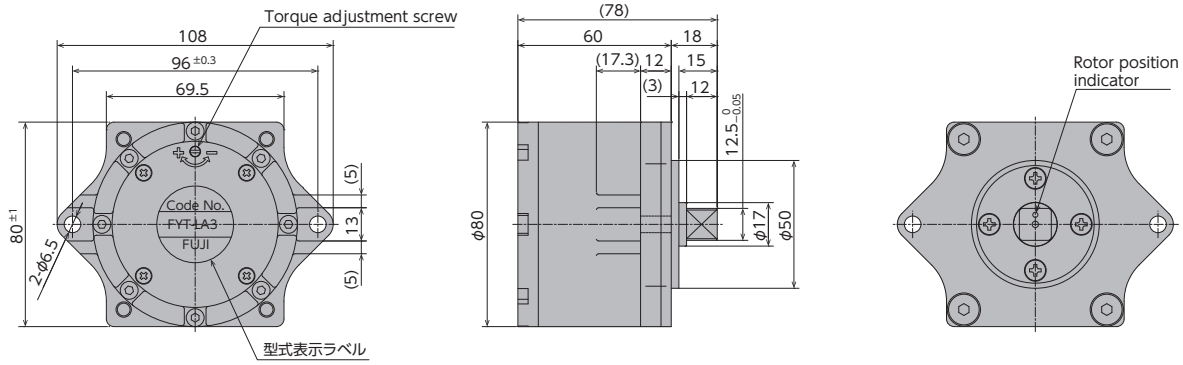


* Max. angle 210°
* Operating temperature 0～50℃
* Weight 1. 75k g
* Body and cap material Zinc die-cast (ZDC)
* Rotating shaft material Alloy steel
* Oil type Silicone oil

## Specifications

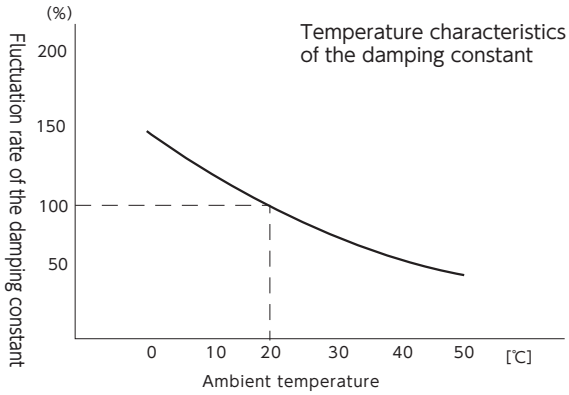
| Model | Max. torque | Damping constant | Damping direction |
|---|---|---|---|
| FYT-LA3 | 40N·m (400kgf·cm) | 10～60N·m/(rad/sec) | Both directions |
| FYN-LA3-R | | | Clockwise |
| FYN-LA3-L | | | Counter-clockwise |

Note) Measured at 23°C±2°C



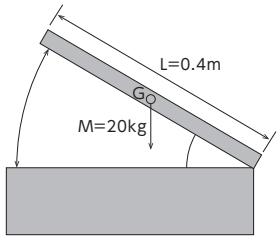

## How to Use the Damper

1. Damper characteristics vary according to the ambient temperature. In general, the damping constant decreases as the temperature increases, and the damping constant increases as the temperature decreases. This is because the viscosity of the oil inside the damper changes according to the temperature. When the temperature returns to normal, the damping constant will return to normal as well.

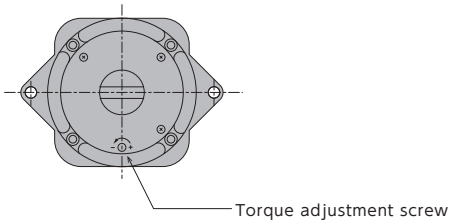



2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example)
Lid mass M : 20kg
Lid dimensions L : 0.4m
Gravity Center Position : Assumed as $\frac{L}{2}$
Load torque : T = 20×0.4×9.8÷2
= 39.2N·m

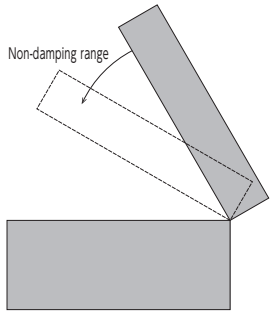


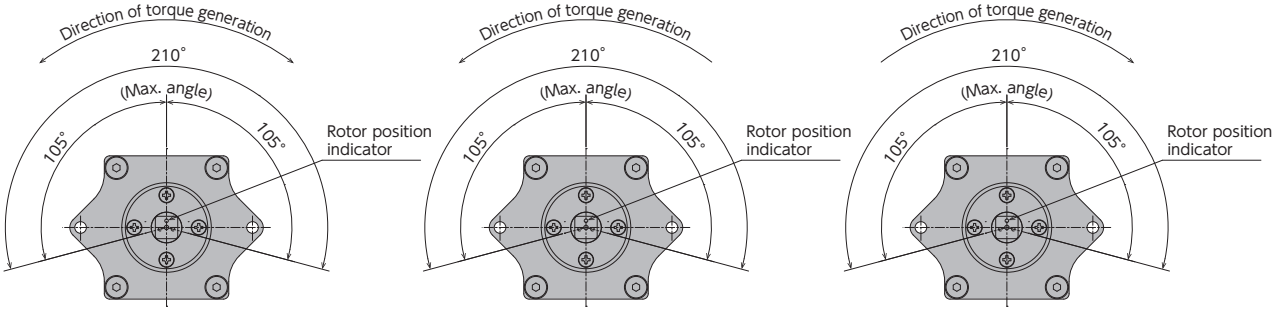

3. FYT, FYN-LA3 series are torque-adjustable types. Turn the damping adjustment screw located on the back of the main body by inserting a slotted screwdriver.
The damping constant increases when turned to the + direction (right).
The damping constant decreases when turned to the - direction (left).



# Instruction for Damper Attachment

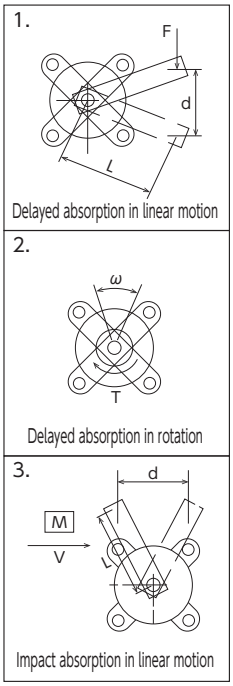
1. When attaching a rotating shaft to its corresponding part, ensure that they are firmly attached together by making the gap between them as small as possible. A large gap may affect the damper's non-damping range, preventing the lid from slowing down properly.
2. The damper's working angle is ±105°, as shown on the right (second diagram). Please determine where to attach it according to your needs.
3. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.
4. Do not use the damper as a stopper. An external stopper must be attached at the stopping position.
5. In FYN-LA3-L and FYN-LA3-R, the angular velocity in the reverse direction (opposite to the direction of torque generation) should be 1 rad/sec or less.




FYT-LA3　　FYN-LA3-L　　FYN-LA3-R

# How to Calculate the Damping Constant for Vane Dampers




**1. Delayed absorption in linear motion**

Formula (N·m/(rad/sec)) $= \frac{FL^2t}{d}$

F = Force or mass applied to the lever tip (N)
L = Distance between the centre of the damper shaft and the lever's point of application (m)
d = Distance travelled by lever (m)
t = Travelling time of the lever (sec)

**2. Delayed absorption in rotation**

Formula (N·m/(rad/sec)) $= \frac{T}{\omega}$

T = Torque applied to shaft (N·m)
$\omega$ = Angular velocity(rad/sec)

**3. Impact absorption in linear motion**

Formula (N·m/(rad/sec)) $= \frac{MVL^2}{d}$

M = Mass(kg)
V = Velocity(m/sec)
L = Distance between the centre of the damper shaft and the lever's point of application (m)
d = Distance travelled by lever (m)

# Hinge Damper

Bi-Directional Uni-Directional
Fixed Type Adjustable type Self-adjusting

## FHD-A1 Series

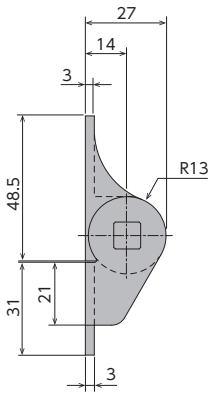
RoHS Compliant

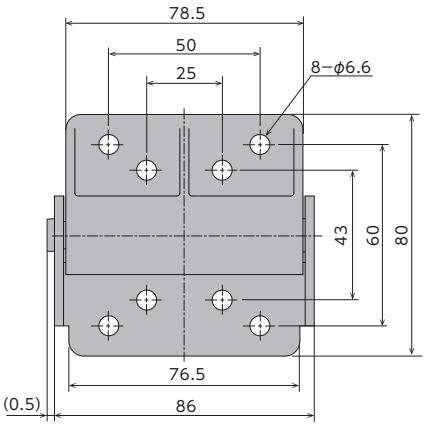
●Products specification might be changed without notice.

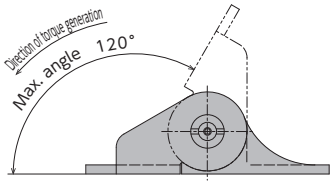
## Specifications

| Model | Max. torque | Max. reverse torque |
|---|---|---|
| FHD-A1-1-503 | 5N·m (50 kgf·cm) | 0.6N·m or lower (6kgf·cm or lower) |
| FHD-A1-2-503 | | |
| FHD-A1-1-104 | 10N·m (100 kgf·cm) | 1N·m or lower (10kgf·cm or lower) |
| FHD-A1-2-104 | | |

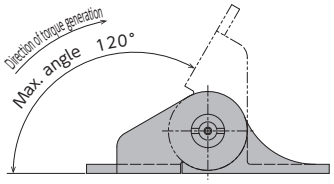
- ＊Max. angle 120°
- ＊Operating temperature −5～50℃
- ＊Weight 410g
- ＊Main body material Zinc die-cast (ZDC) + silver coating
- ＊Hinge material SUS304
- ＊Oil type Silicone oil




<FHD-A1-1-***>

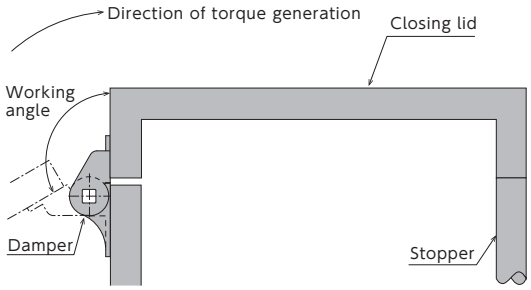



<FHD-A1-2-***>

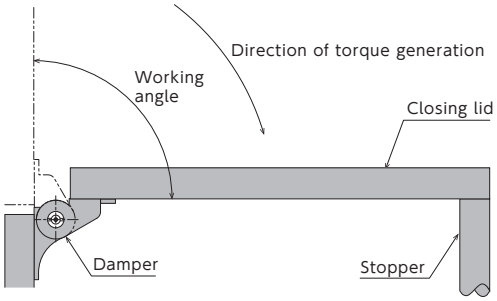
## How to Use the Damper

1. There are two ways to attach the damper, as shown below.

○Attached externally(FHD-A1-1***)




○Attached internally(FHD-A1-2***)

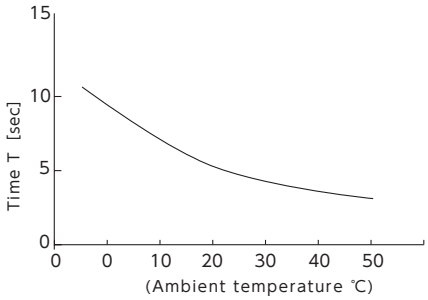



2. This damper is only for horizontal application. Please do not use this damper for vertical application.

## Damper Characteristics

1. Temperature characteristics

Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the viscosity of the oil inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well.




2. The working angle of the hinge is 120° .
Operating the hinge beyond this angle will cause damage to the hinge. Please ensure that an external stopper is in place.

# Friction Type Hinge Damper

Fixed Type | Bi-Directional | Uni-Directional | Adjustable type | Self-adjusting

## FHD-B1/B2 Series

RoHS Compliant

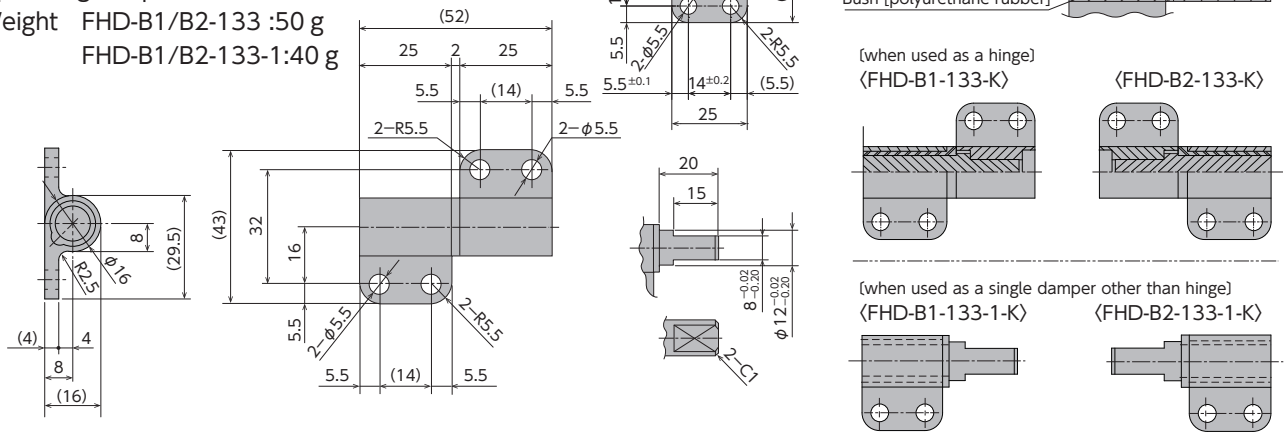
●Products specification might be changed without notice.

## Specifications

| Model | Max. torque |
|---|---|
| FHD-B1-133-K | 1.35±0.34 N·m (13.5±3.4 kgf·cm) |
| FHD-B2-133-K | |
| FHD-B1-133-1-K | 1.35±0.34 N·m (13.5±3.4 kgf·cm) |
| FHD-B2-133-1-K | |
| FHD-B1-133-2-K | |
| FHD-B2-133-2-K | |

Note) Damper torque was measured at 25°C±2C° at 2rpm

∗ Max. rotation speed 15rpm
∗ Max. cycle rate 5cycle / min
∗ Operating temperature 0℃~60℃
∗ Weight FHD-B1/B2-133 :50 g
FHD-B1/B2-133-1:40 g



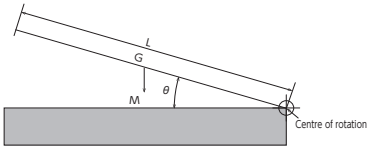

## How to Use the Damper

1. The damper generates torque in both clockwise and counter-clockwise directions.
2. A friction-type hinge damper can be used as a bearing.
3. Friction-type hinge dampers have a long product life and do not require lubrication.
4. Torque down will result if the damper part gets wet with water or oil.
5. It cannot be used for continuous rotation. Please use it in a vane motion.
6. Depending on the operating conditions, it can be used as a free-stop hinge. Please calculate the retention torque based on the following equation.

$$\text{Retention torque } o = \frac{M \times 9.8 \times \frac{L}{2} \times \cos\theta}{0.65 \times \alpha \times N} \text{ (N·m)}$$

| Retention temperature | α |
|---|---|
| Room temperature (25±5℃) | 1.0 |
| MAX40℃ | 0.75 |
| MAX60℃ | 0.50 |

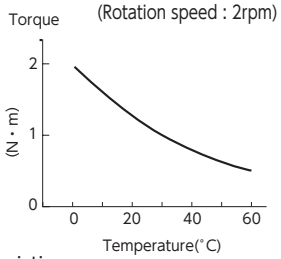
M : Mass of the retaining part
L : Distance between the tip of retaining part and the centre of rotation
θ : Retention angle from the retaining part's horizontal position
α : Temperature coefficient of the max. temperature
N : Number of dampers used



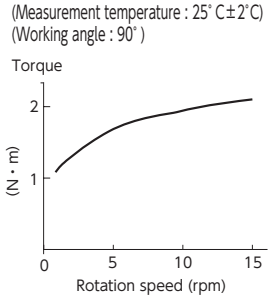

7. This damper is only for horizontal application. Please do not use this damper for vertical application.

## Damper Characteristics

1. Temperature characteristics
Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the temperature of the shaft bush inside the damper varies according to the temperature. When the temperature returns to normal, the damper characteristics will return to normal as well.




2. Speed characteristics
The speed characteristics of a friction-type hinge damper are shown in the graph below. The damper torque is determined based on the speed characteristics at 2rpm.



# Friction Damper

Fixed Type | Bi-Directional | Uni-Directional | Adjustable type | Self-adjusting

## FFD-25FS/FW/SS/SW Series

RoHS Compliant

●Products specification might be changed without notice.

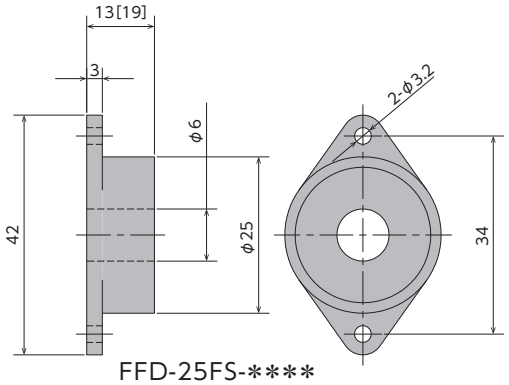
## Specifications

| Model | Max. torque | Max. reverse torque |
|---|---|---|
| FFD-25FS-R102 | 0.1±0.01 (N·m) (1±0.1 kgf·cm) | Clockwise |
| FFD-25FS-L102 | | Counter-clockwise |
| FFD-25FS-R502 | 0.5±0.05 (N·m) (5±0.5 kgf·cm) | Clockwise |
| FFD-25FS-L502 | | Counter-clockwise |
| FFD-25FS-R103 | 1±0.1 (N·m) (10±1 kgf·cm) | Clockwise |
| FFD-25FS-L103 | | Counter-clockwise |
| FFD-25FW-R103 | 1±0.1 (N·m) (10±1 kgf·cm) | Clockwise |
| FFD-25FW-L103 | | Counter-clockwise |
| FFD-25FW-R153 | 1.5±0.15 (N·m) (15±1.5 kgf·cm) | Clockwise |
| FFD-25FW-L153 | | Counter-clockwise |
| FFD-25FW-R203 | 2±0.2 (N·m) (20±2 kgf·cm) | Clockwise |
| FFD-25FW-L203 | | Counter-clockwise |

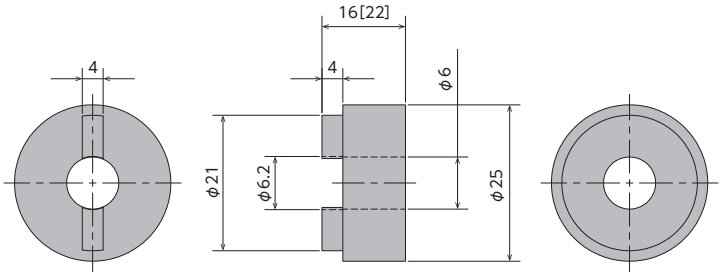
| Model | Max. torque | Max. reverse torque |
|---|---|---|
| FFD-25SS-R102 | 0.1±0.01 (N·m) (1±0.1 kgf·cm) | Clockwise |
| FFD-25SS-L102 | | Counter-clockwise |
| FFD-25SS-R502 | 0.5±0.05 (N·m) (5±0.5 kgf·cm) | Clockwise |
| FFD-25SS-L502 | | Counter-clockwise |
| FFD-25SS-R103 | 1±0.1 (N·m) (10±1 kgf·cm) | Clockwise |
| FFD-25SS-L103 | | Counter-clockwise |
| FFD-25SW-R103 | 1±0.1 (N·m) (10±1 kgf·cm) | Clockwise |
| FFD-25SW-L103 | | Counter-clockwise |
| FFD-25SW-R153 | 1.5±0.15 (N·m) (15±1.5 kgf·cm) | Clockwise |
| FFD-25SW-L153 | | Counter-clockwise |
| FFD-25SW-R203 | 2±0.2 (N·m) (20±2 kgf·cm) | Clockwise |
| FFD-25SW-L203 | | Counter-clockwise |

*) Rated torque is measured at a rotation speed of 20rpm at 20~25℃

| | | | |
|---|---|---|---|
| ∗Max. rotation speed | 30rpm | ∗Cap colour | R:Black L:White |
| ∗Max. cycle rate | 13cycle/min | ∗Weight | FFD-25FS 13±2g |
| ∗Operating temperature | −10~60℃ (90%RH) | | FFD-25FW 24±2g |
| | | | FFD-25SS 12±2g |
| ∗Body and cap material | POM | | FFD-25SW 23±2g |




FFD-25FS-∗∗∗∗
(Dimension of FFD-25FW-∗∗∗∗ are in [ ])

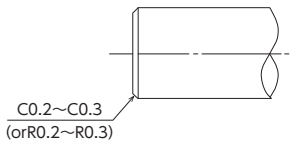



FFD-25SS-∗∗∗∗
(Dimension of FFD-25SW-∗∗∗∗ are in [ ])

## How to Use the Damper

1. The damper generates torque in both the clockwise and counter-clockwise directions. (A one-way clutch is built in inside the damper.)

2. Please make sure that the shaft attached to a damper has a bearing, as the damper itself is not fitted with one.

| | |
|---|---|
| Shaft's external dimensions | 6 $^{0}_{-0.03}$ |
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) |   |

3. It can be used as a free-stop for a load that is smaller than the rated torque.

4. Please refer to the recommended dimensions below when creating a shaft for attachment to the damper. Using a shaft outside of the recommended dimensions may cause the shaft to slip out.

5. To insert a shaft into the damper, insert the shaft while spinning it in the opposite direction of the damper's direction of torque generation. (Do not force the shaft in from a regular direction. This may damage the built-in oneway clutch.)

# Friction Damper

Fixed Type | Bi-Directional | Uni-Directional | Adjustable type | Self-adjusting

## FFD-28FS/FW/SS/SW Series

RoHS Compliant

●Products specification might be changed without notice.

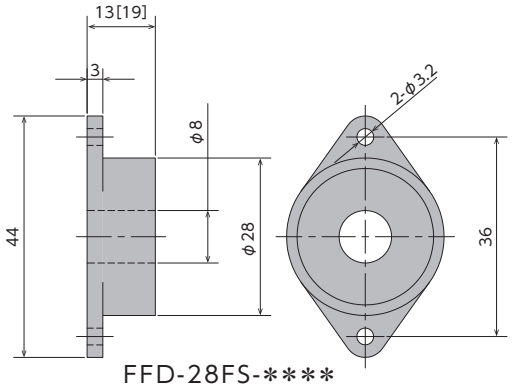
## Specifications

| Model | Max. torque | Max. reverse torque |
|---|---|---|
| FFD-28FS-R102 | 0.1±0.01 {N·m} (1±0.1 kgf·cm) | Clockwise |
| FFD-28FS-L102 | | Counter-clockwise |
| FFD-28FS-R502 | 0.5±0.05 {N·m} (5±0.5 kgf·cm) | Clockwise |
| FFD-28FS-L502 | | Counter-clockwise |
| FFD-28FS-R103 | 1±0.1 {N·m} (10±1 kgf·cm) | Clockwise |
| FFD-28FS-L103 | | Counter-clockwise |
| FFD-28FW-R103 | 1±0.1 {N·m} (10±1 kgf·cm) | Clockwise |
| FFD-28FW-L103 | | Counter-clockwise |
| FFD-28FW-R153 | 1.5±0.15 {N·m} (15±1.5 kgf·cm) | Clockwise |
| FFD-28FW-L153 | | Counter-clockwise |
| FFD-28FW-R203 | 2±0.2 {N·m} (20±2 kgf·cm) | Clockwise |
| FFD-28FW-L203 | | Counter-clockwise |

| Model | Max. torque | Max. reverse torque |
|---|---|---|
| FFD-28SS-R102 | 0.1±0.01 {N·m} (1±0.1 kgf·cm) | Clockwise |
| FFD-28SS-L102 | | Counter-clockwise |
| FFD-28SS-R502 | 0.5±0.05 {N·m} (5±0.5 kgf·cm) | Clockwise |
| FFD-28SS-L502 | | Counter-clockwise |
| FFD-28SS-R103 | 1±0.1 {N·m} (10±1 kgf·cm) | Clockwise |
| FFD-28SS-L103 | | Counter-clockwise |
| FFD-28SW-R103 | 1±0.1 {N·m} (10±1 kgf·cm) | Clockwise |
| FFD-28SW-L103 | | Counter-clockwise |
| FFD-28SW-R153 | 1.5±0.15 {N·m} (15±1.5 kgf·cm) | Clockwise |
| FFD-28SW-L153 | | Counter-clockwise |
| FFD-28SW-R203 | 2±0.2 {N·m} (20±2 kgf·cm) | Clockwise |
| FFD-28SW-L203 | | Counter-clockwise |

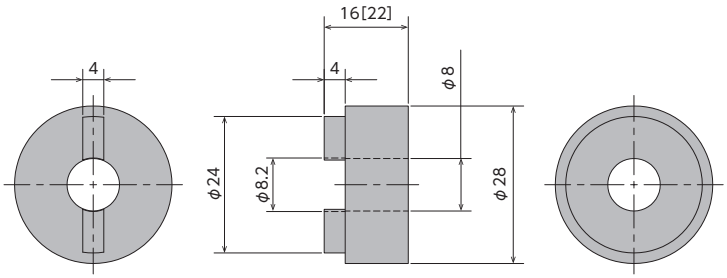
*) Rated torque is measured at a rotation speed of 20rpm at 20~25°C

| | | | |
|---|---|---|---|
| ∗ Max. rotation speed | 30rpm | ∗Cap colour | R:Black L:White |
| ∗ Max. cycle rate | 13cycle/min | ∗ Weight | FFD-28FS 14 ± 2g |
| ∗ Operating temperature | – 10 ~60℃ (90%RH) | | FFD-28FW 27 ± 2g |
| | | | FFD-28SS 14 ± 2g |
| ∗Body and cap material | POM | | FFD-28SW 25 ± 2g |




FFD-28FS-∗∗∗∗

(Dimension of FFD-28FW-∗∗∗∗ are in [ ])



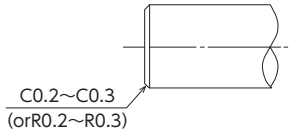

FFD-28SS-∗∗∗∗

(Dimension of FFD-28SW-∗∗∗∗ are in [ ])

## How to Use the Damper

1. The damper generates torque in both the clockwise and counter-clockwise directions. (A one-way clutch is built in inside the damper.)

