

# CAUTION

## Read these instructions before use

### 1. About this owner's manual

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.

### 2. Definition 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.



## Caution

### ■ 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.

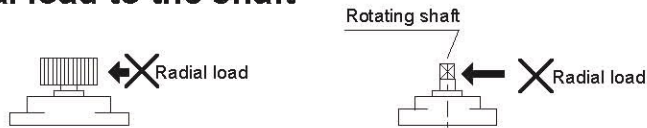
### ■ Usage environment

- This product cannot be used in a vacuum 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 necessary

- 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.

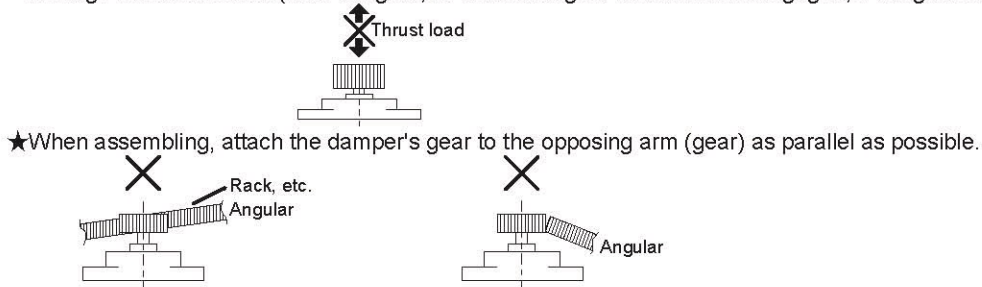
## ■ Radial load to the shaft



- 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.

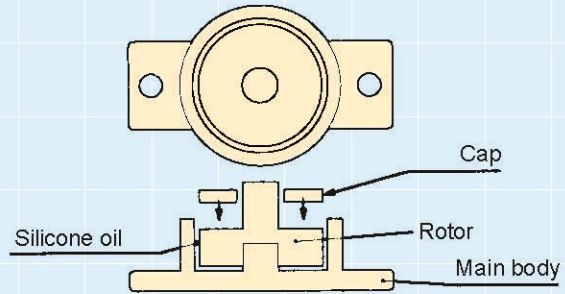
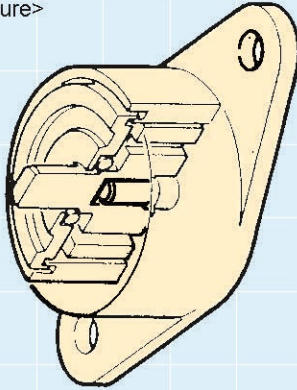
**Bansbach is not responsible for any secondary accidents caused by a rotary damper. The user should implement preventative measures against such secondary accidents.**



# Basic Structure and Principle

## 1. Rotary Damper

<Basic structure>



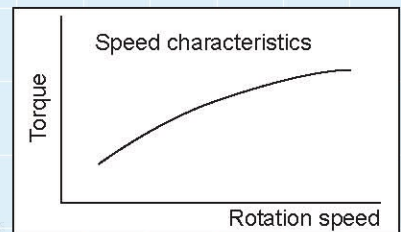
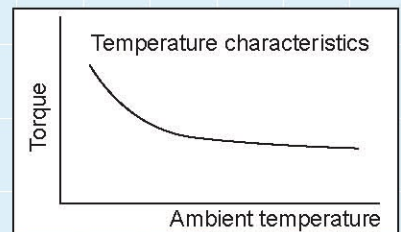
This is a rotary damper that utilizes the braking force generated by the oil's viscosity resistance. The braking force generated by oil viscosity, clearance between the rotor and the main body, and the oil's contact area varies based on the structure shown above.

### 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.

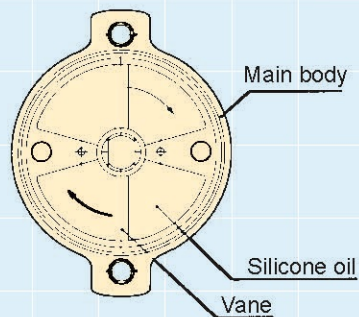
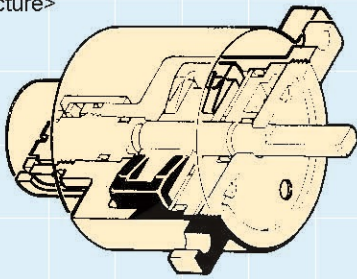
### 1-2) Speed characteristics

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.



## 2. Vane Damper

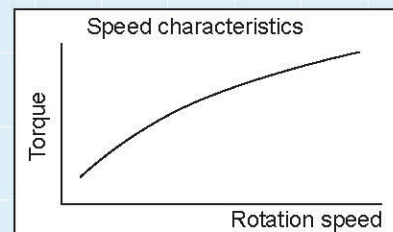
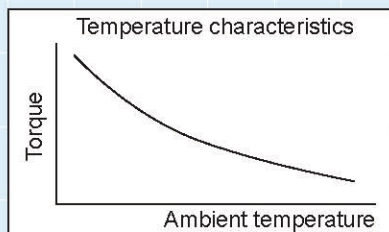
<Basic structure>



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 rotation speed increases, which consequently increases the torque.