2. Please make sure that the shaft attached to a damper has a bearing, as the damper itself is not fitted with one.

| | |
|---|---|
| Shaft's external dimensions | 8 $-\phi_{.03}$ |
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) |  C0.2~C0.3 (orR0.2~R0.3) |

3. It can be used as a free-stop for a load that is smaller than the rated torque.

4. Please refer to the recommended dimensions below when creating a shaft for attachment to the damper. Using a shaft outside of the recommended dimensions may cause the shaft to slip out.

5. To insert a shaft into the damper, insert the shaft while spinning it in the opposite direction of the damper's direction of torque generation. (Do not force the shaft in from a regular direction. This may damage the built-in oneway clutch.)

# Friction Damper

Fixed Type | Bi-Directional | Uni-Directional | Adjustable type | Self-adjusting

## FFD-30FS/FW/SS/SW Series

RoHS Compliant

●Products specification might be changed without notice.

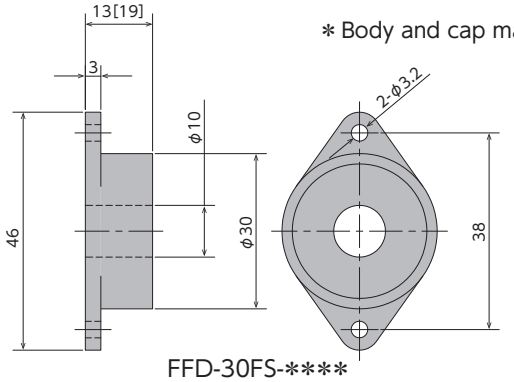
## Specifications

| Model | Max. torque | Max. reverse torque |
|---|---|---|
| FFD-30FS-R102 | 0.1±0.01 (N·m) (1±0.1 kgf·cm) | Clockwise |
| FFD-30FS-L102 | | Counter-clockwise |
| FFD-30FS-R502 | 0.5±0.05 (N·m) (5±0.5 kgf·cm) | Clockwise |
| FFD-30FS-L502 | | Counter-clockwise |
| FFD-30FS-R103 | 1±0.1 (N·m) (10±1 kgf·cm) | Clockwise |
| FFD-30FS-L103 | | Counter-clockwise |
| FFD-30FS-R153 | 1.5±0.15 (N·m) (15±1.5 kgf·cm) | Clockwise |
| FFD-30FS-L153 | | Counter-clockwise |
| FFD-30FW-R153 | 1.5±0.15 (N·m) (15±1.5 kgf·cm) | Clockwise |
| FFD-30FW-L153 | | Counter-clockwise |
| FFD-30FW-R203 | 2±0.2 (N·m) (20±2 kgf·cm) | Clockwise |
| FFD-30FW-L203 | | Counter-clockwise |
| FFD-30FW-R253 | 2.5±0.25 (N·m) (25±2 .5kgf·cm) | Clockwise |
| FFD-30FW-L253 | | Counter-clockwise |
| FFD-30FW-R303 | 3±0.3 (N·m) (30±3 kgf·cm) | Clockwise |
| FFD-30FW-L303 | | Counter-clockwise |

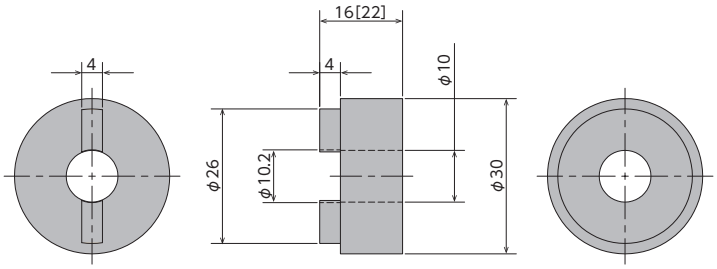
| Model | Max. torque | Max. reverse torque |
|---|---|---|
| FFD-30SS-R102 | 0.1±0.01 (N·m) (1±0.1 kgf·cm) | Clockwise |
| FFD-30SS-L102 | | Counter-clockwise |
| FFD-30SS-R502 | 0.5±0.05 (N·m) (5±0.5 kgf·cm) | Clockwise |
| FFD-30SS-L502 | | Counter-clockwise |
| FFD-30SS-R103 | 1±0.1 (N·m) (10±1 kgf·cm) | Clockwise |
| FFD-30SS-L103 | | Counter-clockwise |
| FFD-30SS-R153 | 1.5±0.15 (N·m) (15±1.5 kgf·cm) | Clockwise |
| FFD-30SS-L153 | | Counter-clockwise |
| FFD-30SW-R153 | 1.5±0.15 (N·m) (15±1.5 kgf·cm) | Clockwise |
| FFD-30SW-L153 | | Counter-clockwise |
| FFD-30SW-R203 | 2±0.2 (N·m) (20±2 kgf·cm) | Clockwise |
| FFD-30SW-L203 | | Counter-clockwise |
| FFD-30SW-R253 | 2.5±0.25 (N·m) (25±2 .5kgf·cm) | Clockwise |
| FFD-30SW-L253 | | Counter-clockwise |
| FFD-30SW-R303 | 3±0.3 (N·m) (30±3 kgf·cm) | Clockwise |
| FFD-30SW-L303 | | Counter-clockwise |

*) Rated torque is measured at a rotation speed of 20rpm at 20~25℃

| | | | |
|---|---|---|---|
| ＊Max. rotation speed | 30rpm | ＊Cap colour | R:Black L:White |
| ＊Max. cycle rate | 13cycle/min | ＊Weight | FFD-30FS 17 ± 2g |
| ＊Operating temperature | − 10 ~60℃ (90%RH) | | FFD-30FW 31 ± 2g |
| | | | FFD-30SS 16 ± 2g |
| ＊Body and cap material | POM | | FFD-30SW 30 ± 2g |




FFD-30FS-＊＊＊＊
(Dimension of FFD-30FW-＊＊＊＊ are in [ ])

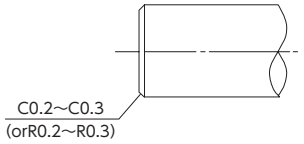



FFD-30SS-＊＊＊＊
(Dimension of FFD-30SW-＊＊＊＊ are in [ ])

## How to Use the Damper

1. The damper generates torque in both the clockwise and counter-clockwise directions. (A one-way clutch is built in inside the damper.)

2. Please make sure that the shaft attached to a damper has a bearing, as the damper itself is not fitted with one.

| | |
|---|---|
| Shaft's external dimensions | $\phi 10_{-0.03}^{0}$ |
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) |  C0.2~C0.3 (orR0.2~R0.3) |

3. It can be used as a free-stop for a load that is smaller than the rated torque.

4. Please refer to the recommended dimensions below when creating a shaft for attachment to the damper. Using a shaft outside of the recommended dimensions may cause the shaft to slip out.

5. To insert a shaft into the damper, insert the shaft while spinning it in the opposite direction of the damper's direction of torque generation. (Do not force the shaft in from a regular direction. This may damage the built-in oneway clutch.)

# Read these instructions before use

This owner's manual contains various safety cautions regarding the proper handling of this product, and preventing danger to the operator as well as damage to the plant and the machine. Please read this manual thoroughly before using the product.

## ⚠ Warning

**Definition of Warning** "Warning" applies to situations in which death or serious injuries may occur to the user, etc. if the potential dangers of the products are not avoided.

**The decision on the suitability of MRF damper shall be made by an engineer of the equipment or a person who determine the specification.**

●Because of the wide variety of conditions of use, the decision on the suitability of MRF damper shall be made by an engineer of the equipment or a person who determine the specification, after the performance verification and life test as necessity.

**Do not use the MRF damper outside the range of specification.**

●Do not use outside the range of specification for such like operating temperature range, rated voltage and current of the coil, the rated torque, the allowable slip rate, maximum rotational speed.
●There is a risk to receive injury or to make damage for MRF damper and/or peripheral devices.
●There is a risk of Electric shock, burns or fire.
●Due to oil leakage or deterioration of parts, there is a possibility that the durability of the product is significantly decreased.
●Refer to the product page of MRF damper for details.
●When used, it generates heat by energization and or the slip friction of the coil. If the temperature of MRF damper surface is high, adjust the condition and make its surface under 70 ℃ and prevent the generation of heat.

**Implementation of Safety Measures for the Purposes Below.**

●Implement the safety measures if used under the following conditions and environment, and consult our company for a judgment on the feasibility check beforehand. Also please take countermeasures against waterproofing, humid proofing as well as the designing of fail-safe, redundant and etc. for the purpose to keep the reliability of safety of the device as user's responsible task.
1) The use in the environment other than those standard specifications clearly indicated in the catalog or owner's manual, outdoors, or place exposed to the direct sunlight.
2) Nuclear related devices, devices directly or indirectly related to the running of rail or ship, devices related to aviation or space, military devices, medical devices, devices contacting the potions and foods, combustion equipment, amusement devices that are related to the influence on human and properties, emergency shut off circuit, press machinery, the use for the devices or purposes to which especially the safety is required because of the expected serious influence on the human and properties.
●Environment and the next safety exhibit can not be secured, please do not use the following devices that are required extremely high reliability and safety.
1) environment in which there is a possibility of ignition or explosion, or in water or a very high humid.
2) device in relate to the nuclear power, aviation, space, military, life supporting medical equipment, combustion etc.

**When you touch the MRF dampers, confirm the power supply of the coil and the peripheral devices are switched off and the temperature of MRF damper is cooled down.**

●There is a risk of Electric shock, burns or fire if to mount or dis-mount the MRF damper during the operation of peripheral device or powering the MRF damper.

**Ensure the connection of coil lean of MRF damper.**

●There is a risk of operation failure, electrical shock or leak if the connection of the leads is incomplete electrically or mechanically.

**Do not throw into a fire**

As the products contain oil, throwing them into a fire may cause them to ignite, resulting in injuries.

## ⚠ Caution

**Definifinition of "Caution"** "Caution" applies to situations in which minor injuries or property damage may result if the operation or maintenance procedures are not strictly followed.

**Do not operate without sufficient mounting strength**

●Operating with insufficient mounting strength may damage the main machine and cause injuries.
●Ensure sufficient mounting strength of load torque x safety factor

**Do not pull or hang the MRF damper by the leads.**

●There is a risk of injury by the fall of MRF damper. Also there is a risk that the leads shall cut and results operational failure or electrical shock or short-circuit.
●Hold the MRF damper when mounting or dis-mounting.
●After the installation, make sure to fix the leads not to contact with MRF damper or with peripheral devices.

**Do not rotate the screw on top of MRF damper**

●Screw on top of MRF damper is the sealing for oil filling. Do not rotate it otherwise it may cause oil leakage or quality deterioration.

**Usage environment**

●This product cannot be used in a vacuum or under high pressure as well as in the circumstance where is impact. It may cause damage to the MRF damper or Peripheral equipment
●Do not use in an environment where chips, cutting oil, water, etc. can come in contact with the linear damper. This will result in a malfunction due to an oil leak caused by damage.
●Do not leave or use under the circumstance where is a high humid.

**Do not discard oil more than is necessary**

●Discarding the oil contained in MRF dampers more than is necessary will pollute the environment.
●Dispose the oil according to laws concerning waste management and cleaning.

**Radial/Thrust load to the shaft**

●Applying load to the rotating shaft (gear) in a radial/thrust direction may cause an oil leak, torque problems, and damage to the main unit (or to the gear, or cause the gear to become disengaged, if the gear is used).

**Do not repair, disassemble or modify the MRF damper**

●MRF damper is not corresponded with repairing. In the even of failure and deterioration of performance, please replace it with a new one.
●It is contained the excitation coil and oil in inside of MRF damper. For safety reason, do not repair, disassemble or modify by yourself.
●If the remodeling to MRF damper (additional machining, painting, welding, hardening, etc.) has been carried out, we do not guarantee the MRF damper as well as peripheral equipment.
●Any damage or loss won't be indemnified if the customer performed the repairing, disassembly and modification of MRF damper.

**Replacing time of MRF damper**

●Product reliable cycles are depended on the using circumstances and conditions; therefore, we cannot determine the life cycle however if there is phenomena such like below please consider that it is the time to replace to the new one.
1. When the necessary torque is no longer performed even though given rated current.
2. When the torque started to be appeared without giving eclectic current.
3. When various torque started to be appeared under a same circumstance.
4. When abnormal noise, vibration or oil leakage are started to be appeared.

●In particular, high reliability and safeties is required, regardless the phenomenon such like above, we strongly recommend to replace to the new one periodically.

**Over-tightening of mounting screws**

●Over-tightening the mounting screws when installing a MRF damper may cause damage to the main unit.
Based on the types and sizes of the screws used, please apply an appropriate tightening torque to tighten the screws.
●Use a proper sized screw as the screwing hall of MRF damper is M4 x 5.5 depth. As for tighten torque, make sure under 550N.cm.

**Dispose**

●In case to dispose the MRF damper, follow the local rules and dispose as industrial waste.

# MRF Damper

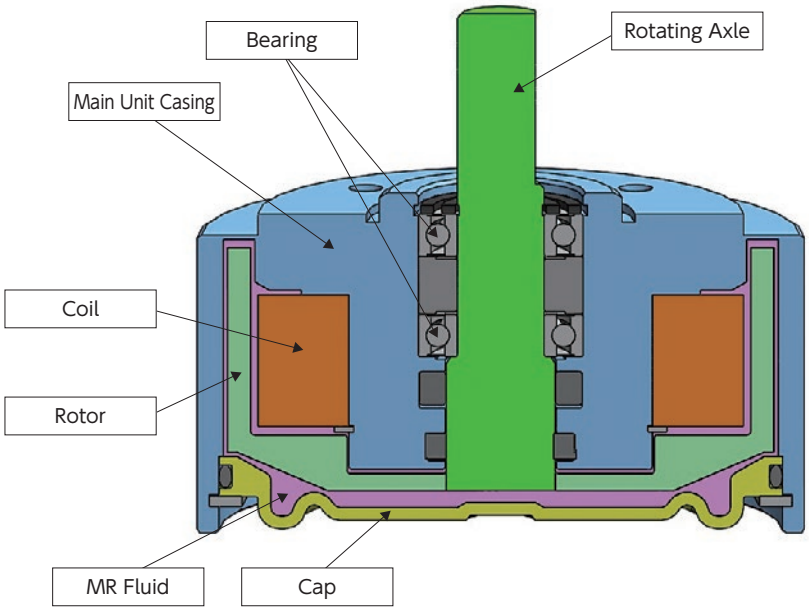
## FMR-70S-403

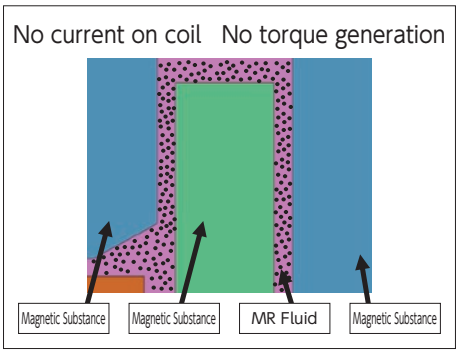
## Characteristics

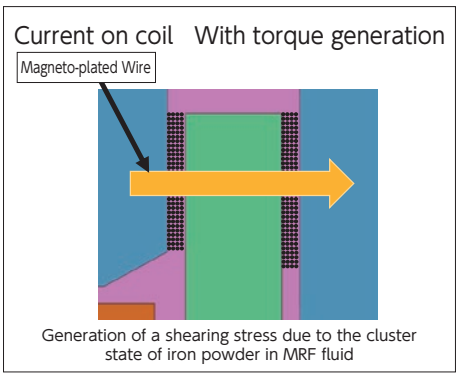
| | |
|---|---|
| Electrically controlled | : Enabled electrically controlling the torque by using MR fluid (magnetic viscous fluid) |
| High response | : excellent electrical response makes realize a high response |
| Flexible mounting ways | : No restriction on the mounting direction |
| Not required Pre-conditioning operation | : Using MR fluid on friction part, it realized less humid effect and no requirement of pre-conditioning |
| Smooth motion | : Small differences between the static friction and dynamic friction allows a smooth actuation |
| Long life | : Our original sealing structure realizes a long life cycle |
| Seamless torque change | : Available a seamless torque control steplessly |
| Less susceptibility of temperature affect | : Comparing to a standard rotary damper, small effect by temperature |
| Less susceptibility of the rotational speed affect | : Comparing to a standard rotary damper, small effect by the rotating speed |

## Basic Structure and Action

The basic structure of MRF damper is shown below.




Generation of a shearing stress due to the cluster state of iron powder in MRF fluid

### Behavior

The rotating shaft is supported with the bearings for providing the freedom of rotation in the main unit casing.
A coil is implemented in the main unit casing, and a rotor having the shape of a cup is mounted on the rotating shaft.
There is a gap between the internal surface of the main unit casing and the external surface of the rotor. The MR fluid is filled in this gap.
When a current is supplied to the coil, a magnetic field line runs through the gap between the main unit casing and rotor, and a magnetic force flows in the MR fluid.
When a magnetic force flows in the MR fluid, the iron power is linked like a chain and the friction force of iron powder generates a force to restrict the rotation between the main unit casing and rotor.

### What is the MR Fluid?

The MR (magneto-rheological) Fluid is a functional fluid that can be instantly reversibly changed between free liquid and semi-solid state by varying the applied magnetic field.The MR Fluid is featured with the wide shearing stress variation range based on the yield point determined by the semi-solid fluid due to the formation of chain type clusters of iron powder particles induced by the application of magnetic field in the dispersed micron size magnetic iron powders in the carrier fluid differently from general magnetic fluid.

MR Fluid

MR Fluid A magnet in the proximity

## Main Applications

The applications for robots, welfare devices, logistics, amusements, operation levers, switchgears and the torque controls for vibration control devices are expected.

## Precautions for Use

Be sure to carefully read the owner's manual delivered with the product before using.

# Specifications

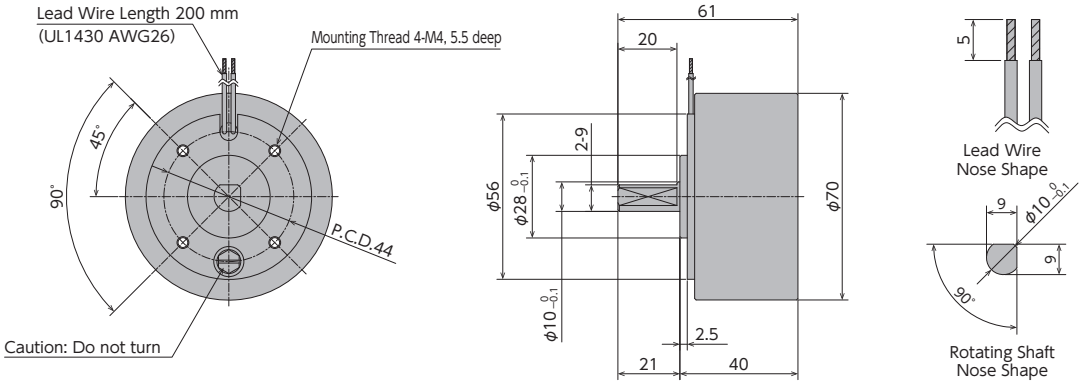
| Type | Rated Torque N·m | Coil(23℃) | | | | Allowable slipping efficiency W |
|---|---|---|---|---|---|---|
| | | Voltage V | Current A | Resistance Ω | Capacity W | |
| FMR-70S-403 | 4 | DC24 | 0.13 | 192 | 3.12 | 10※1 |
| | Maximum Operating Speed rpm | Mounting Posture | Direction of Rotation | Mass kg | Moment of Inertia kg·cm² | |
| | 50 | No ristriction | Both directions | 0.83 | 1.16 | |

Temperature Range for Use: 0℃ to 40℃ The heat is generated from coil and the slipping friction during operation. The surface temperature of the product during operation shall not exceed 70℃.
* For a continuous slipping application, the friction heat shall be taken into consideration. The operation shall be within the allowable slipping efficiency range.

**Calculation**

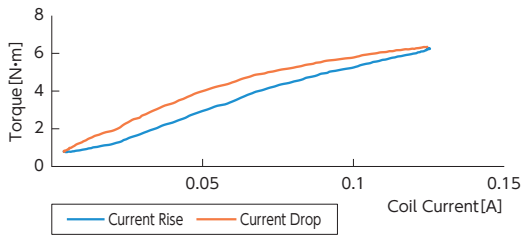
Allowable slipping efficiency = 2 x π / 60 x n x Tc
n : Rotating Speed (rpm)
Tc : Slipping Torque (N-m)

| | Material | Surface Treatment |
|---|---|---|
| Main Unit Casing | Metal (SUM) | Non-Electrolytic Nickel Plating |
| Rotating Shaft | Metal (SUM) | Nitriding |
| Cap | Polyacetal (POM) | – |

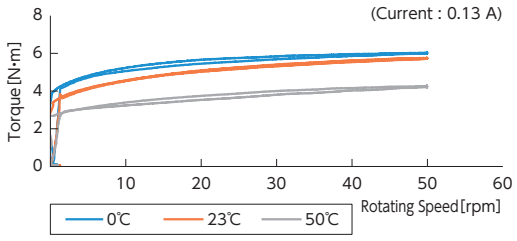



## Test Data

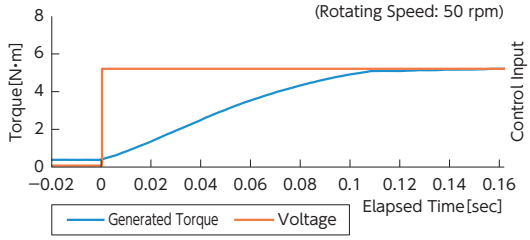
Coil Current - Torque Properties



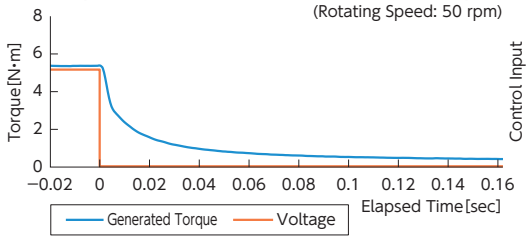

Temperature Properties (Torque and Rotating Speed)




Response - Voltage Rise

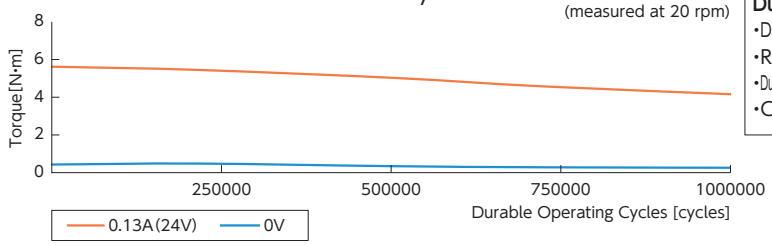



Response Performance - Voltage Drop




Durability

(measured at 20 rpm)



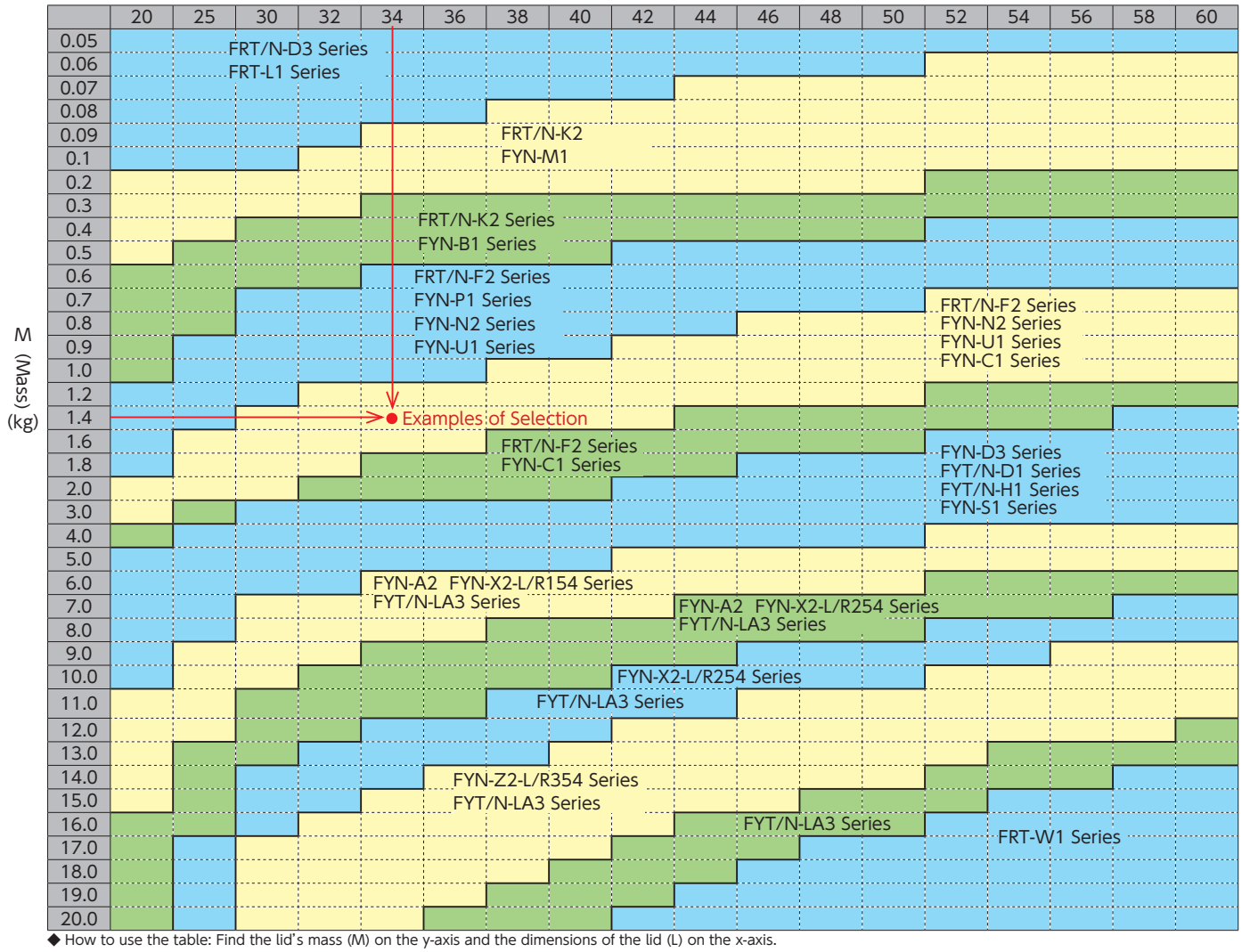

**Durability Test Conditions**
- Damper Mounting Posture: Shaft Upwards
- Rotating Speed: 50 rpm
- Durability Operation : Continuous Single Directional Rotation
- Current: 0.065 A (12 V)

# Reference Table for the Selection of a Rotary Damper/Vane Damper/Customizable Torque Chart for Rotary Dampers

## Reference Table for the Selection of a Rotary Damper/Vane Damper

※Lid's mass M·····1.4kg Dimensions of the lid L·····36cm Selected model : FYN–N1

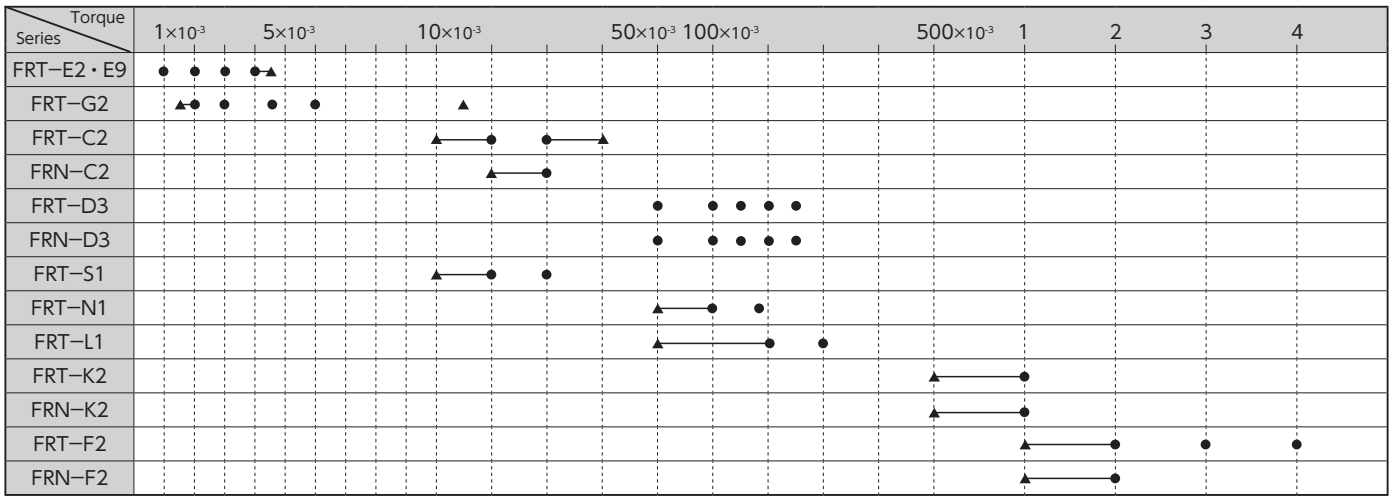
L (Dimensions of the lid ) (cm)




◆ How to use the table: Find the lid's mass (M) on the y-axis and the dimensions of the lid (L) on the x-axis.
◆ This table should be used as a general guideline. The model selected based on this table is only a suggestion.

## Customizable Torque Chart for Rotary Dampers

(Unit : N・m)




Note)" ● " indicates standard torque "▲" stands for a made to order torque range. Be sure to confirm before selecting.

3

# Magnum Series

A worry free hydraulic shock absorber for heavy duty applications

# Please be sure to read before using.

This owner's manual lists the various precautions for safe and proper use of the product and for prevention of safety hazards to the operators and damage to the plant/machines. Please thoroughly read before using the product.

## ⚠ Warning

**Definition of Warning** "Warning" applies to situations in which death or serious injuries may occur to the user, etc. if the potential dangers of the products are not avoided.

### The use under a condition outside the specification is prohibited

- ●Any use outside the catalog specification will damage the soft absorber and will cause an abnormal condition (bottoming, defective return, etc.) and lead to damage to mother machine.
- ● If the use outside the catalog specification is planned, please consult our sales department.

### Contacting the soft absorber while in operation of the mother machine is prohibited

- ●A contact with a soft absorber while operating may cause an injury.
- ● The adjustment of the soft absorber shall be conducted after confirming the shutdown of the mother machine.

### Working without wearing safety clothes and safety equipment is prohibited

- ●The work related with soft absorber is a hazardous work.
- ●Please abide by Section 1 General Standard in the Ordinance on Industrial Safety and Health Part II, Chapter I

### Operation before the installation of external tank and pipework is prohibited

(for air/oil return types)

- ●The use before installation of external tank and pipework will cause damage and pose a serious hazard to the workers.
- ●Please operate after installation of external tank and pipework.

### Installation of external tank at a lower level than soft absorber is prohibited

(for air return/air & spring combination return types)

- ●If an external tank is installed at a lower level than soft absorber, the drained oil will disable the soft absorber and the mother machine will be damaged.
- ● Please install the external tank at a higher level than the soft absorber.

### Touching a soft absorber while hot is prohibited

- ●The soft absorber is hot after operation. Risk of burning by touching.
- ●Be sure to start working after returning to the ordinary temperature.

### Throwing into an open flame is prohibited

- ●Be sure to start working after returning to the ordinary temperature.
- ●Do not throw into an open flame

## ⚠ Caution

**Definifition of "Caution"** "Caution" applies to situations in which minor injuries or property damage may result if the operation or maintenance procedures are not strictly followed.

### Operation under insufficient strength of installation is prohibited

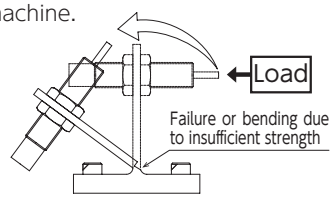
- ●An operation under an insufficient strength of installation may pose a risk of damaging mother machine and injury.
- ●Please secure the strength of mounting component equivalent to (loading torque) x (safety factor).

### Operation of the soft absorber on a mounting component that does not have the sufficient strength is prohibited

- ●An operation with insufficient strength of the mounting component will damage the mother machine.
- ●Please give a higher strength than designated strength for a mounting component.

(strength of mounting component) = (max. drag x safety factor)

$$\text{(max. drag)} = \frac{\text{max. absorption energy (J)}}{\text{stroke (m)} \times 0.3}$$




### Mounting with other than tightening torque for the mounting nut is prohibited

- ●The mounting with other than tightening torque may cause a malfunction or damage to the mother machine.
- ●Please tighten the mounting nut with a tightening torque below.

The nut may become loose depending on the conditions of mating material. Please use an adhesive together as necessary.

| Thread outside diameter (mm) | M33×1.5 | M36×1.5 | M45×1.5 | M64×2.0 |
|---|---|---|---|---|
| Nut tightening torque (N·m) | 81 | 81 | 250 | 830 |

### Be sure to conduct an adjustment of an adjusting type soft absorber

- ● Be sure to conduct an adjustment of an adjusting type product for using in the most appropriate position. If the adjustment is improper, the product may be damaged even within the range of the specification.

## Operation under oil leakage is prohibited.

●The operation under a condition of oil leakage from pipework or main unit will disable the soft absorber and damage the mother machine.
●An operation shall be started after checking for any leakage of oil from fastened joints, etc.

## Oil

●Seals, etc. are used for prevention of leakage of oil used in an absorber to outside, but a perfect sealing performance cannot be expected. Accordingly, it cannot be used in an environment that dislikes oil.

## Model Selection

●Please check all the contents of the specification in the newest product catalog for selecting a model.
●The energy absorbing capacity will be degraded with the increased cycles of use, reduced internal oil quantity, or worn parts. In consideration of this, it is recommended to make a selection with a margin of 20–40% to the maximum absorption energy.
●Please avoid parallel use of adjustable soft absorbers because the synchronization of absorption property is difficult. For a parallel application, please use a preset type soft absorber.

## Pay attention to scattering of broken pieces of the cap

● Any use outside the specification may cause breakage of the cap and injury by scattering
● Please install a scattering prevention cover, or keep away from operating area and stay in the position where safety is secured.

## Main unit of the product

●Please be careful not to scratch or contaminate with lubricating oil on the piston rod. Degraded durability or defective return will be caused.
●Please be careful not to scratch the spring for an external spring type. Breakage of the spring will be caused.
●Please do not turn the screw for the oil supply port on the bottom of the soft absorber. Malfunction, oil scattering due to oil leakage will be caused.

## Eccentric Load/Inclination Angle

●If a load is collided with an inclination angle exceeding ±2.0°, the defective returning due to the bent piston rod or degraded performance due to local friction of sliding zone will be caused and as a result the mother machine will be damaged.
●Please align the piston rod in such a way that the collision occurs in the centerline. If the inclination angle exceeds ±2.0°, please use an inclination angle adapter together. It can cope with an angle as large as ±25°.

## Usable circumstances

●Please use within the specified temperature range for use. Any use outside the range will lead to a shortened lifetime. Please use within -12℃ - +66℃. *Please avoid a high temperature/humidity for storage.
●Please use in the environment under atmospheric pressure. Any use in vacuum or high pressure will cause oil leakage or damage.
●Any use in a place where ozone is generated will cause a shortened lifetime.
●Please do not use in an environment where cutting chips, cutting oil, water, etc., contacts the piston rod. The damage to the packing will cause a malfunction or damage to mother machine due to oil leakage.

## Daily Inspection/Maintenance

●The performance/functions of the product will be degraded with the lifetime. Carry out daily inspections and check the satisfaction of necessary functions and prevent the occurrence of an accident.
●Please check for loosening of the fastening nuts. Any use with a loose condition will cause damage or accidents.
●Please pay attention to abnormal vibration noises and vibration. When the crashing noise or vibration is abnormally high, please replace because the product may have reached the lifetime limit. Any continued use under this condition will cause damage to machine in which the product is implemented.
●Please check for any oil leakage and the returning status of the piston rod. If a large quantity of oil leakage or defective returning of the piston rod is observed, please replace because there might be some abnormality. Any continued use under this condition will cause damage to machine in which the product is implemented.
●The maintenance of the soft absorber such as disassembly, re-assembly, and oil supply are not available from the structural reason. Ignorance of owner's manual while carrying out daily maintenance/inspection is prohibited.

## Don't maintain or inspect without reading the operation manual

●Ignorance of owner's manual while carrying out daily maintenance/inspection is dangerous. Be sure to read the owner's manual and understand before carrying out a maintenance/inspection.
●Please carefully keep the owner's manual so that it is available at any time.

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## Discarding

● When a soft absorber is no more necessary, please follow a proper disposal procedure in accordance with the local ordinance, rules, etc. as an industrial waste.

**Fuji Latex Co., Ltd. assumes no responsibility for any secondary disasters caused by a soft absorber. Please enforce a preventive measure against any secondary disasters.**

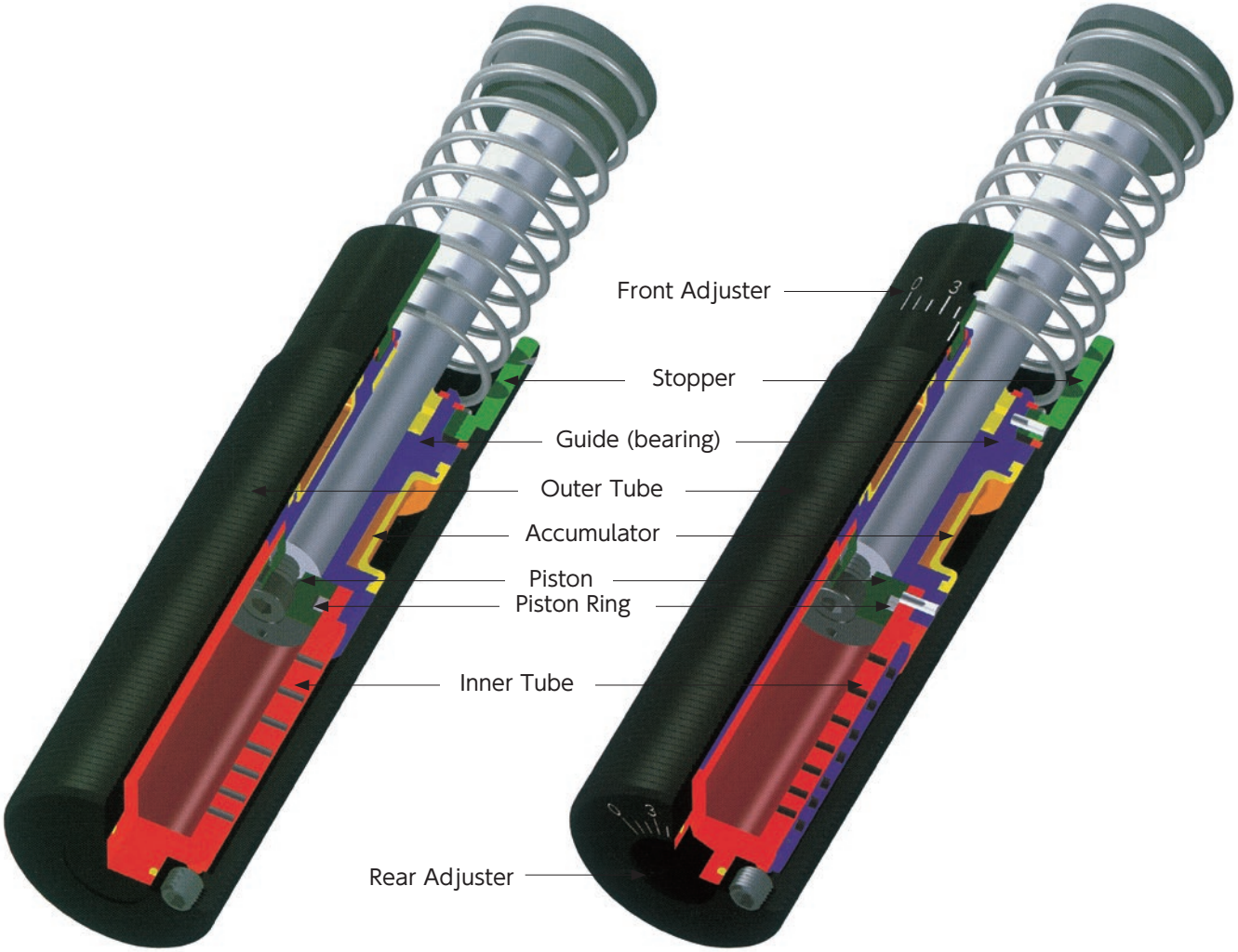
# Structure/Outlines

## FMC/FMA Magnum Series

Magnum Series is the newest model of industrial soft absorber implemented with the innovative next generation deceleration technology for self-correction/adjusting type. It consists of four types with external threads of M33, 36, 45, and 64.
The newest sealing technology, high precision bearing, and the design to allow the use of the main unit as a stopper are applied for the internal structure, which achieves high durability in an extreme usage environment.
The full thread type main unit makes a wide variety of mountings possible compared to conventional types.
From a performance viewpoint, this series has an increased absorption energy capacity by 50% compared with conventional products, and also has a wider equivalent mass range.
In addition the adjusting type FML model, developed as a low speed specification, provides a wide range of uses in a low speed impact.
As explained, the Magnum Series is a new series with the performance and appearance to improve the capability of production machines and equipment by 100%.

FMC33 ~64 (Self-correction type)

FMA & FML33 ~64 (Adjusting type)




<Model number>
FMC - With External Returning Spring (Standard Type)
FMCA - Air Return Type (Without Returning Spring)
* When an external tank is used.

<Model number>
FMA/FML - With External Returning Spring (Standard Type)
FMAA/FMLA - Air Return Type (Without Returning Spring)
* When an external tank is used.

## Outlines

| | Self-correction type | Adjusting type | |
|---|---|---|---|
| | FMC•FMCA | FMA•FMAA | FML•FMLA |
| Range of impact rate | 0.15～5m/s | 0.15～5m/s | 0.02～0.46m/s |
| Adjustment method | Unnecessary | Adjustable at the front stopper or bottom. (Direction to "0" for harder, Direction to "9" for softer) | |
| Oil type | Automatic Transmission Fluid (ATF) | | |
| Range of operating temperature | −12℃～66℃ | | |

## Key to Model Number

(ex.) **FMC** **33** **25** **M** **1** **-C33** (Type FMC3325M1-C33)

- Mounting Mark: No Mark : Base Type (with one lock nut); -C33 : Crevice Mount Type (crevice flange not included)
- Equivalent mass range: 1～4(not applied for the adjustment type)
- Standards for Fastening Screws: (Metric)
- Stroke: (mm)
- External diameter: (mm)
- Name of Series: FMC :Self-Correction Type Spring Return; FMCA :Self-Correction Type Air Return; FMA :Adjusting Type Spring Return; FMAA :Adjusting Type Air Return; FML :Adjusting Type Spring Return (for Low Speed Impact); FMLA :Adjusting Type Air Return (for Low Speed Impact)

(*) If the mounting parts such as flanges are required, please order together with the models above.
(ex.) QF33 : Square flange
S33 : Side mount fixture

## Caution

- For appropriate heat radiation, do not apply a coating on the soft absorber.
  If used in an acid, dirt, dust, steam, or water environment, please protect the soft absorber main unit.
  Install the soft absorber on a smooth structure with proper strength.
- If a square flange/rectangular flange is used:
  Be sure to mount the flange in front of the structure and avoid direct loading on the mounting bolts.
- If side mount fixture is used:
  Be sure to support the side mount with a stopper to avoid direct shearing force on the mounting bolts.

# Magnum Series

## Self-Correction Type FMC33/Adjustable Type FMA/FML33 Series

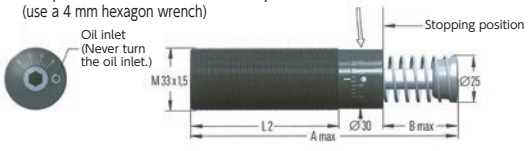
RoHS Compliant

●Products specification might be changed without notice.

### FMC/FMA/FML33 Series
Base Type

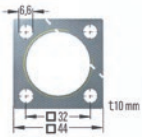
Rear adjuster
(Only for FMA/FML series)
(use a 4 mm hexagon wrench)

Front adjuster
(Only for FMA/FML series)

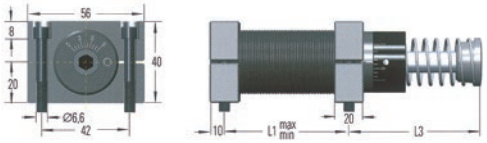



### NM 33
Lock nut
(one piece for the main unit)

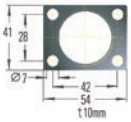

### QF 33
Square flange
(A locking nut is unnecessary.)
Tightening torque 11N




### S 33
Side mount fixture
(2 fixtures + 6 screws × 40, 4 pieces)
Tightening torque 11Nm



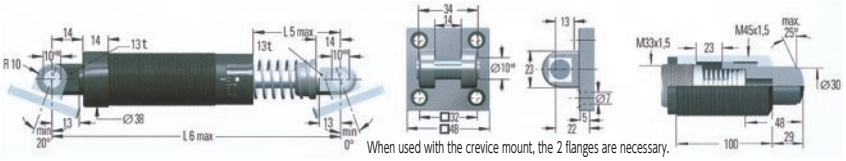

### RFL1200
Rectangle flange




### FMC/FMA/FML33 Series
Crevice Mount Type
(The crevice flange SF33 is not included.)
Example model: FMC3325M1-C33

### SF 33
Crevice flange
(1 flange + 6 screws × 20, 4 pieces)
Tightening torque 7.5Nm

### BV 3325
(for 25 stroke)
Eccentric angle adaptor




< FMA33 Series Adjustable Type>

| Model |
|---|
| FMA3325M (Spring Turn) |
| FMA3350M (Spring Turn) |

< FML33 Series Low Speed Adjustable Type>

| Model |
|---|
| FML3325M (Spring Turn) |
| FML3350M (Spring Turn) |

< FMC33 Series Self-Correction Type> * □ will be filled in with 1-4.

| Model |
|---|
| FMC3325M□ (Spring Turn) |
| FMC3350M□ (Spring Turn) |

< Option >

| Model |
|---|
| Lock Nut NM33 |
| Square Flange QF33 |
| Side Mount Kit S33 |
| Rectangular Flange RFL1200 |
| Clevis Mount Kit C33 |
| Clevis Flange SF33 |
| Inclination Angle adapter BV3325 |

## Dimensions (mm)

| Model | Stroke | A max | B max | L1 min | L1 max | L2 | L3 | L5 max | L6 max |
|---|---|---|---|---|---|---|---|---|---|
| FMA、FML、FMC 3325M | 25 | 138 | 23 | 25 | 60 | 83 | 68 | 39 | 168 |
| FMA、FML、FMC 3350M | 50 | 189.0 | 48.5 | 32 | 86 | 108.0 | 93 | 64 | 218 |

## Specifications

| Model | Absorption energy per time J | Max. absorption energy per hour J | | | * Equivalent mass kg (Soft ◄ ► Hard) | | | | Pis ton rod | | Max. allowable | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Standard | External Tank | Oil circulator | 1 min-max | 2 min-max | 3 min-max | 4 min-max | recovering power N min-max | Returning time s | Eccentric angle ° | Mass kg |
| FMC3325M | 155 | 75,000 | 124,000 | 169,000 | 9-40 | 30-120 | 100-420 | 350-1,420 | 45-90 | 0.03 | 4 | 0.45 |
| FMC3350M | 310 | 85,000 | 135,000 | 180,000 | 18-70 | 60-250 | 210-840 | 710-2,830 | 45-135 | 0.06 | 3 | 0.54 |

| Model | Absorption energy per time J | Max. absorption energy per hour J | | | * Equivalent mass kg | | Pis ton rod | | Max. allowable | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FMA series | FML series | | | | |
| | | Standard | External Tank | Oil circulator | min-max | min-max | recovering power N min-max | Returning time s | Eccentric angle ° | Mass kg |
| FMA、FML3325M | 170 | 75,000 | 124,000 | 169,000 | 9-1,700 | 300-50,000 | 45-90 | 0.03 | 4 | 0.45 |
| FMA、FML3350M | 340 | 85,000 | 135,000 | 180,000 | 13-2,500 | 500-80,000 | 45-135 | 0.06 | 3 | 0.54 |

# Magnum Series

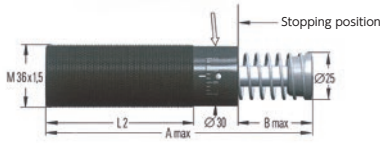
## Self-Correction Type FMC36/Adjustable Type FMA/FML36 Series

RoHS Compliant

●Products specification might be changed without notice.

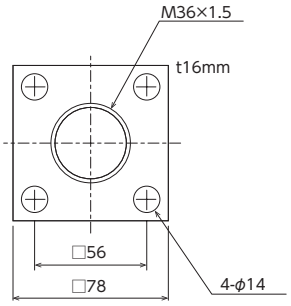
Rear adjuster
(Only for FMA/FML series)
(use a 4 mm hexagon wrench)


Front adjuster
(Only for FMA/FML series)




NM 36
Lock nut
(one piece for the main unit)


OP-040UB
Square flange




＜FMA36 Series Adjustable Type＞

| Model |
|---|
| FMA3625M (Spring Turn) |
| FMA3650M (Spring Turn) |

＜FML36 Series Low Speed Adjustable Type＞

| Model |
|---|
| FML3625M (Spring Turn) |
| FML3650M (Spring Turn) |

＜FMC36 Series Self-Compensation Type＞ * □ will be filled in with 1-4.

| Model |
|---|
| FMC3625M□ (Spring Turn) |
| FMC3650M□ (Spring Turn) |

＜Option＞

| Model |
|---|
| Lock Nut NM36 |
| Square Flange OP-040UB |

## Dimensions (mm)

| Model | Stroke | A max | B max | L2 |
|---|---|---|---|---|
| FMA、FML、FMC 3625M | 25 | 138 | 23 | 83 |
| FMA、FML、FMC 3650M | 50 | 189.0 | 48.5 | 108.0 |

## Specifications

| Model | Absorption energy per time J | Max. absorption energy per hour J | | | * Equivalent mass kg Soft ◄ ► Hard | | | | Pis ton rod | | Max. allowable | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Standard | External Tank | Oil circulator | 1 min-max | 2 min-max | 3 min-max | 4 min-max | recovering power N min-max | Returning time s | Eccentric angle ° | Mass kg |
| FMC3625M | 155 | 75,000 | 124,000 | 169,000 | 9-40 | 30-120 | 100-420 | 350-1,420 | 45-90 | 0.03 | 4 | 0.56 |
| FMC3650M | 310 | 85,000 | 135,000 | 180,000 | 18-70 | 60-250 | 210-840 | 710-2,830 | 45-135 | 0.06 | 3 | 0.68 |

| Model | Absorption energy per time J | Max. absorption energy per hour J | | | * Equivalent mass kg | | Pis ton rod | | Max. allowable | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FMA series | FML series | | | | |
| | | Standard | External Tank | Oil circulator | min-max | min-max | recovering power N min-max | Returning time s | Eccentric angle ° | Mass kg |
| FMA、FML3625M | 170 | 75,000 | 124,000 | 169,000 | 9-1,700 | 300-50,000 | 45-90 | 0.03 | 4 | 0.56 |
| FMA、FML3650M | 340 | 85,000 | 135,000 | 180,000 | 13-2,500 | 500-80,000 | 45-135 | 0.06 | 3 | 0.68 |

# Magnum Series

## Self-Correction Type FMC45/Adjustable Type FMA/FML45 Series

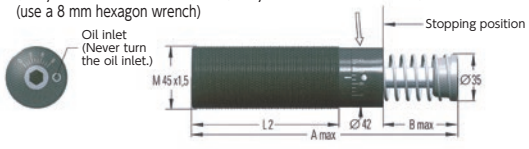
RoHS Compliant

●Products specification might be changed without notice.

FMC/FMA/FML45 Series
Base type

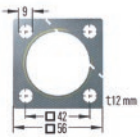
Rear adjuster
(Only for FMA/FML series)
(use a 8 mm hexagon wrench)

Front adjuster
(Only for FMA/FML series)

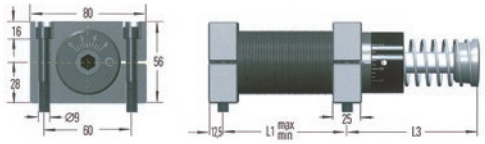



NM 45
Lock nut
(one piece for the main unit)

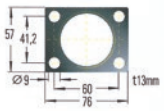

QF 45
Square flange
(A locking nut is unnecessary.)
Tightening torque 27Nm



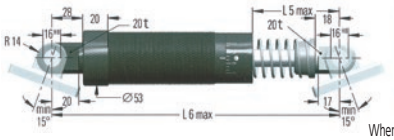

S 45
Side mount fixture
(2 fixtures + 8 screws × 50, 4 pieces)
Tightening torque 27Nm



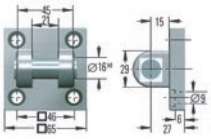

RFL1400
Rectangle flange



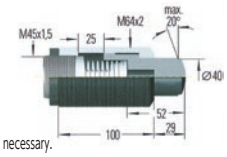

FMC/FMA/FML45 Series
Crevice Mount Type
(The crevice flange SF45 is not included.)
Example model: FMC4525M1-C45




SF 45
Crevice flange
(flange + 8 screws × 20, 4 pieces)
Tightening torque 7.5Nm




BV 4525 (for 25 stroke)
Eccentric angle adaptor




When used with the crevice mount, the 2 flanges are necessary.

< FMA45 Series Adjustable Type >

| Model |
|---|
| FMA4525M (Spring Turn) |
| FMA4550M (Spring Turn) |
| FMA4575M (Spring Turn) |

< FML45 Series Low Speed Adjustable Type>

| Model |
|---|
| FML4525M (Spring Turn) |
| FML4550M (Spring Turn) |

< FMC45 Series Self-Correction Type> * □ will be filled in with 1-4.

| Model |
|---|
| FMC4525M□ (Spring Turn) |
| FMC4550M□ (Spring Turn) |
| FMC4575M□ (Spring Turn) |

< Option >

| Model |
|---|
| Lock Nut NM45 |
| Square Flange QF45 |
| Side Mount Kit S45 |
| Rectangular Flange RFL1400 |
| Clevis Mount Kit C45 |
| Clevis Flange SF45 |
| Inclination Angle adapter BV4525 |

## Dimensions (mm)

| Model | Stroke | A max | B max | L1 min | L1 max | L2 | L3 | L5 max | L6 max |
|---|---|---|---|---|---|---|---|---|---|
| FMA、FML、FMC 4525M | 25 | 145 | 23 | 32 | 66 | 94.5 | 66 | 43 | 200 |
| FMA、FML、FMC 4550M | 50 | 195 | 48.5 | 40 | 92 | 120 | 91 | 68 | 250 |
| FMA、FMC 4575M | 75 | 246 | 74 | 50 | 118 | 145 | 116 | 93 | 300 |

## Specifications

| Model | Absorption energy per time J | Max. absorption energy per hour J | | | * Equivalent mass kg ◄Soft Hard► | | | | Pis ton rod | | Max. allowable | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Standard | External Tank | Oil circulator | 1 min-max | 2 min-max | 3 min-max | 4 min-max | recovering power N min-max | Returning time s | Eccentric angle ° | Mass kg |
| FMC4525M | 340 | 107,000 | 158,000 | 192,000 | 20-90 | 80-310 | 260-1,050 | 890-3,540 | 70-100 | 0.03 | 4 | 1.13 |
| FMC4550M | 680 | 112,000 | 192,000 | 248,000 | 45-180 | 150-620 | 520-2,090 | 1,800-7,100 | 70-145 | 0.08 | 3 | 1.36 |
| FMC4575M | 1,020 | 146,000 | 225,000 | 282,000 | 70-270 | 230-930 | 790-3,140 | 2,650-10,600 | 50-180 | 0.11 | 2 | 1.59 |

| Model | Absorption energy per time J | Max. absorption energy per hour J | | | * Equivalent mass kg | | Pis ton rod | | Max. allowable | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FMA series | FML series | | | | |
| | | Standard | External Tank | Oil circulator | min-max | min-max | recovering power N min-max | Returning time s | Eccentric angle ° | Mass kg |
| FMA、FML4525M | 390 | 107,000 | 158,000 | 192,000 | 40-10,000 | 3,000-110,000 | 70-100 | 0.03 | 4 | 1.13 |
| FMA、FML4550M | 780 | 112,000 | 192,000 | 248,000 | 70-14,500 | 5,000-180,000 | 70-145 | 0.08 | 3 | 1.36 |
| FMA4575M | 1,170 | 146,000 | 225,000 | 282,000 | 70-15,000 | | 50-180 | 0.11 | 2 | 1.59 |

# Magnum Series

## Self-Correction Type FMC64/Adjustable Type FMA/FML64 Series

RoHS Compliant

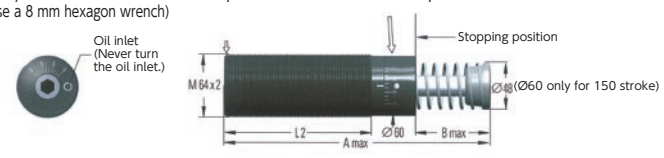
●Products specification might be changed without notice.

### FMC/FMA/FML64 Series

Base type

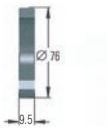
Rear adjuster
(Only for FMA/FML series)
(use a 8 mm hexagon wrench)

Front adjuster
(Only for FMA/FML series except for 150 stroke)



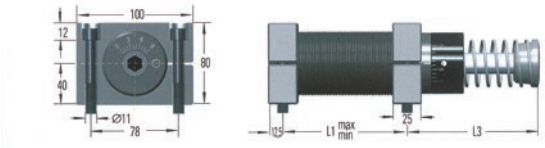

### NM 64

Lock nut
(one piece for the main unit)



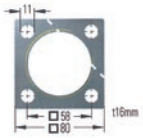

### S 64

Side mount fixture
(2 fixtures + 10 screws × 80, 4 pieces)
Tightening torque 50Nm



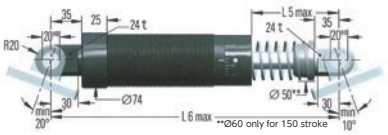

### QF 64

Square flange
Tightening torque 50Nm



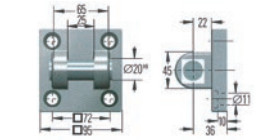

### FMC/FMA/FML64 Series

Crevice Mount Type
(The crevice flange SF64 is not included.)
Example model: FMC6450M1-C64




### SF 64

Crevice flange
(flange + 10 screws × 20, 4 pieces)
Tightening torque 15Nm




When used with the crevice mount, the 2 flanges are necessary.

### < FMA64 Series Adjustable Type>

| Model |
|---|
| FMA6450M (Spring Turn) |
| FMA64100M(Spring Turn) |
| FMA64150M (Spring Turn) |

### < FML64 Series Low Speed Adjustable Type>

| Model |
|---|
| FML6425M (Spring Turn) |
| FML6450M (Spring Turn) |

### < FMC64 Series Self-Correction Type > * □ will be filled in with 1-4.

| Model |
|---|
| FMC6450M□ (Spring Turn) |
| FMC64100M□ (Spring Turn) |
| FMC64150M□ (Spring Turn) |

### < Option >

| Model |
|---|
| Lock Nut NM64 |
| Square Flange QF64 |
| Side Mount Kit S64 |
| Clevis Mount Kit C64 |
| Clevis Flange SF64 |

## Dimensions (mm)

| Model | Stroke | A max | B max | L1 min | L1 max | L2 | L3 | L5 max | L6 max |
|---|---|---|---|---|---|---|---|---|---|
| FML 6425M | 25 | 174.0 | 23 | 40 | 86 | 114 | 75.5 | 60 | 260 |
| FMA、FML、FMC 6450M | 50 | 225 | 48.5 | 50 | 112 | 140 | 100 | 85 | 310 |
| FMA、FMC 64100M | 100 | 326 | 99.5 | 64 | 162 | 191 | 152 | 136 | 410 |
| FMA、FMC 64150M | 150 | 450 | 150 | 80 | 212 | 241 | 226 | 187 | 530 |

## Specifications

| Model | Absorption energy per time J | Max. absorption energy per hour J | | | * Equivalent mass kg Soft ◄ ► Hard | | | | Pis ton rod | | Max. allowable | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Standard | External Tank | Oil circulator | 1 min-max | 2 min-max | 3 min-max | 4 min-max | recovering power N min-max | Returning time s | Eccentric angle ° | Mass kg |
| FMC6450M | 1,700 | 146,000 | 293,000 | 384,000 | 140-540 | 460-1,850 | 1,600-6,300 | 5,300-21,200 | 90-155 | 0.12 | 4 | 2.90 |
| FMC64100M | 3,400 | 192,000 | 384,000 | 497,000 | 270-1,100 | 930-3,700 | 3,150-12,600 | 10,600-42,500 | 105-270 | 0.34 | 3 | 3.70 |
| FMC64150M | 5,100 | 248,000 | 497,000 | 644,000 | 410-1,640 | 1,390-5,600 | 4,700-18,800 | 16,000-63,700 | 75-365 | 0.48 | 2 | 5.10 |

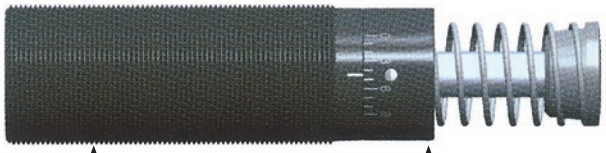
| Model | Absorption energy per time J | Max. absorption energy per hour J | | | * Equivalent mass kg FMA series | * Equivalent mass kg FML series | Pis ton rod | | Max. allowable | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Standard | External Tank | Oil circulator | min-max | min-max | recovering power N min-max | Returning time s | Eccentric angle ° | Mass kg |
| FML6425M | 1,020 | 124,000 | 248,000 | 332,000 | | 7,000-300,000 | 120-155 | 0.06 | 5 | 2.50 |
| FMA、FML6450M | 2,040 | 146,000 | 293,000 | 384,000 | 220-50,000 | 11,000-500,000 | 90-155 | 0.12 | 4 | 2.90 |
| FMA64100M | 4,080 | 192,000 | 384,000 | 497,000 | 270-52,000 | | 105-270 | 0.34 | 3 | 3.70 |
| FMA64150M | 6,120 | 248,000 | 497,000 | 644,000 | 330-80,000 | | 75-365 | 0.48 | 2 | 5.10 |

# Cautions on Mounting Methods/Mounting Work

## No external stopper required

Magnum Series has a stopper integrated into the Soft Absorber.

Rear Adjuster



Adjustment lock screw
(use a 2 mm hexagon wrench)
(for some models)

Stopper combined
with front adjuster

## Setting of a most appropriate absorption energy condition.

**Self-Correction Type Absorber**

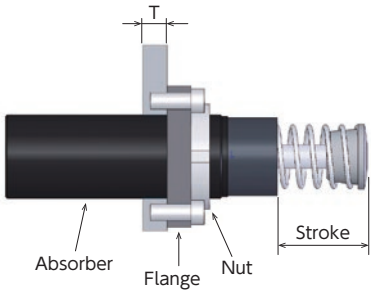
FMC model is a Self-Soft Absorber.
Can be used under the varying conditions of weight of impact load/impact rate/thrusting force as long as the condition of use is within the equivalent mass range.
The products for this model are prepared for handling the equivalent mass range (min. - max.) of five stages.
Select the model by the attached tail Nos. -0 (soft) - 4 (hard) of the type in accordance with the condition of use.
The best deceleration performance will be achieved under conditions with no sudden change in the speed of load at the top or end of the absorber piston rod.
If there is an impact at the start of stroke - change to one stage softer model (with smaller tail No.)
If there is an impact at the stroke end - change to one stage harder model(with larger tail No.).
or change to the use of two in parallel.

**Adjusting Type Absorber**

There is an adjusting scale of 0～9 on the FMA/FML models adjustment type soft absorber.
Before starting adjustment, loosen (maximum 1/2 turns) the locking screw (excluding 150mm stroke, FMA/FML 64 series only) located at the side of main unit using a hexagon wrench (2mm).
The Magnum Series is adjustable with the rear adjuster on the bottom of main unit, or the front adjuster (front stopper).
Both of the adjusters are internally linked together, and the adjusted scale of one side will be synchronous with the other scale.
After mounting, check the functioning several times, and turn the adjuster to a scale which provides the best deceleration. (At the start of stroke and stroke end of the piston rod, confirm that there is no impact.)
The soft absorbers are delivered with the adjusting scale positioned at 5.
If there is an impact at the start of stroke, turn the adjusting scale to 9 (soften) .
If there is an impact at the stroke end, turn the adjusting scale to 0 (harden).
* If the adjusting scale indicates 0 or 9, consider changing to another model.
If the adjusting scale indicates 0: A) Due to the very slow impact rate, change to FML model.
or
B) Too small size of absorber, please study the adoption of an absorber that is one stage larger.

## Thickness of mounting base/Mounting strength/Tightening torque for the lock nut (recommendation)

| Model (External thread) | Thickness T (minimum) | Mounting strength | Tightening torque for the lock nut |
|---|---|---|---|
| FMA、FML、FMC33/36 (M33/36x1.5) | 10mm | 1,150kg | 15～30kgf･m |
| FMA、FML、FMC45 (M45x1.5) | 13mm | 1,800kg | 30～60kgf･m |
| FMA、FML、FMC64 (M64x2) | 16mm | 5,100kg | 50～100kgf･m |




* Reinforce the thickness T applying a rib etc. as necessary.

# Measures for Eccentric Load

The impact of eccentric load over 3° will speed up the wear of the piston rod bearing and rapidly reduce the life cycle of the soft absorber. For maintaining the durability, the use of an eccentric angle adaptor is recommended.

**Solutions:**

The use of an eccentric angle adaptor is recommended. If possible, dividing the center of stroke to set the impact angle to 1/2 is recommended, as shown below.

**Equations:**

$$\alpha = \tan^{-1}\left(\frac{s}{2 \cdot Rs}\right) \qquad Rsmin = \frac{s}{2 \cdot \tan\alpha\ max}$$

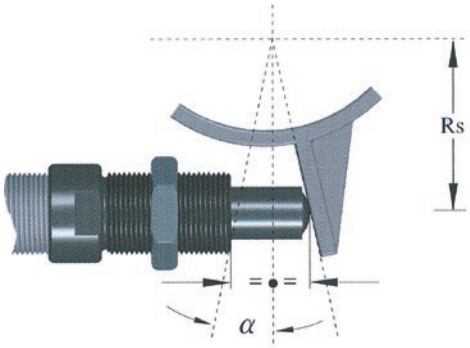
**Sample Calculations:**

$s=0.025m$ $\alpha\ max=25^\circ$

$Rs=0.1m$

$$\alpha = \tan^{-1}\left(\frac{0.025}{2 \cdot 0.1}\right) \qquad Rsmin = \frac{0.025}{2 \cdot \tan 25}$$

$\alpha = 7.13^\circ$ $Rsmin=0.027m$

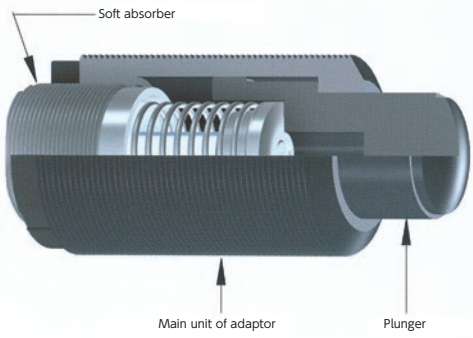



$\alpha$ = Eccentric angle: °
$\alpha\ max$ = Maximum Allowable Eccentric Angle: °
s= Absorber Stroke: m
$Rs$ = Mounting Distance (radius): m
$Rsmin$ = Shortest Possible Mounting Distance (radius): m

**Eccentric Angle Adaptor:**

The durability will be improved by taking a measure for eccentric angle of 3°～ 25° using a BV eccentric angle adaptor.
When using the eccentric angle adaptor, screw in the absorber until the end cap of the absorber contacts the plunger.
Be sure to lock the nut for absorber main unit after mounting.
Be careful not to screw in the absorber too deep: the absorption performance may be influenced if the stroke is short.

BV3325 (external diameter M45x1.5) - for FMC, FMA, FML3325 (M33x1.5)
BV4525 (external diameter M64x2) - for FMC, FMA, FML4525(M25x1.5)




# Example of installation

Base type

Flange mount

Side mount

Crevice mount

* For side mountings, be sure to support with the stopper to avoid direct force to the mounting bolt.

# MEMO

# 4

# Speed Controller

Differently from shock absorber that absorbs a shock, a hydraulic type speed controller manufactured for the purpose of speed control

# Read these instructions before use

This owner's manual contains various safety precautions regarding the proper handling of this product, and preventing danger to the operator, as well as damage to the plant and the machine. Please read this manual thoroughly before using the product.

## ⚠ Warning

**Definition of Warning** "Warning" applies to situations in which death or serious injuries may occur to the user, etc. if the potential dangers of the products are not avoided.

### A person who designs the equipment or determines the specification shall determine the compatibility of the speed controller.

●A person who designs the equipment or determines the specification shall determine the compatibility of the speed controller with the equipment after carrying out the performance verification and a life test because there are a variety of conditions for applications.

### To enforce a safety measure when using for the following applications

●Any use outside the specification range will cause a malfunction or damage to product.

### To enforce a safety measure when using for the following applications

●Please enforce a safety measure when using in the conditions and environments listed below, and consult our company for determining the adequacy of use.

1) The use in such places as an environment outside the standard specification not clarified in the catalogs or owner's manuals, outdoors or direct sunlight
2) The use for those devices and applications such as nuclear power equipment, the devices directly or indirectly related with the services of railroad, boats and ships and the running of vehicles, aerospace devices, military devices, medical devices, devices contacting with the beverages and foods, combustion equipment, amusement devices influencing human or property, emergency shut down circuits, press devices, etc., a serious influence on humans or property is anticipated and special safety is requested.

### Do not throw into a fire

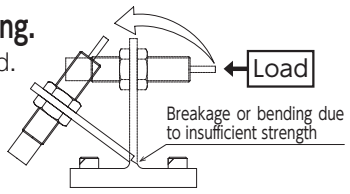
●As the products contain oil, throwing them into a fire may cause them to explode/ignite, resulting in injuries.

## ⚠ Caution

**Definifition of " Caution"** "Caution" applies to situations in which minor injuries or property damage may result if the operation or maintenance procedures are not strictly followed.

### It is prohibited to operate the speed controller with insufficient strength of mounting.

• If operated with insufficient strength of the mounting, the mother unit may be damaged.
• Apply a mounting strength which is more than that specified.
(Strength of Mounting) = (Maximum Thrust x Safety Factor)




### Do not attach using incorrect tightening torque

• Mounting with a torque other than the tightening torque may cause malfunction/damage of mother unit.
●Please tighten the mounting screw with a tightening torque below. The nut may become loose depending on the conditions of mating material. Please use an adhesive together as necessary.

| External diameter of the screw (mm) | M20 × 1.5 | M25 × 1.5 |
|---|---|---|
| Tightening torque for the nut (N・m) | 29.4 | 49 |

### Be sure to adjust the speed controller

● Be sure to adjust a speed controller for use in the most appropriate position. If the adjusted position is improper, the product may be damaged even within the range of the specification.

### Oil

● Seals, etc., are used for prevention of leakage of oil used in the speed controller to outside, but perfect sealing performance cannot be expected. Accordingly, it cannot be used in an environment that dislikes oil.

### Model Selection

● Please check all the contents of the specification in the newest product catalog when selecting a model.

### Pay attention to the scattered broken pieces of the cap

●Any use outside the specification may cause the breakage of the cap and injury by scattering
●Please install a scattering prevention cover, or keep away from operating area and stay in the position where safety is secured.

### Pay attention to a loose retaining ring

● Any use outside the specification may bring about an abnormally increased internal pressure of the speed controller and cause a jump out of implemented parts by a disengaged retaining ring.

Accordingly, as well as using within specification, please step away from the product to a distant position where safety is secured during operation

## Product Main Unit

●Please carefully handle the piston rod and do not scratch or stain with lubricating oil. Degraded durability or imperfect return will be caused.
●Please do not turn the screw for the oil supply port on the bottom of the soft absorber. Malfunction or scattering of oil will be caused due to oil leakage
●Please never turn the piston rod of FVC Series that adopts the rolling seal type. Oil leakage will be caused.
●Please do not damage the rear adjusting knob while mounting, etc.

## Environment for Use

●Please use within the temperature range for use. The use out of the range will lead to a shortened lifetime. Please use in an ambient temperature 0 ℃ - +60 ℃.
●Please use under an atmospheric pressure environment. The use under vacuum or high pressure environment will cause oil leakage or damage.
●The use in a place where ozone is generated will cause a shortened lifetime.
●Please do not use in an environment where cutting chips, cutting oil, water, etc. contacts the piston rod. The damage on packing will cause a malfunctioning or damage to mother machine due to oil leakage.

## Daily Inspection/Maintenance

●The performance/functions of the product will be degraded as will the service life. Carry out daily inspections and check the satisfaction of necessary functions and prevent the occurrence of an accident.
●Please check for no loosening of mounting nuts. The use under a loose condition will cause damage or accident.
●Please pay attention to abnormal vibration noises and vibration. When the crashing noise or vibration is abnormally high, please replace because the product may have reached the lifetime limit. A continued use under this condition will cause damage to machine in which the product is implemented.
●Please check for any oil leakage and the returning status of piston rod. If a large quantity of oil leakage or defective returning of piston rod is observed, please replace because there might be some abnormality. A continued use under this condition will cause damage to machine in which the product is implemented.
●The maintenance of the speed controller such as disassembly, re-assembly, oil supply are not available from the structural reason.

---

## How to Adjust the Speed Controller

●The adjustment of the speed controller is available by turning the [adjusting knob] on the bottom of main unit. (FSC series: Please loosen the locking screw for turning the adjusting knob.) The display of adjusting scale differs model to model.

| | |
|---|---|
| FVC series | 0 (weak) - 20 (strong)/ adjustment in the range of 270° |
| AE series | 00 (weak) - 9 (strong) / adjustment in the range of 270° |

● Be sure to tighten the locking screw when the adjustment is complete. The use without locking will allow the rotation of adjusting knob and a property variation will occur.
Some models are not equipped with a locking screw mechanism. The adjusting knob will not rotate while in an ordinary use if a model is not equipped with a locking screw mechanism (FVC series), but the adjusting knob may be rotated if it is used in a place where vibration is generated.
Please confirm with a real device and determine if it can be used or not.

## Disposal

● When a speed controller is no more necessary, please follow a proper disposal procedure in accordance with the local ordinance, rules, etc. as an industrial waste.

## Selection of the speed controller

● Please refer to the item "Speed Controller" in the catalog for selection of a speed controller.

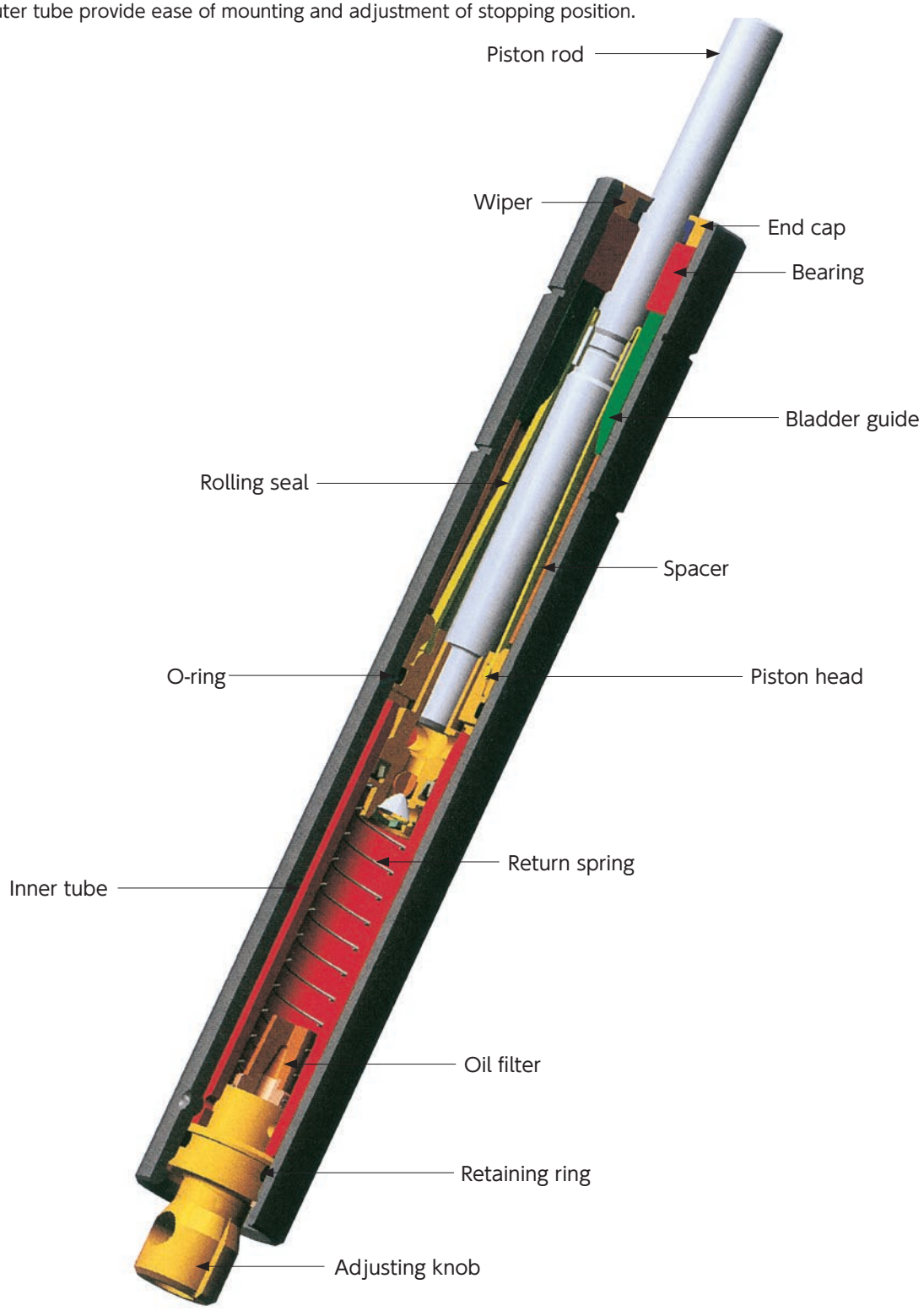
**Fuji Latex Co., Ltd. will not take any responsibility for the secondary disasters caused by the speed controller.**
**The user should implement preventative measures against such secondary accidents.**

# Structure/Outlines

## FVC Series

RoHS Compliant

FVC provides the precise speed adjustment, making use of high precision flow controlling mechanism. The hydraulic oil squeezed out when the piston rod is compressed will go through the high precision adjustable orifice to allow constant and precise speed control. The wide range of adjustment of controlled speed is available by turning the adjusting knob at the backside. The added screws on the outer tube provide ease of mounting and adjustment of stopping position.




This series will precisely control the machine motion. In addition, it is maintenance free, has no oil leakage, has no stick slip, and is not influenced by a change in temperature. In addition, FVC2515 ~2555 seals the piston rod and absorbs the volume variation of the piston rod with the adoption of Bellofram Seal. The high precision flow control valve has made it possible to precisely control the speed from 13mm/min under small thrusting force. This series can be used in the fields of plastics, metal, wood, glass, etc. for the feeding of cutting, turning, drilling, grinding, and boring works.

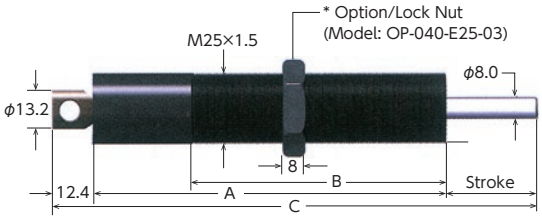
# Speed Controller

## FVC Series

RoHS Compliant

●Products specification might be changed without notice.

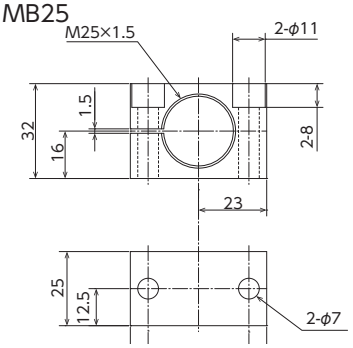
FVC Series




* The main unit does not come with nuts.

| Model |
|---|
| MB25 |

MB25



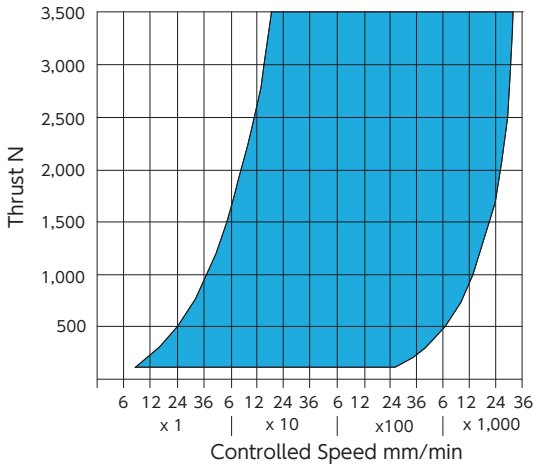

## Dimensions/Specifications

| Model | Stroke mm | A mm | B mm | C mm | Thrust N Minimum - Maximum | Recovering power N Minimum - Maximum | Returning time S | Allowable eccentric angle ° | Weight kg |
|---|---|---|---|---|---|---|---|---|---|
| FVC2515-FT | 15 | 128 | 80 | 156 | 30-3,500 | 5-10 | 0.2 | 3 | 0.4 |
| FVC2530-FT | 30 | 161 | 110 | 204 | 30-3,500 | 5-15 | 0.4 | 2 | 0.5 |
| FVC2555-FT | 55 | 209 | 130 | 277 | 35-3,500 | 5-20 | 1.2 | 2 | 0.6 |
| FVC2575-FT | 75 | 283 | 150 | 371 | 50-3,500 | 33-51 | 1.7 | 2 | 0.8 |
| FVC25100-FT | 100 | 308 | 150 | 421 | 60-3,500 | 27-51 | 2.3 | 1 | 0.9 |
| FVC25125-FT | 125 | 333.5 | 150 | 471.5 | 70-3,500 | 23-50 | 2.8 | 1 | 1.0 |

## Range of FVC use

FVC2575 to 25125 cannot be used in an environment of spattering liquid, such as cutting oil, water, or cleansing liquid, etc.
Use in place of the AE Series for applications where higher precision is needed.

Range of FVC use



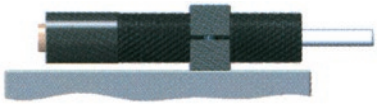

## Characteristics

Range of Speed Control : Minimum 0.013m/min
at Thrusting Force 400N
Maximum 38.1m/min
at Thrusting Force 3500N

Do not rotate the piston rod of FVC2515 ~2555
The Bellofram Seal will be broken.
Do not damage the adjusting knob at mounting, etc.
Operating temperature : 0 ~60℃

Surface treatment :
Outer tube Black oxide coating
Piston rod Hard chromium plated

Example of installation



Mounting using Mount Block MB25

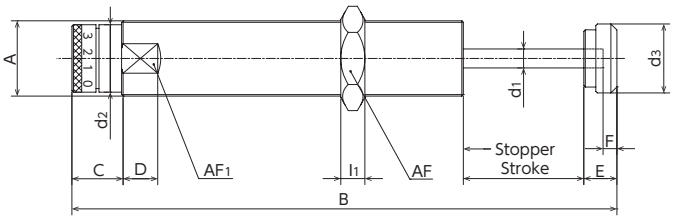
# Speed Controller

## AE Series

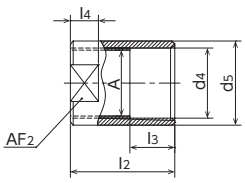
RoHS Compliant

●Products specification might be changed without notice.

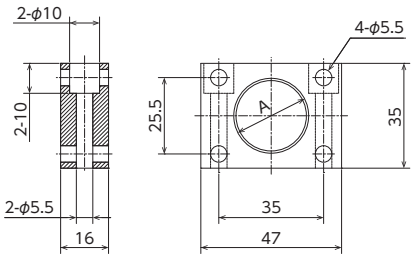
Nut
OP-040-E20-03
OP-040-E25-03
(one piece for the main unit)




Stopper nut
OP-020-E20
OP-020-E25




Mount block
OP-040-E20-05
OP-040-E25-05




## Dimensions

| Model | Stroke mm | A | B | C | D | E | F | $d_1$ | $d_2$ | $d_3$ | $d_4$ | $d_5$ | $l_1$ | $l_2$ | $l_3$ | $l_4$ | AF | $AF_1$ | $AF_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AE-020019ASP | 19.1 | M20×1.5 | 118.6 | 13.2 | 12 | 11 | 4.6 | 4.8 | 16.8 | 16.8 | 20.5 | 25 | 6 | 25 | 12 | 8 | 24 | 18 | 22 |
| AE-025025ASP | 25.4 | M25×1.5 | 142.6 | 16.5 | 12 | 11 | 4.6 | 6.3 | 22.4 | 22.9 | 25 | 30 | 8 | 32 | 16 | 10 | 30 | 23 | 27 |
| AE-025040ASP | 40.0 | M25×1.5 | 189 | 16.5 | 12 | 11 | 4.6 | 6.3 | 22.4 | 22.9 | 25 | 30 | 8 | 32 | 16 | 10 | 30 | 23 | 27 |

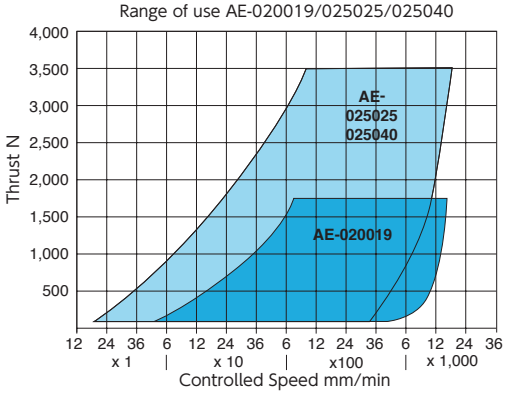
## Specifications

| Model | Stroke mm | Thrust N Minimum - Maximum | Recovering power N Minimum - Maximum | Returning time S | Allowable eccentric angle ° | Weight kg |
|---|---|---|---|---|---|---|
| AE-020019ASP | 19.1 | 22–1779 | 4.69–9.56 | 0.65 | 2 | 0.13 |
| AE-025025ASP | 25.4 | 62–3559 | 10.67–30.56 | 0.85 | 2 | 0.30 |
| AE-025040ASP | 40 | 67–3559 | 10.67–32.92 | 0.95 | 2 | 0.39 |

| Model | Remarks |
|---|---|
| OP-040-E20-05 | 020 |
| OP-040-E25-05 | 025 |
| OP-040-E20-03 | 020 |
| OP-040-E25-03 | 025 |
| OP-020-E20 | 020 |
| OP-020-E25 | 025 |

## Range of use/Range of Control

Range of use AE-020019/025025/025040




## Characteristics

Operating temperature : 0 ~60℃

Material/Surface Treatment : Outer tube Carbon Steel/Black Oxide Coating
Piston rod Stainless steel

The product cannot be used in an environment where spattering liquid such as cutting oil, water, or cleansing liquid, etc. are present.

# Speed Controller

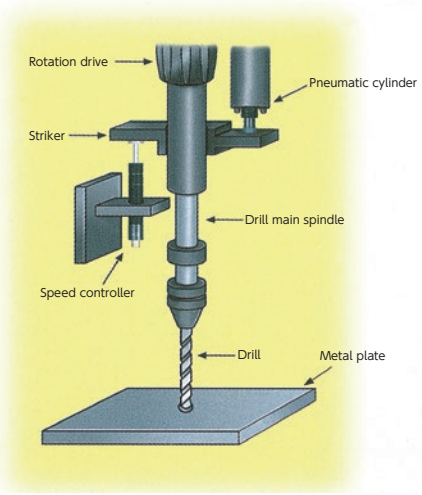
## FVC/AE Series

RoHS Compliant



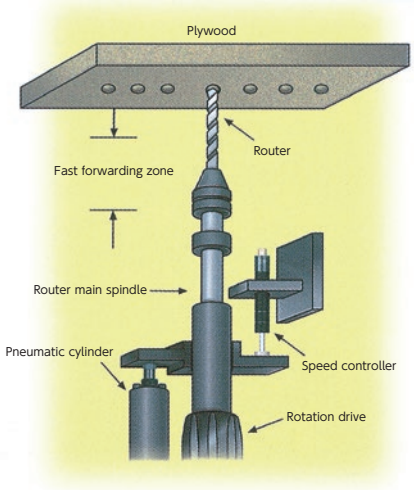
## Application

### Drilling the metal plate



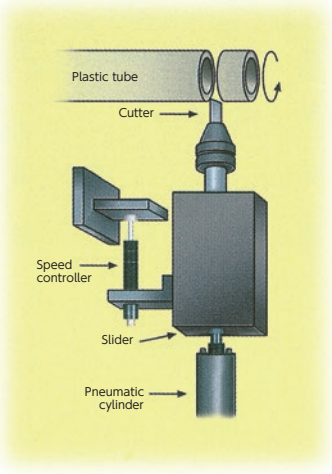

If the control of feeding speed is not possible at drilling, the excessive force will be applied to the drill, and the drill will bite into the work to generate a sharp projection and break the drill. By mounting a speed controller, the feeding speed of the drill can be precisely controlled to reduce burrs and remarkably reduce the breakage of drill.

### Drilling of the panels for furniture.



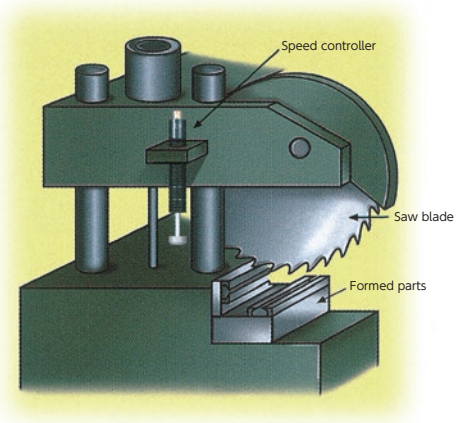

A custom-made tandem type pneumatic cylinder can provide the control of the fast forward and the low speed feeding at cutting. However, the mechanism becomes sophisticated, and the adjustment and the controllability do not perform optimally. By mounting a speed controller, the feeding speed can be precisely controlled; therefore, the equipment using a high cost custom-made tandem pneumatic cylinder can be replaced by a standard product.

### Cutting and Chamfering of Plastic tube




Precisely adjusting the cutting and feeding speeds in accordance with the materials and works is required. The speed controller can easily control the different feeding speed in accordance with the materials. Due to this, a standard pneumatic cylinder can be applied for structuring an inexpensive system in accordance with the materials.

### Cutting the Formed Parts of Aluminum/Plastics




The saw blade will wear with the high cutting resistance of materials, such as aluminum and plastics. If the cutting is continued with this feeding speed, the saw blade or the material will be damaged. The attached speed controller on the tool head will provide the ease of feeding speed control to prevent the breakage, and the ease of mounting, which offers a low cost solution.

# MEMO

5

# Helical Isolators

A unique vibration absorber that absorbs vibration and shock utilizing the deflection and friction of a stainless wire.
A vibration absorber that provides an effective vibration measure for transporting special vehicles, on board electronic devices on ships, arts, precision instrument.

# Read these instructions before use

This owner's manual contains various safety precautions regarding the proper handling of this product, and preventing danger to the operator, as well as damage to the plant and the machine. Please read this manual thoroughly before using the product.

## ⚠ Warning

**Definition of Warning** "Warning" applies to situations in which death or serious injuries may occur to the user, etc. if the potential dangers of the products are not avoided.

### The decision on the suitability of helical vibration absorber shall be made by an engineer of the equipment or a person who determine the specification.

- Because of the wide variety of conditions of use, the decision on the suitability of helical vibration absorber shall be made by an engineer of the equipment or a person who determine the specification, after the performance verification and life test as necessity.

### Do not use the helical vibration absorber outside the range of specification.

- The use outside the range of specification will cause the failure or breakage of the product.

### Implementation of Safety Measures for the Purposes Below.

- Implement the safety measures if used under the following conditions and environment, and consult our company for a judgment on the fe asibility check beforehand.

1. The use in the environment other than those standard specifications clearly indicated in the catalog or owner's manual, outdoors, or place exposed to the direct sunlight.
2. Nuclear related devices, devices directly or indirectly related to the running of rail or ship, devices related to aviation or space, military devices, medical devices, devices contacting the potions and foods, combustion equipment, amusement devices that are related to the influence on human and properties, emergency shut off circuit, press machinery, the use for the devices or purposes to which especially the safety is required because of the expected serious influence on the human and properties.

### When installing a heavy object, follow these instructions:

- The installation process is extremely dangerous, as it may result in accidents causing injury or death as well as damage to the object being installed.

1. Install by lifting up the object with a hoist, etc.
   - Ensure that the object is well balanced and stable.
   - Make sure that the hoisting wire rope does not become undone or severed
2. Install by jacking up the object.

- As the helical vibration absorber will flex due to the installed object's weight, please accordingly select an appropriate jack. Please contact our company for further information on the product's flex.

## ⚠ Caution

**Definifition of " Caution"** "Caution" applies to situations in which minor injuries or property damage may result if the operation or maintenance procedures are not strictly followed.

### Never disassemble the helical vibration absorber.

- You may not be able to reassemble it, or the mounting dimensions and characteristics may be altered.

### Do not use the helical vibration absorber in the pulling direction.

- Compared to a compression direction, the spring is so rigid in a pulling direction that the selection graph in this catalog cannot be applied (please see Installation Method).

### Do not use in a CR (Clean Room).

- Minute friction dust may contaminate the room.

**Fuji Latex Co., Ltd. assumes no responsibility for any secondary disasters caused by a helical vibration absorber. Please enforce a preventive measure against any secondary disasters.**

# MEMO

# Helical Vibration Absorber

## FH•FHM Series

## Structure and Principle

The stainless steel wire rope is bound on the retainer for mounting, and the wire rope is wound in a helical manner. This structure provides the significant deformation of wire rope in three axial directions to work as a spring. In addition, the element wires will rub each other during deformation to cause a phenomenon called hysteresis, which shows the different reaction forces at extension and shrinkage of helical vibration absorber due to this friction. This hysteresis phenomenon works as a damper.

## Common Applications

Absorption of vibration and impact in electronic devices, computer hardware, and precision instruments such as optical equipment, machines, carrier devices, automobiles, ships, aircrafts, and containers.

## Characteristics

1. Hybrid function of spring and damper:
It is a compact and simple device that functions as a spring and a damper.
2. A variety of installation options:
Because it can absorb vibration and impact in all three dimensions, it can be installed in four different ways, as shown below.
Installation is easy and simple.
3. Wide range of use:
From a small load to a large load, helical isolators can be used in a wide range of conditions, as they are extremely resistant to corrosion and chemicals, and they can operate under a wide range of temperatures (-50 ~ +190°C).
FH Series are provided with All Stainless Steel Specification
4. Maintenance-free:
No maintenance is required.
5. Delivery:
FH Series achieved the short delivery based on the domestic production.

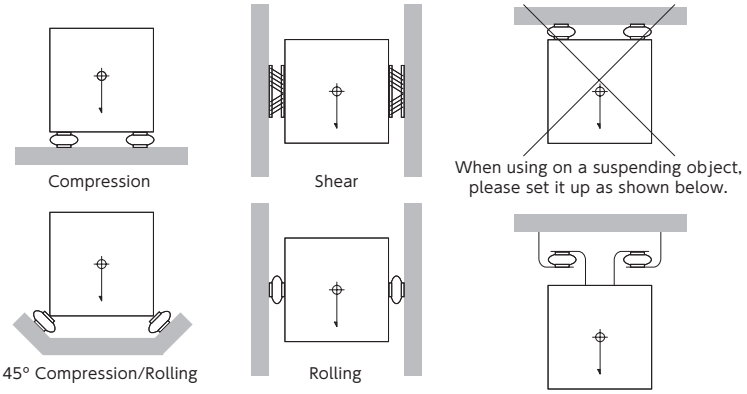
## Material

| Name | FH series | FHM series |
|---|---|---|
| Retainer | Stainless steel (SUS304) | Aluminum alloy (A6061-T6 with iridite coating) |
| Press fitting nut | Stainless steel (martensite passivation treated) | FHM08375~FHM08625: Stainless steel (SUS304 embedded nut)<br>FHM08875: Directly threaded on the retainer |
| Wire rope | Stainless steel (SUS304) | |
| Tube | Stainless steel (SUS304) | ——— |
| Retaining bolt | ——— | FHM08375~FHM08875: Carbon Steel with chrome (III) chromate |

Note: Stainless steel and aluminum alloy are used, but it does not guarantee the rust prevention.

## Installation Method

Helical vibration absorber cannot be used in the pulling direction. (Use for suspension)
The position of the mounting hole of the retainer may be misaligned due to the deflection of wire during the installation of the helical vibration absorber.
Please contact our sales department with any questions regarding the mounding method.
Contact information: Fuji Latex Co., Ltd. Precision Device Business Division Phone: +81-282-30-1856 Fax: +81-282-30-1857



## Type Indication Method

**FH** **10** **016** – **4** – **A**

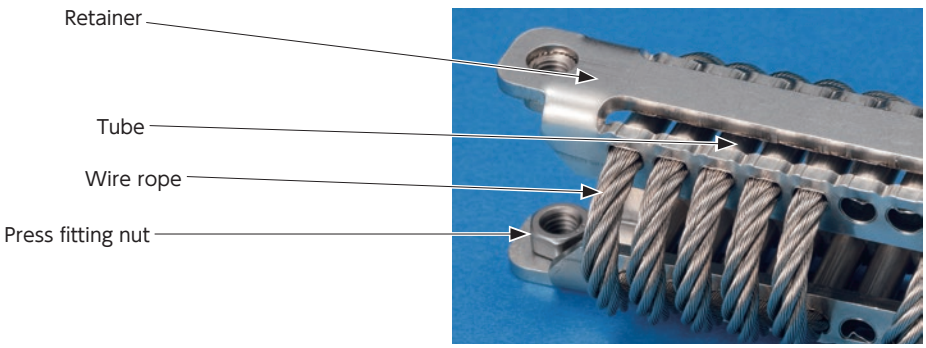
- Please see Shape of Mounting Parts of each model.
- Performance classification
- Wire rope diameter (□□□ × 0.1 ≒ wire diameter in mm)
- Number of wire rope coils
- Helical vibration absorber FH series Stainless steel used for the whole/Domestic product

**FHM** **08** **375** – **3** – **A**

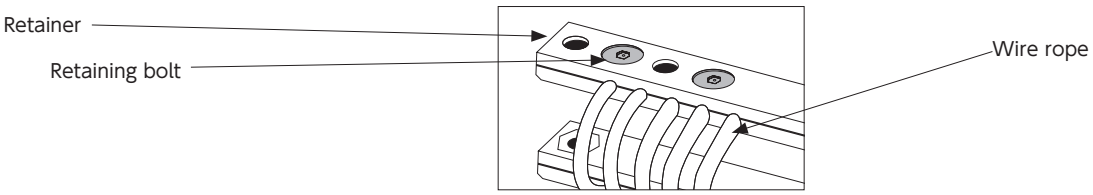
- Please see Shape of Mounting Parts (on page 208).
- Performance classification
- Wire rope diameter (□□□ × 0.0254 ≒ wire diameter in mm)
- Number of wire rope coils
- Helical vibration absorber FHM series

## Name of parts and their materials

FH series

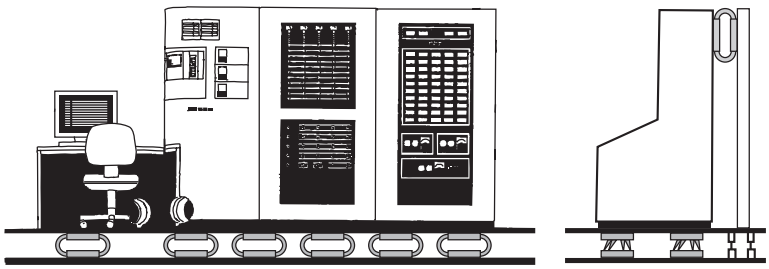



FHM series



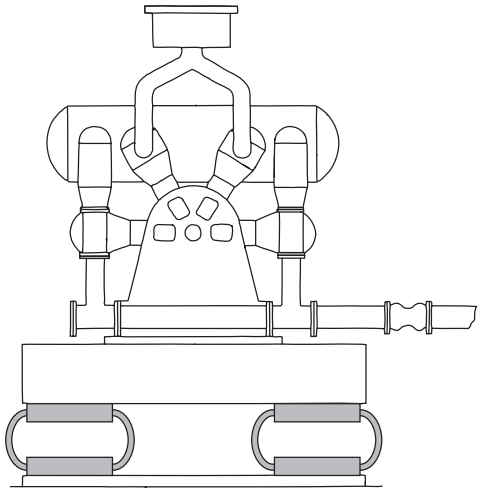
# Applications

## FH•FHM Series



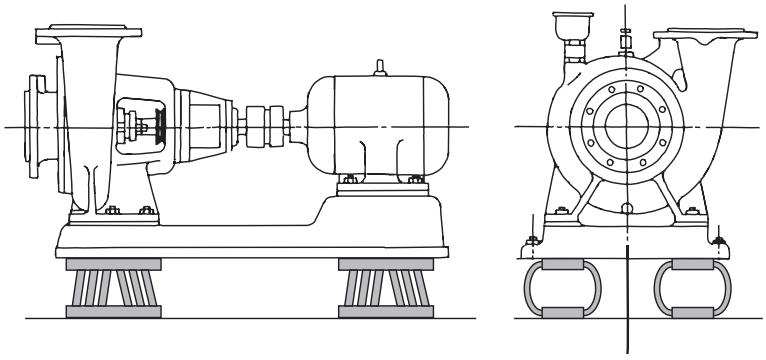
Control panel

Vibration Absorption Wagons

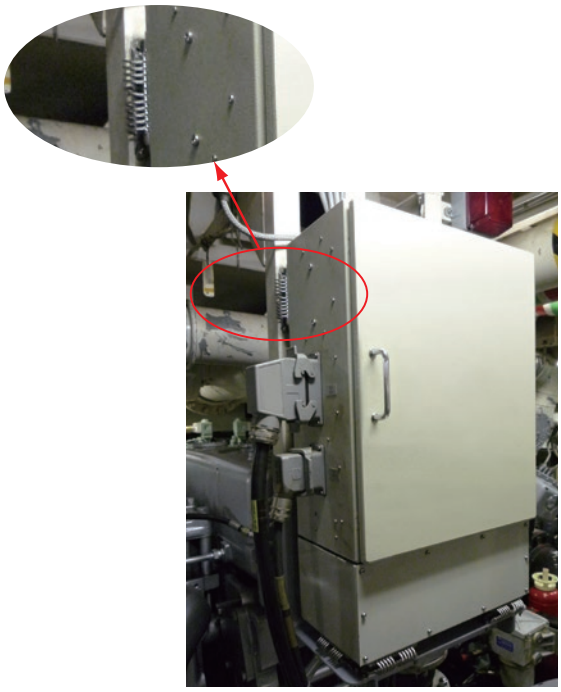


Compressor

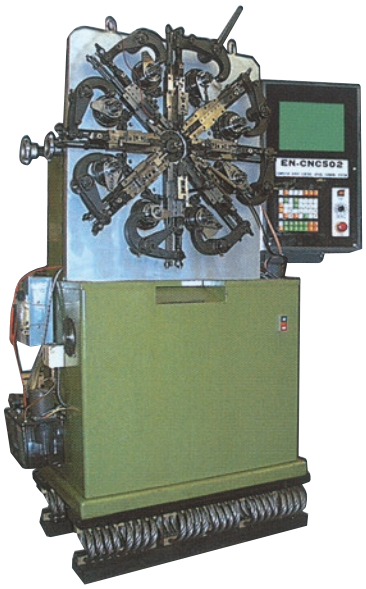
Vibration Absorption Wagons



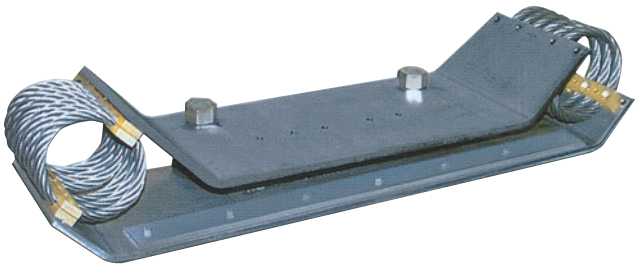
Turbo Blowers



Marine Control Panels




Coil spring machine



Example of 45° compression/rolling installation

This example uses the vibration absorber as a stabilizer. For thin or high gravity center equipment, the combined use with vibration or impact absorber will effectively reduce the swaying motion.

power generator

Various control panels
This example uses a standard vibration absorber for absorbing vibration or impact.

# Selection Method

## FH•FHM Series

(Please refer to the next page for example selections.)

## Verification of common specifications and calculation thereof

M : Mass of the installing object = kg

n : Number of vibration absorber = pce

(The number of vibration or impact absorbers, in which the number of anti-swaying stabilizers is not included.
For the examples of anti-swaying stabilizer, please see page 205.)

m : Supporting mass per anti-vibration device = $\frac{M}{n}$ = kg

The external dimensions of installed object : H (height)× W (width)× D (depth) = × × mm

Centre of gravity of the installed object :

(If the installing object sways sideways due to a high centre of gravity, etc, use a stabilizer that is the same model as the one selected below, or a model in the next performance classification number.)

Selection of Installation Method: Select from the figures in page 202.

Temperature Range for Use (can be used in the range of -50 ~+190℃ ) : ~ ℃

If you need to use a helical isolator under other operating conditions, please consult our company's sales department.

## Selection for Vibration Absorption

f : Machine's vibration frequency = Hz

N : Rotations per minute of motors and engines = rpm

$f = \frac{N}{60}$ = Hz

fn : Natural Frequency of Helical Vibration Absorber = $\frac{f}{3}$ = Hz

The intersection of calculated m and fn indicates the smallest model in the vibration selection graph. If an intersection cannot be found in the graph, select a model directly under the intersection. Next, select the shape of the mounting to finish the selection.
(The reason for selecting the model listed directly below the intersection is to improve the anti-vibration effect during regular operation by using a more flexible model.)

Caution : Operating a machine at its natural frequency is dangerous, as it increases vibration. Please make sure that natural frequency is passed as quickly as possible.

## Selection for Impact Absorption

Ga : Allowable G value = G

V : Max. speed = m/s

1) Free fall $V = \sqrt{19.6 \times h}$ = m/s

h : Height of free fall = m

2) Halfsine acceleration input $V = \frac{19.6 \times Gmax \times t}{\pi}$ = m/s

Gmax : Max. G value = G

t : Action time of halfsine acceleration input $(\frac{\text{Half Sin Period T}}{2})$ = s

X : Flex = $\frac{1000 \times V^2}{9.8 \times Ga}$ = mm

Ensure that flex X is smaller than the listed maximum flex for each model.

Fmax : Impact load per one vibration absorber = N = m×9.8× Ga (+m× g)

* (+ m x g) is only for uses in the direction of compression

The intersection of calculated Fmax and X indicates the smallest model in the impact selection graph. If an intersection cannot be found in the graph, select a model directly under the intersection Next, select the shape of the mounting to finish the selection.
(The reason for selecting the model listed directly below the intersection is to reduce the impact load by using a more flexible model.)

# Example of a Vibration Absorption Selection

1. Specifications:

M : Mass of installed object =180kg, n: Number of anti-vibration devices (Stabilizer is not required because of good stability due to the low center of gravity) =4

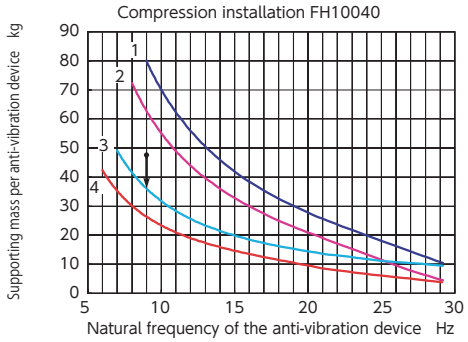
m : Supporting mass per anti-vibration device =45kg, Installation Method: compression, Ambient temperature: -5 ~40℃

f : Vibration frequency of machinery =27Hz

2. Selection:

m : Supporting mass per = 45kg、fn : Natural frequency of anti-vibration device $= \frac{f}{3} = 9Hz$

Selected FH10040-3 using m, fn and the vibration selection graph. Next, the model description will be FH10040-3-D because the shape of mounting parts is D. Such a model description can be used for ordering.




# Example of Impact Absorption Selection

1. Specifications:

Total Mass=60kg, n: Number of anti-vibration devices (Stabilizer is regarded not required because of good stability due to the low center of gravity).

=4, m : Supporting mass per anti-vibration device = 15kg, Installation Method: compression, Ambient temperature: 0 ~60℃ As halfsine input, Ga : Allowable G value = 5G, Gmax : Max. G value = 15G

t : Action time of halfsine acceleration input = 0.01 s

2. Selection:

m : Supporting mass per anti-vibration device = 15 kg

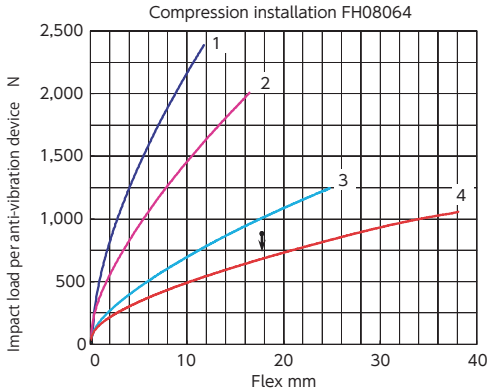
As it is input as halfsine, the maximum speed is as follows, based on the equation in 2) on page 210.

$$V : \text{Max. speed} = \frac{19.6 \times Gmax \times t}{\pi} = \frac{19.6 \times 15 \times 0.01}{\pi} = 0.9358 m/s$$

$$X : \text{Flex} = \frac{1{,}000 \times V^2}{9.8 \times Ga} = \frac{1{,}000 \times 0.9358^2}{9.8 \times 5} = 17.87mm$$

Fmax : Impact load per anti-vibration device = 9.8 × m × Ga = 9.8 × 15 × 5 = 880N

Selected FH08064-4 using Fmax, X and Impact selection graph. Next, the model description will be FH08064-4-A because the shape of mounting parts is A. Such a model description can be used for ordering.



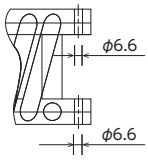
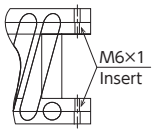
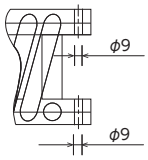
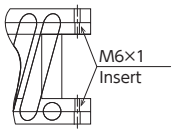
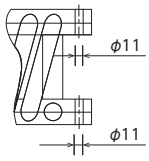
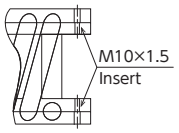
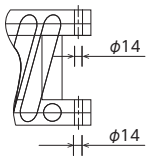
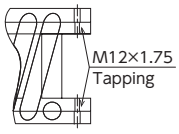
# Helical Vibration Absorber

## FHM Series

## Shape of Mounting Parts

〈Geometry of the mountings for aluminum retainer〉

For this series, there are two types of standard shapes of mounting parts: D (drill end) and A (screw).

| Shape of mounting parts / Symbol / Shape | Standard shape of mounting parts | |
|---|---|---|
| | D | A |
| FHM08375 |  |  |
| FHM08500 |  |  |
| FHM08625 |  |  |
| FHM08875 |  |  |

# Helical Vibration Absorber

## FH10016

RoHS Compliant

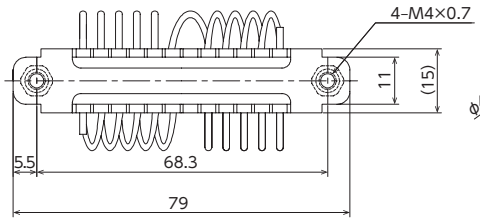
●Products specification might be changed without notice.

## Specifications

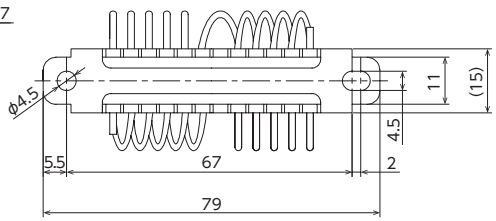
| Model | H mm | OD mm | Mass g | Max. flex mm | | |
|---|---|---|---|---|---|---|
| | | | | Compression | Shear and rolling | 45° Compression /Rolling |
| FH10016-1-□ | 23.3 | 33.5 | 51 | 6.3 | 10.2 | 9.5 |
| FH10016-2-□ | 27.1 | 37.4 | 52 | 10.1 | 15.2 | 14.3 |
| FH10016-3-□ | 29.3 | 39.8 | 53 | 12.3 | 17.8 | 17.4 |
| FH10016-4-□ | 34.0 | 45.4 | 55 | 16.6 | 22.9 | 23.5 |

□ will be filled in with the mounting type either A or D.

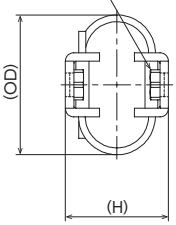
A type (screw of mountin g part)



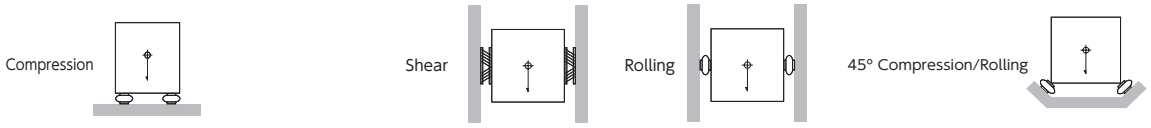

D type (drill end of mountin g part)




Press fitting nut
(Only for A typ e)

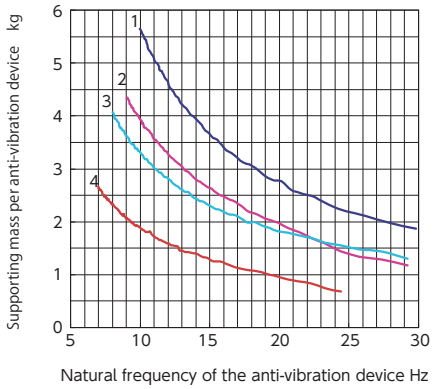



Installation Method

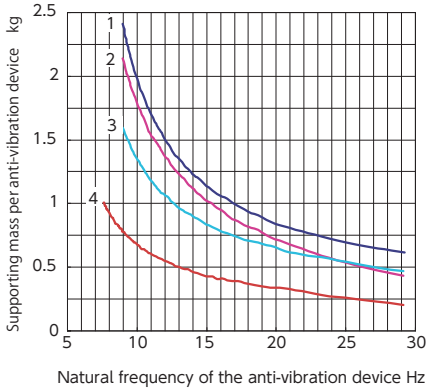



## Vibration Selection Graph

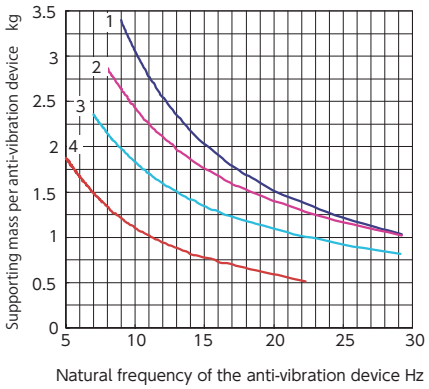
Compression installation




Shear and rolling installation

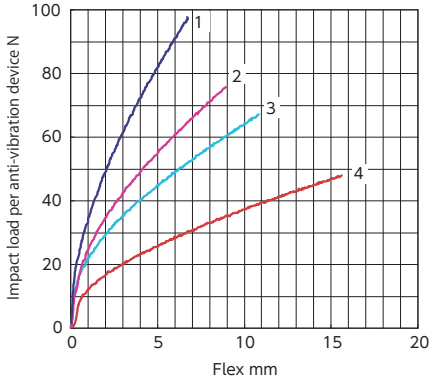



45° Compression/Rolling installation

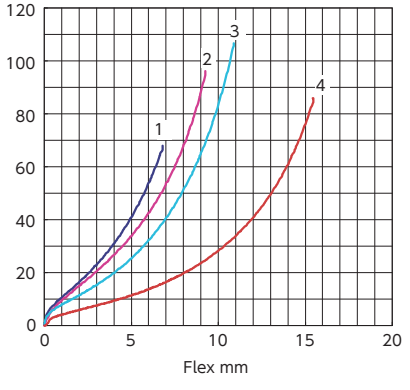



## Impact Selection Graph

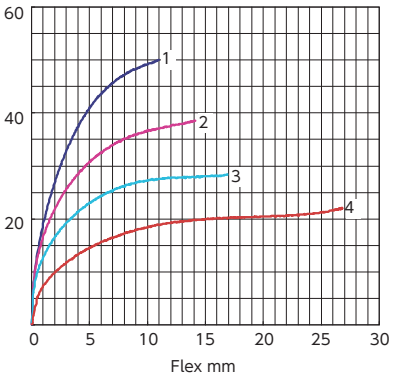
Compression installation




Shear and rolling installation




45° Compression/Rolling installation



# Helical Vibration Absorber

## FH10024

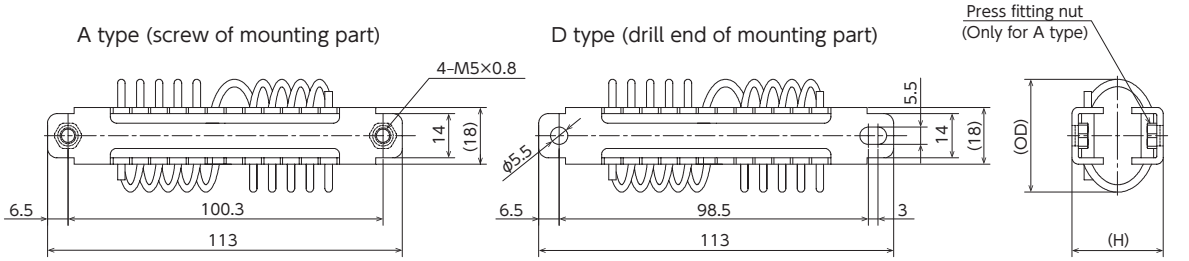
RoHS Compliant

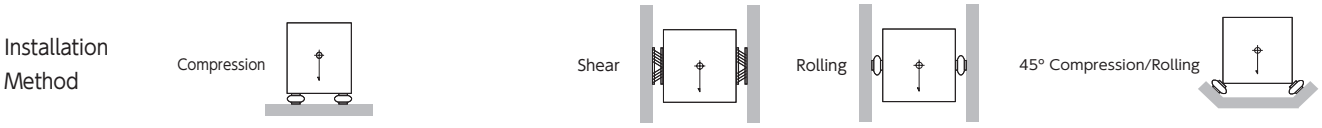
●Products specification might be changed without notice.

## Specifications

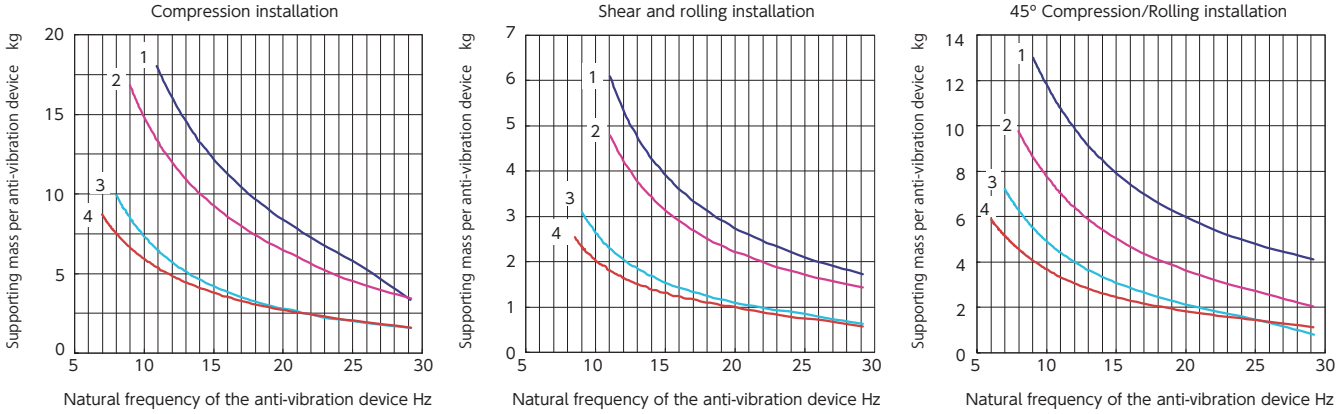
| Model | H mm | OD mm | Mass g | Max. flex mm | | |
|---|---|---|---|---|---|---|
| | | | | Compression | Shear and rolling | 45° Compression /Rolling |
| FH10024-1-□ | 28.8 | 37.8 | 102 | 7.4 | 10.2 | 10.5 |
| FH10024-2-□ | 30.0 | 41.5 | 105 | 8.9 | 12.7 | 12.6 |
| FH10024-3-□ | 35.2 | 46.1 | 108 | 13.9 | 15.2 | 19.7 |
| FH10024-4-□ | 39.7 | 51.7 | 112 | 18.3 | 20.3 | 25.9 |

□ will be filled in with the mounting type either A or D.

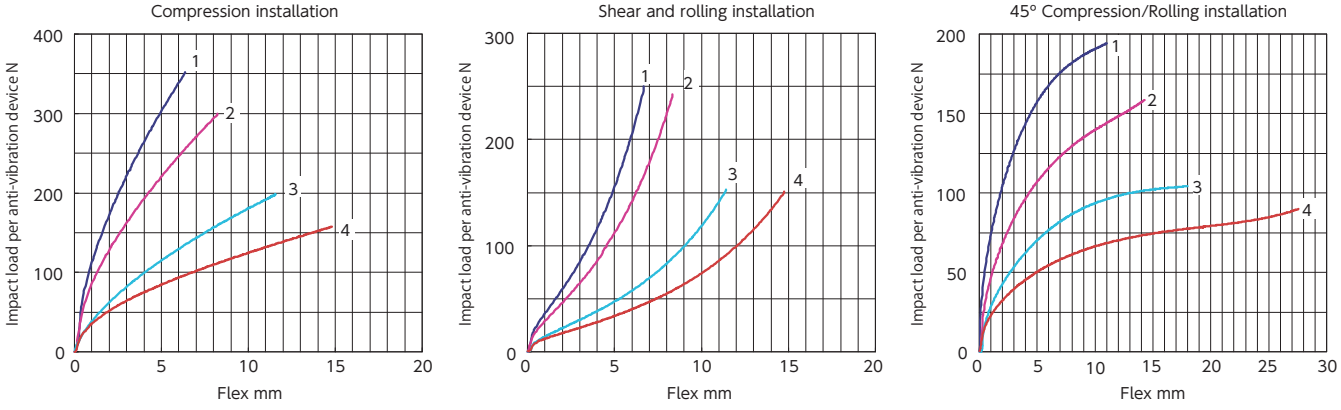



## Vibration Selection Graph




## Impact Selection Graph



# Helical Vibration Absorber

## FH10032

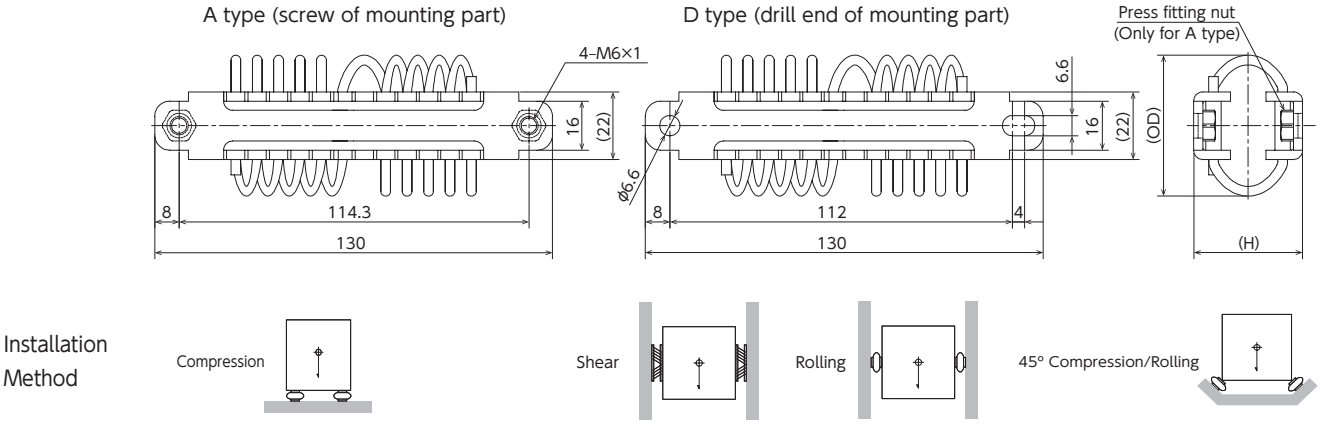
RoHS Compliant

●Products specification might be changed without notice.

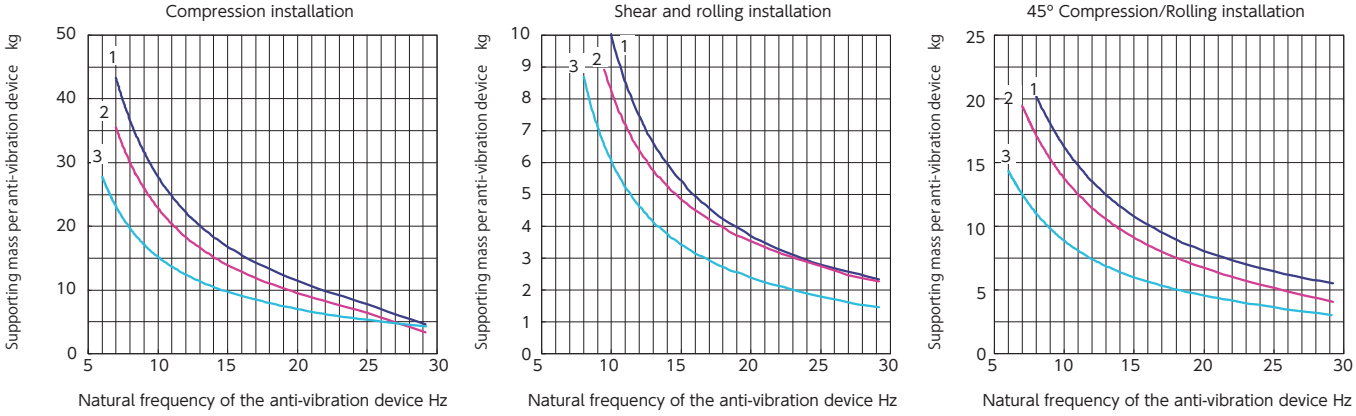
## Specifications

| Model | H mm | OD mm | Mass g | Max. flex mm | | |
|---|---|---|---|---|---|---|
| | | | | Compression | Shear and rolling | 45° Compression /Rolling |
| FH10032-1-□ | 34.3 | 48.3 | 193 | 9.6 | 12.7 | 13.6 |
| FH10032-2-□ | 35.9 | 51.8 | 200 | 10.7 | 15.2 | 15.1 |
| FH10032-3-□ | 40.8 | 56.3 | 203 | 15.8 | 20.3 | 22.3 |

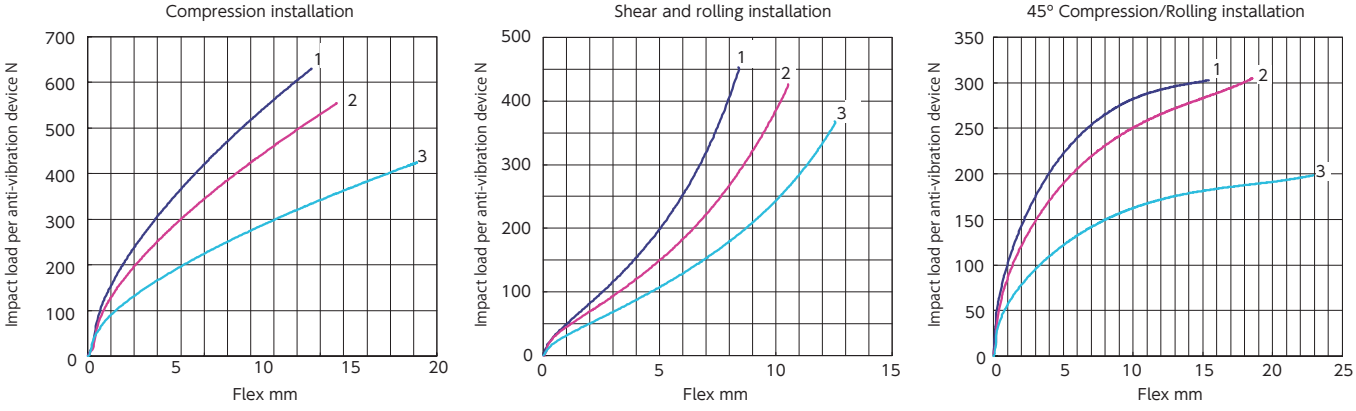
□ will be filled in with the mounting type either A or D.




## Vibration Selection Graph




## Impact Selection Graph



# Helical Vibration Absorber

## FH10040

RoHS Compliant

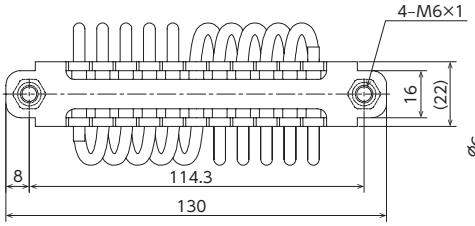
●Products specification might be changed without notice.

## Specifications

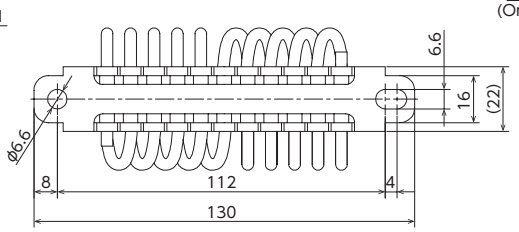
| Model | H mm | OD mm | Mass g | Max. flex mm | | |
|---|---|---|---|---|---|---|
| | | | | Compression | Shear and rolling | 45° Compression /Rolling |
| FH10040-1-□ | 33.5 | 50.6 | 223 | 8.2 | 12.7 | 11.6 |
| FH10040-2-□ | 35.6 | 52.2 | 232 | 10.4 | 15.2 | 14.7 |
| FH10040-3-□ | 40.9 | 58.4 | 235 | 15.4 | 20.3 | 21.8 |
| FH10040-4-□ | 45.7 | 64.6 | 249 | 20.2 | 27.9 | 28.6 |

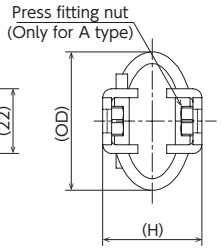
□ will be filled in with the mounting type either A or D.

A type (screw of mounting part)

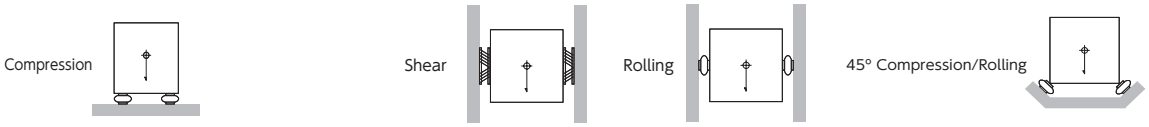



D type (drill end of mounting part)



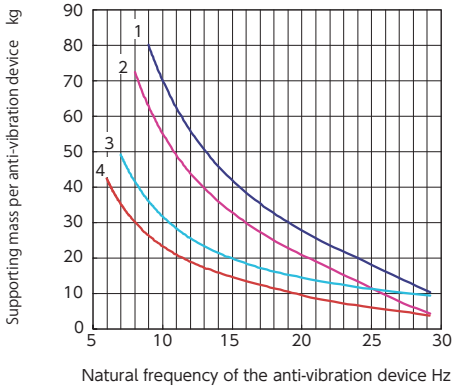




Installation Method

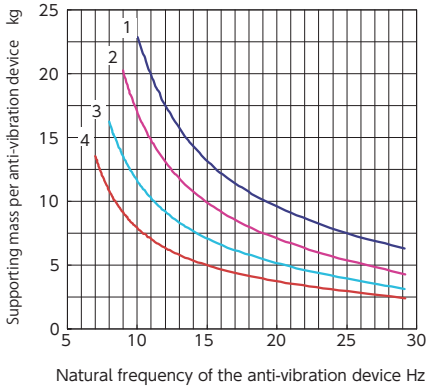



## Vibration Selection Graph

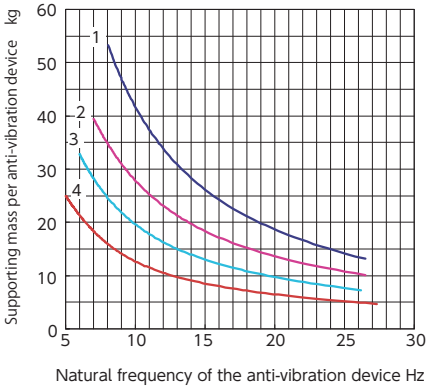
Compression installation




Shear and rolling installation

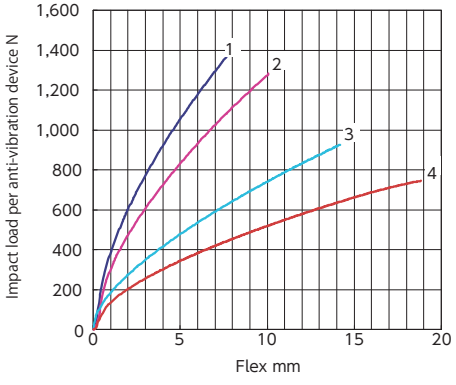



45° Compression/Rolling installation

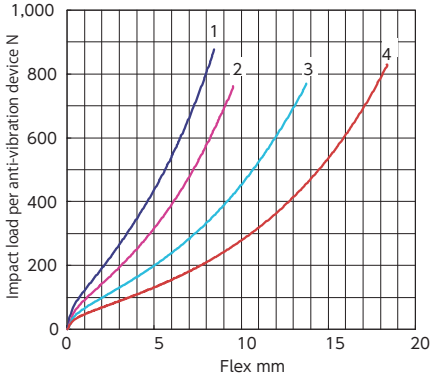



## Impact Selection Graph

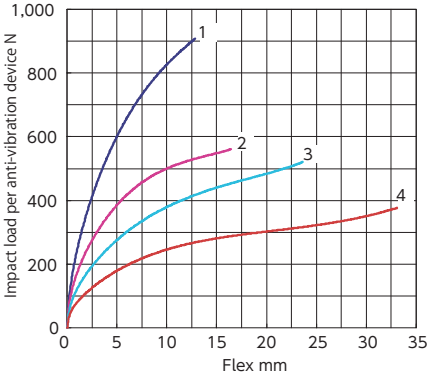
Compression installation




Shear and rolling installation




45° Compression/Rolling installation



# Helical Vibration Absorber

## FH10048

RoHS Compliant

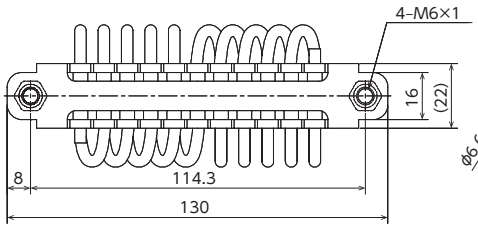
●Products specification might be changed without notice.

## Specifications

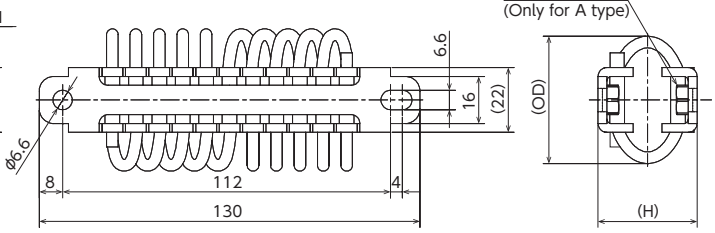
| Model | H mm | OD mm | Mass g | Max. flex mm | | |
|---|---|---|---|---|---|---|
| | | | | Compression | Shear and rolling | 45° Compression /Rolling |
| FH10048-1-□ | 33.5 | 46.1 | 256 | 6.2 | 10.2 | 8.8 |
| FH10048-2-□ | 37.8 | 51.4 | 280 | 10.9 | 12.7 | 15.4 |
| FH10048-3-□ | 42.0 | 57.4 | 286 | 15.0 | 12.7 | 21.2 |

□ will be filled in with the mounting type either A or D.

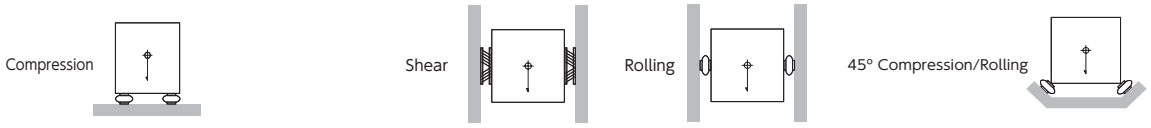
A type (screw of mounting part)




D type (drill end of mounting part)

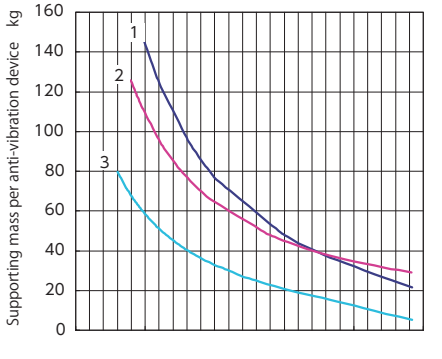



Installation Method

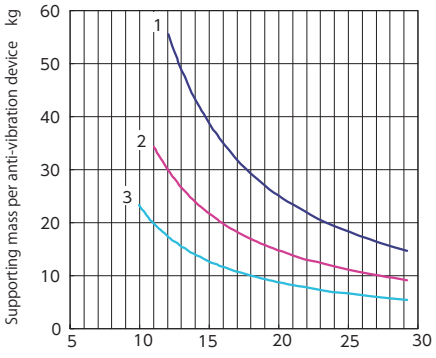



## Vibration Selection Graph

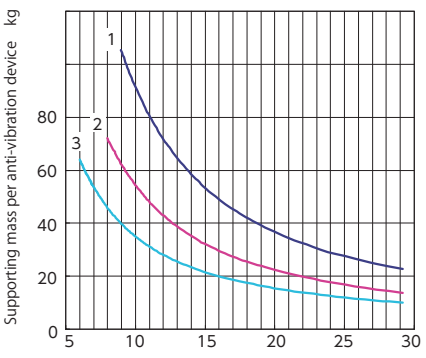
Compression installation




Shear and rolling installation

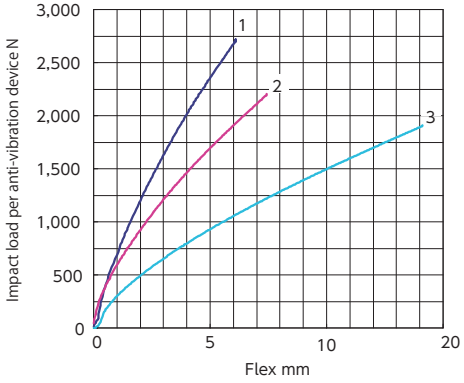



45° Compression/Rolling installation

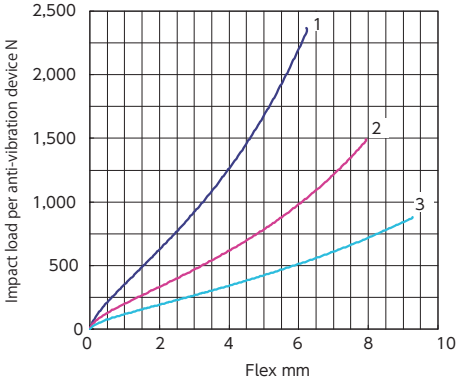



## Impact Selection Graph

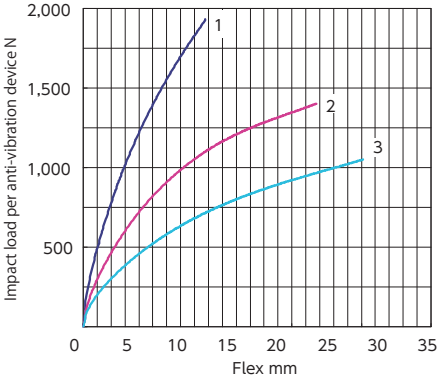
Compression installation




Shear and rolling installation




45° Compression/Rolling installation



# Helical Vibration Absorber

## FH08064

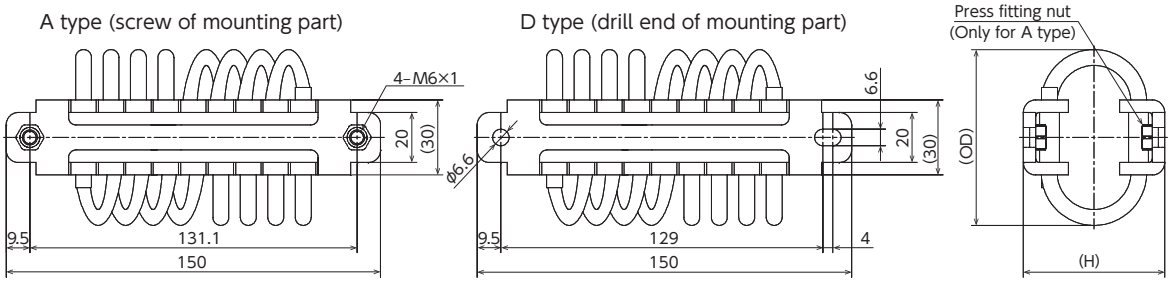
RoHS Compliant

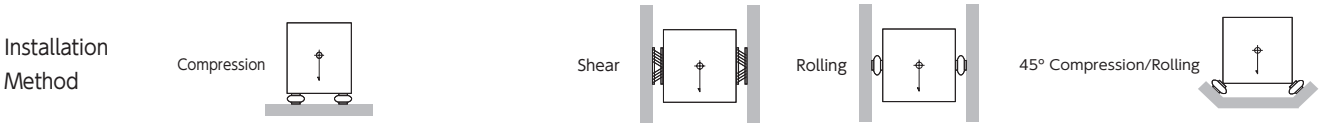
●Products specification might be changed without notice.

## Specifications

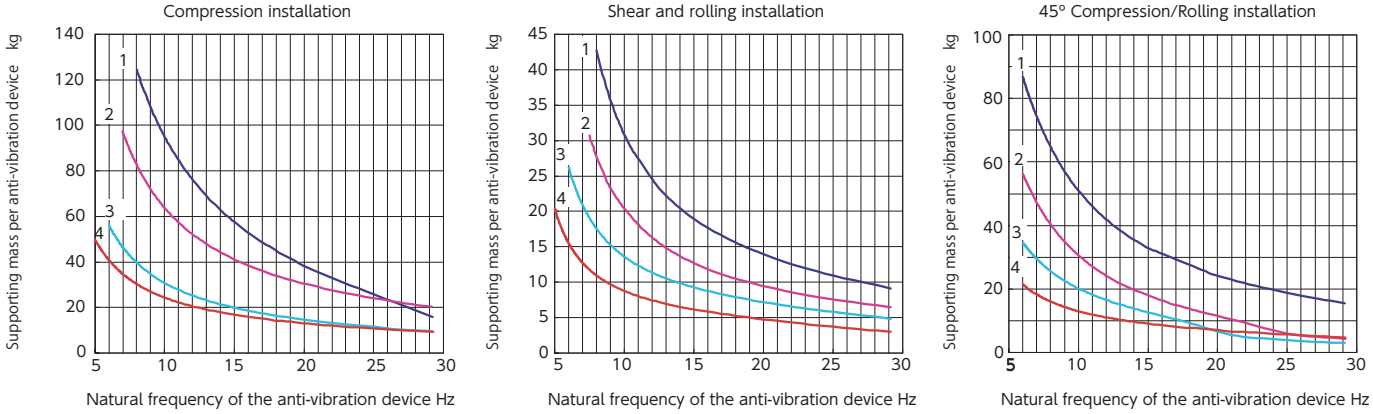
| Model | H mm | OD mm | Mass g | Max. flex mm | | |
|---|---|---|---|---|---|---|
| | | | | Compression | Shear and rolling | 45° Compression /Rolling |
| FH08064-1-□ | 54.1 | 75.0 | 566 | 16.4 | 20.3 | 23.2 |
| FH08064-2-□ | 60.8 | 82.0 | 595 | 22.9 | 25.4 | 32.4 |
| FH08064-3-□ | 70.8 | 98.0 | 679 | 32.4 | 40.6 | 45.8 |
| FH08064-4-□ | 79.7 | 112.6 | 698 | 42.9 | 48.3 | 60.7 |

□ will be filled in with the mounting type either A or D.

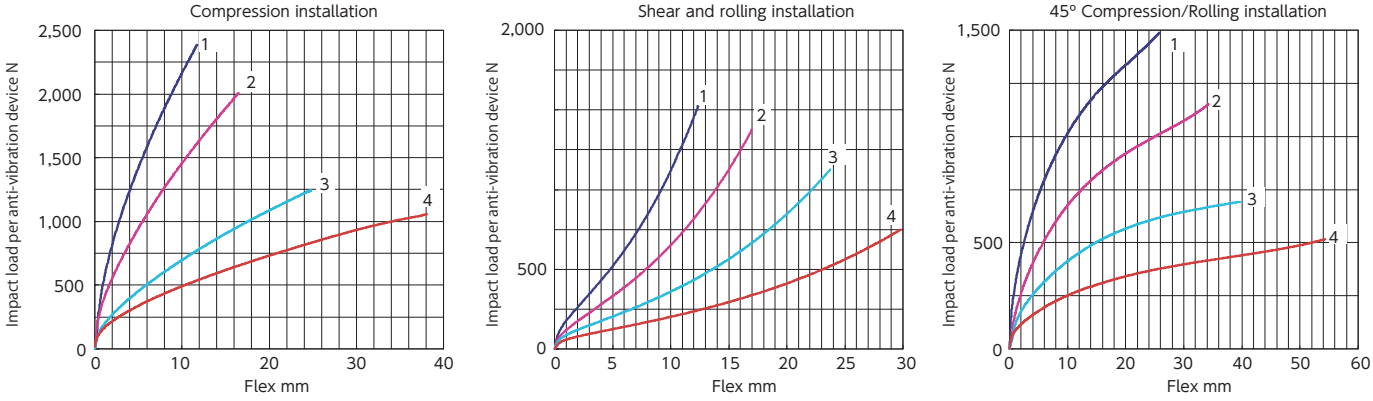



## Vibration Selection Graph




## Impact Selection Graph



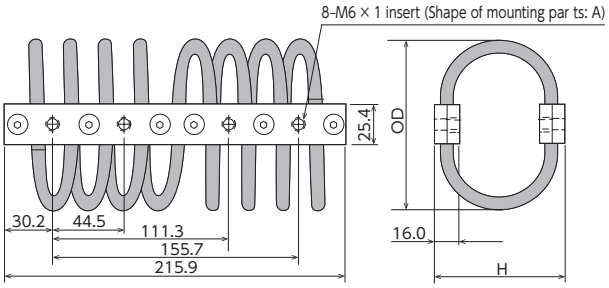
# Helical Vibration Absorber

Customized orders

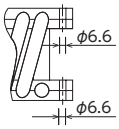
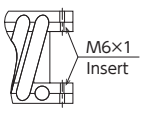
## FHM08375

●Products specification might be changed without notice.

## Dimensions




| Model | H mm | OD mm | Mass g |
|---|---|---|---|
| FHM08375-1 | 71.1 | 84.1 | 1.043 |
| FHM08375-3 | 76.2 | 104.9 | 1.179 |
| FHM08375-7 | 108.0 | 139.7 | 1.406 |

| Standard shape of mounting parts | |
|---|---|
| D | A |
|  |  |

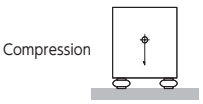


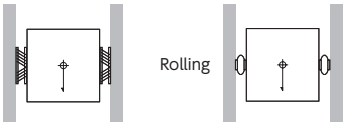
Please refer to page 208 if you require other shapes M6 × 1 for your mounting parts.

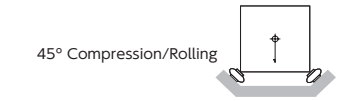
| Model | Max. flex mm | | |
|---|---|---|---|
| | Compression | Shear and rolling | 45° Compression /Rolling |
| FHM08375-1-□ | 25.4 | 25.4 | 38.1 |
| FHM08375-3-□ | 33.0 | 38.1 | 58.4 |
| FHM08375-7-□ | 55.9 | 55.9 | 114.3 |

□ will be filled in with the mounting type either A or D.

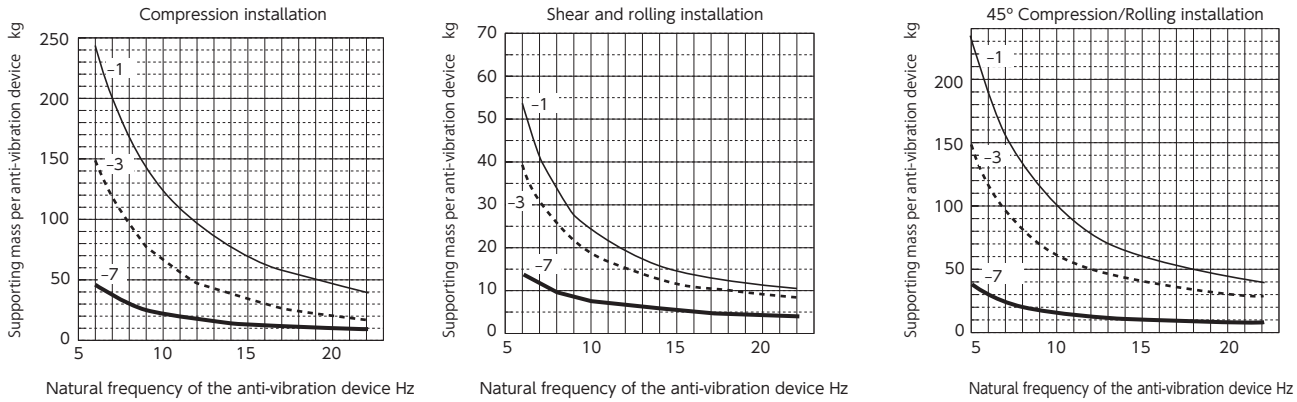
Installation Method



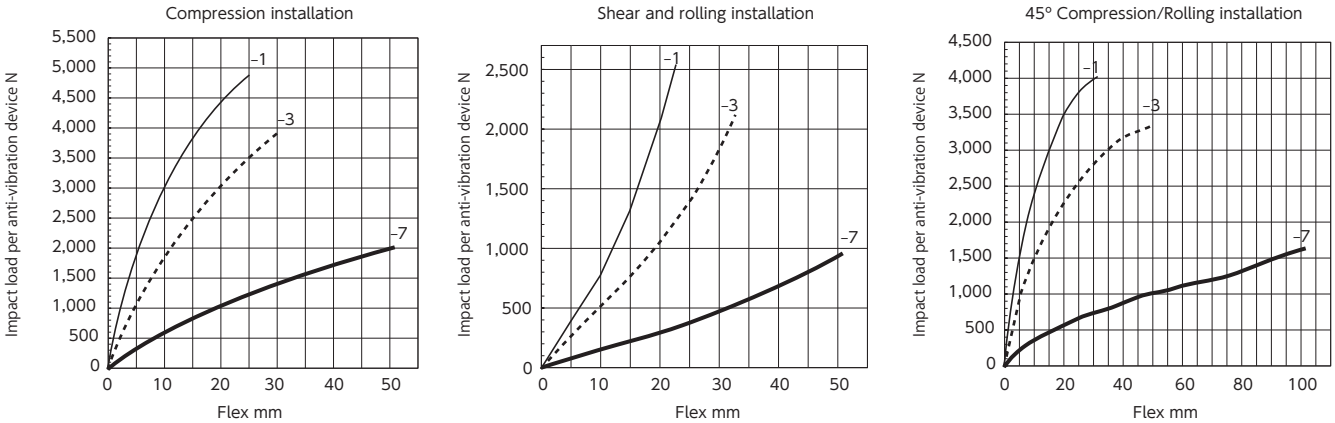




## Vibration Selection Graph




## Impact Selection Graph



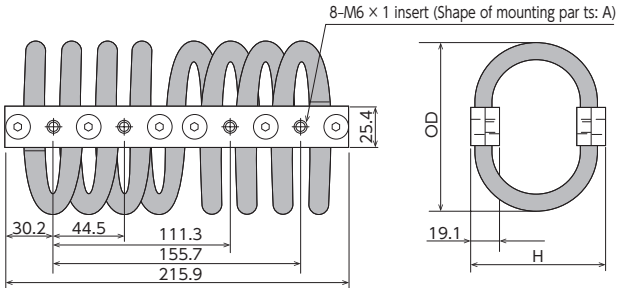
# Helical Vibration Absorber

Customized orders

## FHM08500

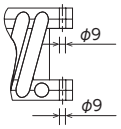
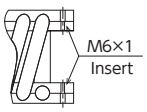
●Products specification might be changed without notice.

## Dimensions




| Model | H mm | OD mm | Mass kg |
|---|---|---|---|
| FHM08500-2 | 88.9 | 104.9 | 1.769 |
| FHM08500-3 | 95.3 | 120.7 | 1.950 |
| FHM08500-5 | 124.5 | 143.5 | 2.358 |

## Standard Shape of Mounting Parts and Maximum Flex

| Standard shape of mounting parts | |
|---|---|
| D | A |
|  |  |

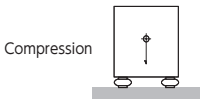


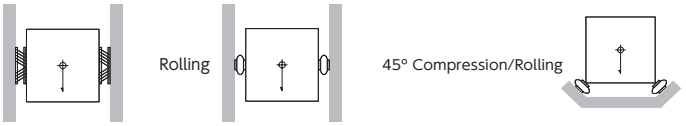
Please refer to page 208 if you require other shapes M6 × 1 for your mounting parts.

| Model | Max. flex mm | | |
|---|---|---|---|
| | Compression | Shear and rolling | 45° Compression /Rolling |
| FHM08500-2-□ | 40.6 | 33.0 | 68.6 |
| FHM08500-3-□ | 43.2 | 38.1 | 81.3 |
| FHM08500-5-□ | 71.1 | 58.4 | 101.6 |

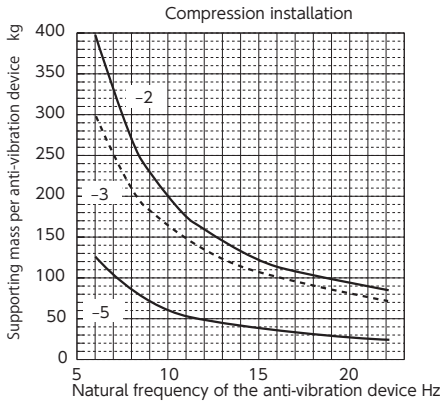
□ will be filled in with the mounting type either A or D.

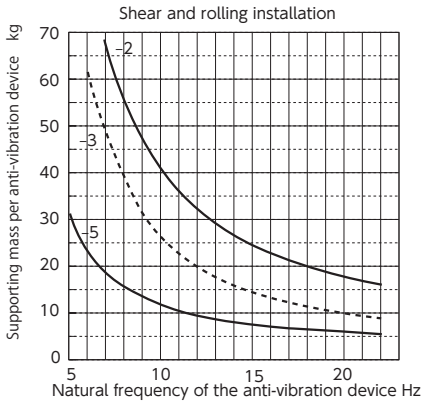
Installation Method

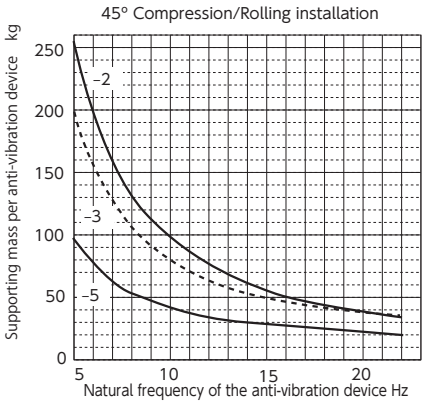


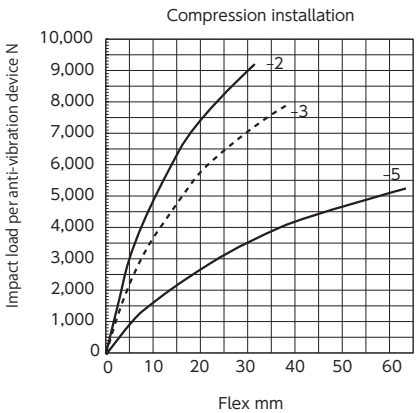

## Vibration Selection Graph

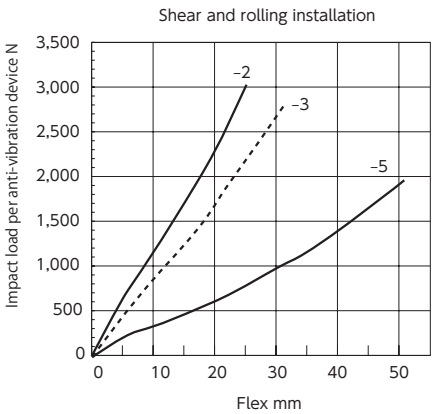


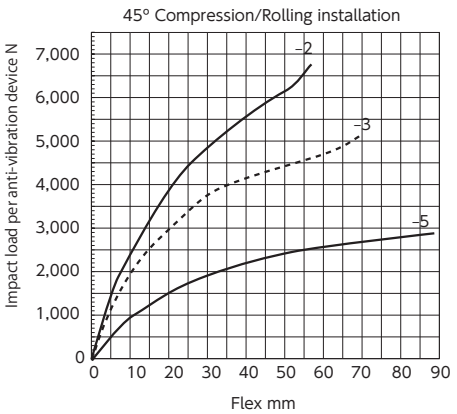




## Impact Selection Graph



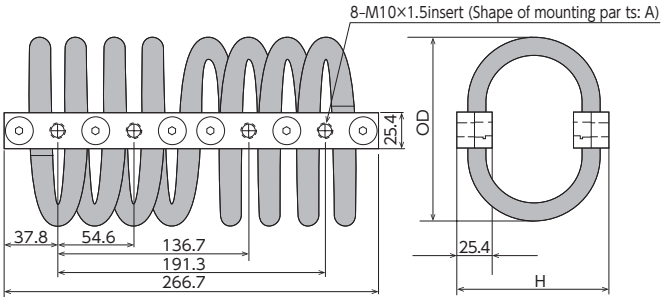
# Helical Vibration Absorber

Customized orders

## FHM08625

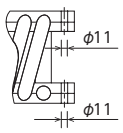
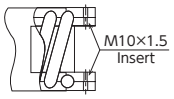
●Products specification might be changed without notice.

## Dimensions




| Model | H mm | OD mm | Mass kg |
|---|---|---|---|
| FHM08625-1 | 88.9 | 101.6 | 2.875 |
| FHM08625-3 | 109.2 | 134.6 | 3.592 |
| FHM08625-5 | 127.0 | 165.1 | 4.236 |

## Standard Shape of Mounting Parts and Maximum Flex

| Standard shape of mounting parts | |
|---|---|
| D | A |
|  |  |

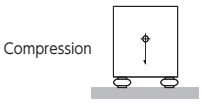


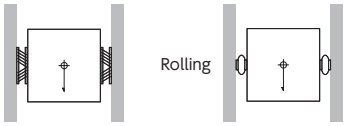
Please refer to page 208 if you require other shapes M6 × 1 for your mounting parts.

| Model | Max. flex mm | | |
|---|---|---|---|
| | Compression | Shear and rolling | 45° Compression /Rolling |
| FHM08625-1-□ | 30.5 | 30.5 | 45.7 |
| FHM08625-3-□ | 45.7 | 45.7 | 71.1 |
| FHM08625-5-□ | 63.5 | 63.5 | 91.4 |

□ will be filled in with the mounting type either A or D.

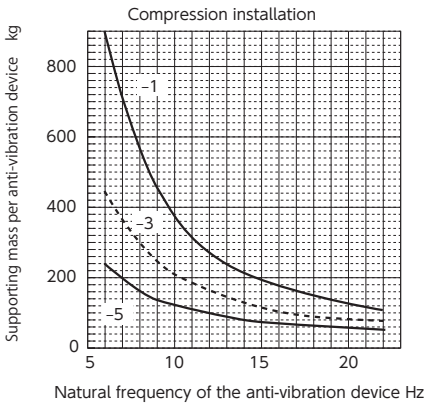
Installation Method

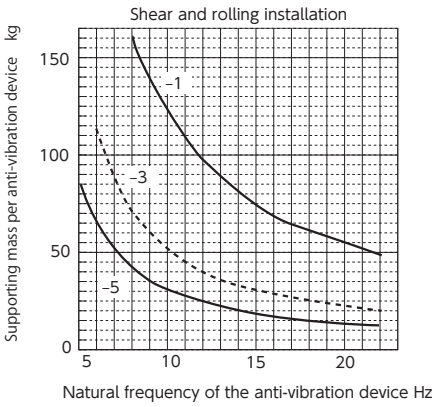


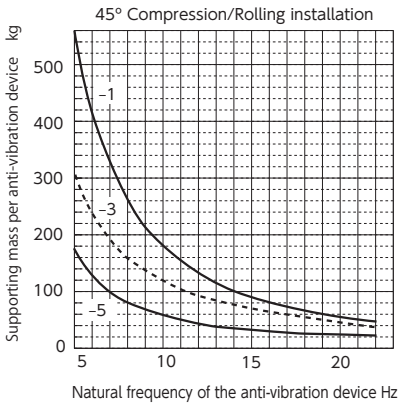





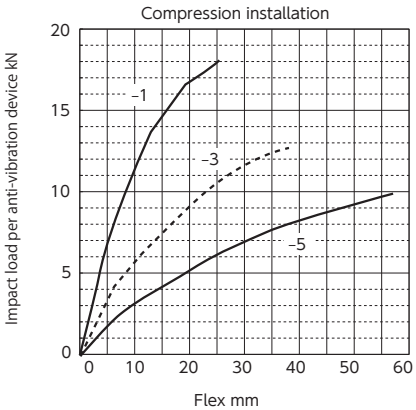
## Vibration Selection Graph

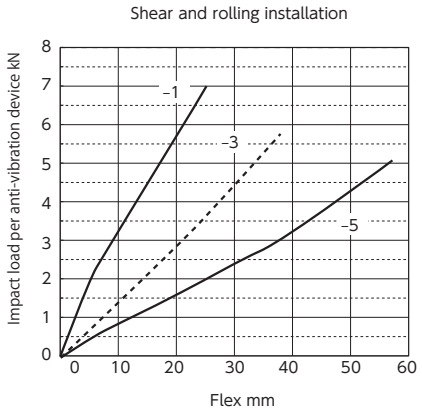


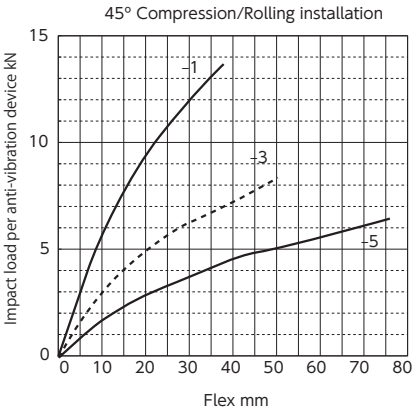




## Impact Selection Graph



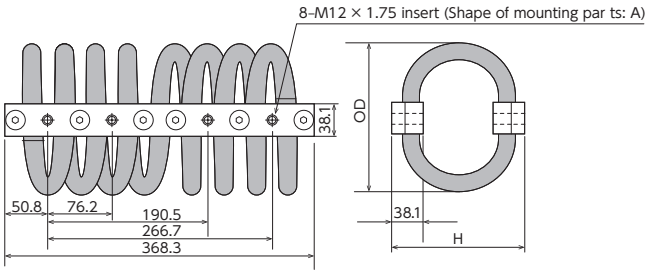
# Helical Vibration Absorber

Customized orders

## FHM08875

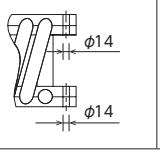
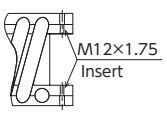
●Products specification might be changed without notice.

## Dimensions




| Model | H mm | OD mm | Mass kg |
|---|---|---|---|
| FHM08875-1 | 133.4 | 139.7 | 8.164 |
| FHM08875-3 | 158.8 | 177.8 | 9.525 |
| FHM08875-4 | 190.5 | 209.6 | 10.886 |

## Standard Shape of Mounting Parts and Maximum Flex

| Standard shape of mounting parts | |
|---|---|
| D | A |
|  |  |

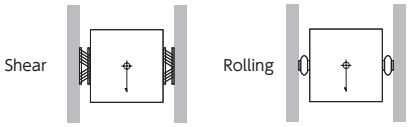


Please refer to page 208 if you require other shapes.

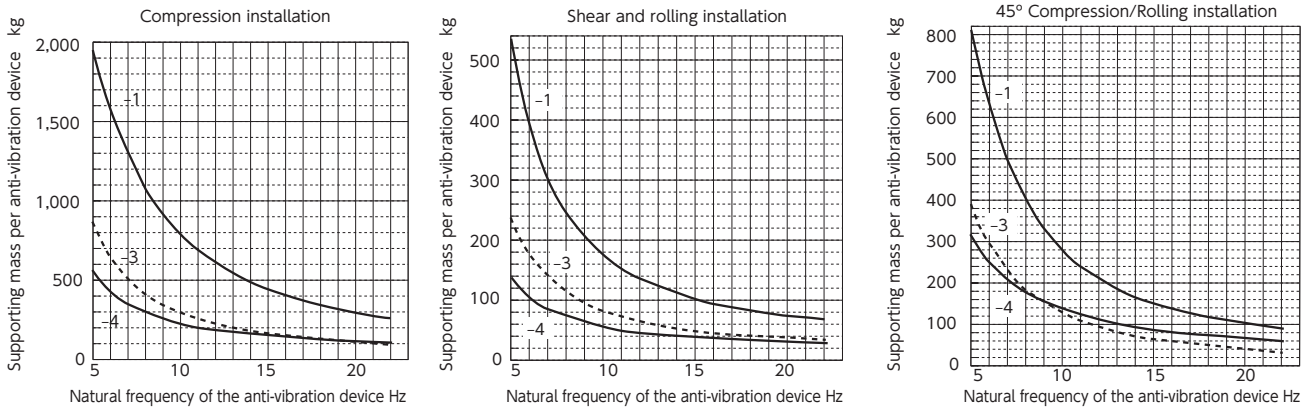
| Model | Max. flex mm | | |
|---|---|---|---|
| | Compression | Shear and rolling | 45° Compression / Rolling |
| FHM08875-1-□ | 50.8 | 53.3 | 63.5 |
| FHM08875-3-□ | 76.2 | 73.7 | 96.5 |
| FHM08875-4-□ | 91.4 | 83.8 | 119.4 |

□ will be filled in with the mounting type either A or D.

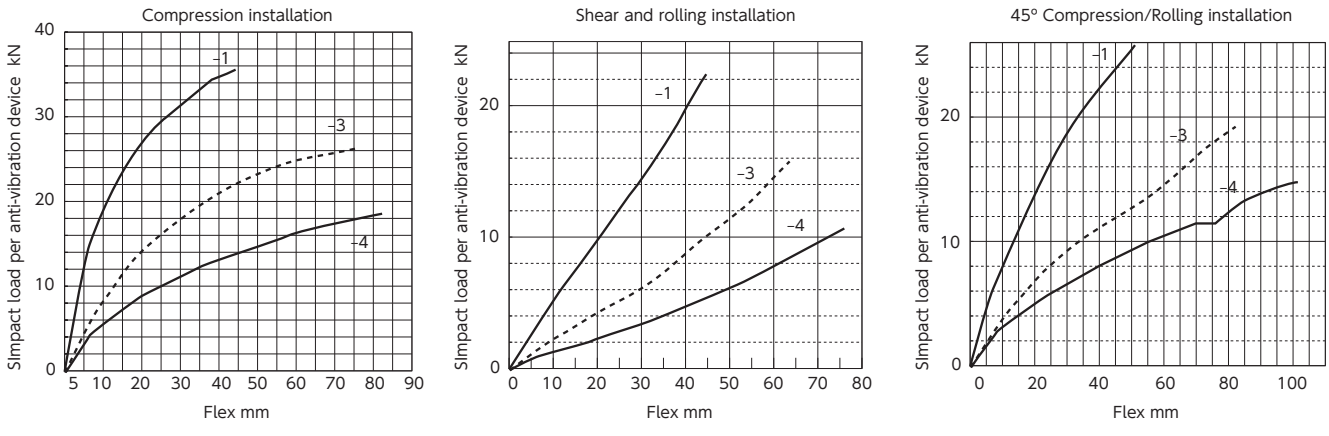
Installation Method


## Vibration Selection Graph




## Impact Selection Graph



# 6

# Model Selection Form

# Rotary Damper/Vane Damper Model Selection Form

1. Fill in an application of a rotary/vane damper (for what/how?)

2. Please draw a simple diagram of the mechanism/device in which you intend to install the soft absorber and the shape of the mounting parts.
[Machine/Device] [Shape of Mounting Parts]

3. Fill in the operating conditions for a rotary damper/vane damper
(The items that require no special designation are not required to be filled in.)
Conditions for Use

For Rotational Motion

| | | |
|---|---|---|
| Body Dimensions | D | mm |
| | W | mm |
| | H (thickness) | mm |
| Position of gravity center of the body | | |
| Angle for use | | degrees |
| Operating Duration | | sec |

For linear motion

| | |
|---|---|
| Body Moving Distance | mm |
| Body Moving Duration | sec |
| Driving Force | N |

| | |
|---|---|
| Body Mass | kg |
| Direction for Use | Horizontal Rotation Vertical Rotation Vertical Movement Horizontal Movement |
| Cycle of use cycle | cycle/min |
| Temperature for use | °C |
| Environment for use | Indoors Outdoors |

4. Fill in the required quantity (planned quantity for mass production)

| | |
|---|---|
| Your company's name | TEL |
| Division/Department | FAX |
| Representative's name | Adress |

Contact information : FUJI LATEX CO., LTD. International Department. TEL +81-03-3259-2530 FAX +81-03-3293-6070

# Soft Absorber Model Selection Form

## For Linear Movement

1. Please tell us your intended purpose for using a soft absorber. (What you intend to use it on and how?).

2. Please draw a simple diagram of the mechanism/device in which you intend to install the soft absorber and the shape of the mounting parts.
[Machine/Device] [Shape of Mounting Parts]

3. Please specify what kind of function and shape you would like to see in the soft absorber.
(You may skip this part if you do not have any particular preference)

Shape

| | | |
|---|---|---|
| Total length | | mm or less |
| Stroke | | mm |
| External diameter | Screw type | M × ((pitch) |
| | Non-screw type | ϕ or less |
| Cap | | Required · Not required |

Function

| | |
|---|---|
| Max. drag | or less |
| Deceleration | or less |
| Recovering power | or less |
| Braking time | |
| Adjustment Method | Fixed · Adjustable |

4. Please enter your impact conditions and usage environment.

Impact conditions

| | |
|---|---|
| Impact rate | m/s |
| Mass of the colliding object | Kg |
| External thrust | N |
| Operating cycle | times/minutes |
| Eccentric angle | degrees |
| Number of supports for soft absorber | pcs |

Operating direction

| | | |
|---|---|---|
| Horizontal | Friction coefficient $\mu$= | ∗1 |
| Perpendicular | Facing upward · Facing downward | |
| Slope | From the horizontal surface | ∗2 |

*1 Please enter if using a conveyer, etc.
*2 Positive value for downward direction

Using a cylinder

| | |
|---|---|
| Drive source | Pneumatic pressure · Hydraulic pressure |
| Internal diameter of the cylinder | ϕ |
| Pressure used | MPa |
| Number of units | units |

Usage environment

| | |
|---|---|
| Ambient temperature | ℃ |
| Contact with liquid | No · Yes |
| Contact with dust | No · Yes |
| Measures against copper ions | None · Exterior only · Full |

5. Please enter the number of units (expected number of mass-produced units) you require._____ units (Monthly · Single order)

| | |
|---|---|
| Your company's name | TEL |
| Division/Department | FAX |
| Representative's name | Adress |

Contact information : FUJI LATEX CO., LTD. International Department. TEL +81-03-3259-2530 FAX +81-03-3293-6070

# Soft Absorber Model Selection Form

## For Rotational Movement

1. Please tell us your intended purpose for using a soft absorber. (What you intend to use it on and how?).

2. Please draw a simple diagram of the mechanism/device in which you intend to install the soft absorber and the shape of the mounting parts.
[Machine/Device] [Shape of Mounting Parts]

3. Please specify what kind of function and shape you would like to see in the soft absorber.
(You may skip this part if you do not have any particular preference)

Shape

| | | |
|---|---|---|
| Total length | | mm or less |
| Stroke | | mm |
| External diameter | Screw type | M × ((pitch) |
| | Non-screw type | $\phi$ or less |
| Cap | | Required · Not required |

Function

| | |
|---|---|
| Max. drag | or less |
| Deceleration | or less |
| Recovering power | or less |
| Braking time | |
| Adjustment Method | Fixed · Adjustable |

4. Please enter your impact conditions and usage environment.

Impact conditions

| | |
|---|---|
| Colliding Speed | m/s |
| Colliding Mass | Kg |
| External Driving Force | N |
| Angular Velocity (fill in either one of these) | rad/s |
| | degrees in seconds |
| Moment of Inertia | |
| Driving Source Torque | |
| Driving Source Type | |
| Cycle of Use | cycle/min |
| Inclination Angle | degrees |
| Number of supports for soft absorber | pcs |

Operating direction

| | | |
|---|---|---|
| Direction of Rotation | Horizontal / Vertical / Inclined ( ° ) | |
| Position of Gravity Center | from rotating axle | mm |
| Stopping Position | from horizontal surface | ° ∗1 |
| Mounting Position | from rotating axle | mm |

∗1 Downward is positive.

Usage environment

| | |
|---|---|
| Ambient Temperature | ℃ |
| Adhesion of liquid, etc. | Present / Absent |
| Adhesion of power dust, etc. | Present / Absent |
| Countermeasures against copper ion | Present / Perfect |

* Please fill in only as far as you know in reference to the examples of selection calculation

5. Please fill in the required quantity (planned number for mass production) pcs (per month/only this time)

| | |
|---|---|
| Your company's name | TEL |
| Division/Department | FAX |
| Representative's name | Adress |

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# Helical Vibration Absorber Selection Form



1. Please specifically describe the applications for the helical vibration absorber

2. Please describe the schematic diagram of machine/equipment used
(H x W x D, position of gravity center, direction of gravity, planned position for installation, etc.)

3. Conditions for Use

| | | | | | |
|---|---|---|---|---|---|
| Installation Method (Please circle on either one) | | | Compression Shearing and roll 45° compression / roll | | |
| Mass of installed body | M | | | | kg |
| Quantity of used vibration absorber (excluding stabilizer) | n | | | | pcs |
| Quantity of use as a stabilizer | n | | | | pcs |
| Temperature for use | | | ℃ ～ ℃ | | |
| Other environmental conditions | | | | | |
| Absorption of Vibration | | | Absorption of Shock | | |
| Machine vibration frequency f | | Hz | Free falling height h | | m |
| Machine rotational speed N | | rpm | Allowable G value Ga | | G |
| | | | * Maximum G value Gmax G | | G |
| | | | * Applied duration of half sin acceleration input t | | S |
| Please fill in the required quantity (planned quantity for mass production) | | | pcs (per month/only this time) | | |

Note The symbol "*" stands for a case where the half sin acceleration is input

4. Requested Items

| Absorption of Vibration | | Absorption of Shock | |
|---|---|---|---|
| Allowable Deflection | mm | Allowable Deflection | mm |

| | |
|---|---|
| Your company's name | TEL |
| Division/Department | FAX |
| Representative's name | Adress |

Contact information : FUJI LATEX CO., LTD. International Department. TEL +81-03-3259-2530 FAX +81-03-3293-6070

FUJI LATEX CO., LTD.

Distributor :

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