## 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.

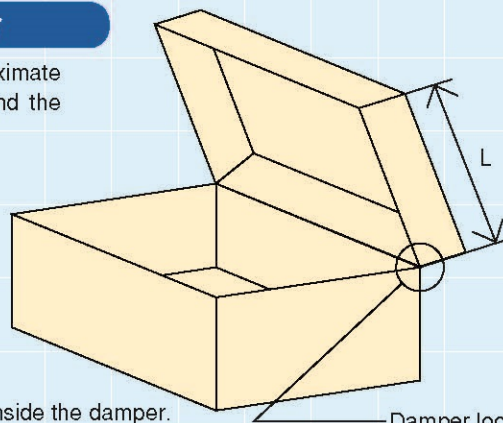
$$\text{Torque } T = \frac{L}{2} \times 9.8 \times M \text{ (N} \cdot \text{m)}$$

L : Dimensions of the lid (m)

M : Weight of the lid (kg)

Using the above equation, determine the maximum torque generated immediately prior to the closing of the lid. Use a prototype to confirm its performance in an actual machine, and determine the torque required.

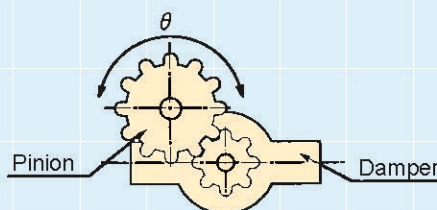
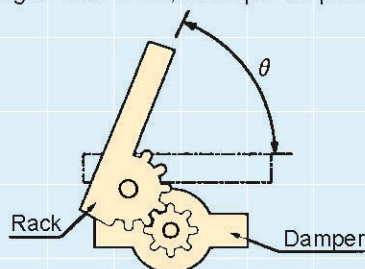
Fine adjustment of the torque can be done by varying the viscosity of the oil inside the damper.



Damper location

- 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.

If the gear ratio is 1:n, a damper torque that is n times the regular damper torque will be required.



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**

Series name

FRT : Bi-directional rotary damper

FRN : Uni-directional rotary damper

FDT : Bi-directional disc damper

FDN : Uni-directional disc damper

**F2**

Model name

**R**

Damping direction

**203**

Torque

**G**

With or without gear

G : With gear, Blank : without gear

The last digit indicates the power, and the torque is expressed as below.  
 $203 = 20 \times 10^3 = 20,000\text{gf} \cdot \text{cm}$   
 $= 20\text{kgf} \cdot \text{cm}$

R : Torque is generated in a clockwise direction

L : Torque is generated in a counter-clockwise direction

<Vane Damper>

**FYN**

Series name

FYT : Bi-directional vane damper

FYN : Uni-directional vane damper

**H1**

Model name

**R**

Damping direction

**104**

Torque

The last digit indicates the power, and the torque is expressed as below.  
 $104 = 10 \times 10^4 = 100,000\text{gf} \cdot \text{cm}$   
 $= 100\text{kgf} \cdot \text{cm}$

R : Torque is generated in a clockwise direction

L : Torque is generated in a counter-clockwise direction



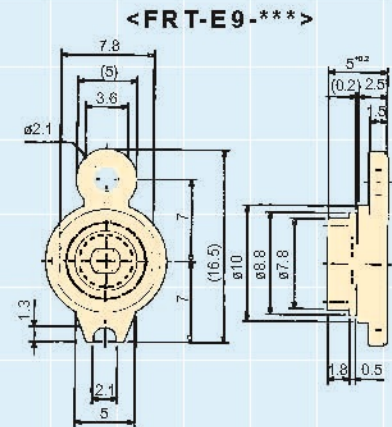
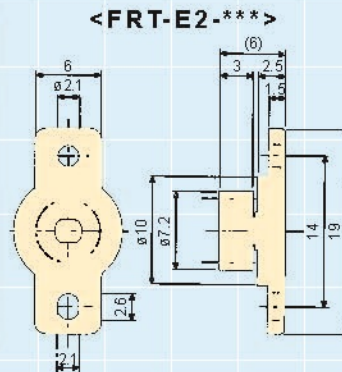
Soft Silent Safety

# FRT-E2/E9 Series

RoHS Compliant

Rotary Damper [Bi-Directional]

Fixed



## <Specifications>

Model	Rated torque
FRT-E2(E9)-100(G*)	$(1 \pm 0.5) \times 10^{-3}$ N·m (1.0 ± 5 gf·cm)
FRT-E2(E9)-200(G*)	$(2 \pm 0.7) \times 10^{-3}$ N·m (2.0 ± 7 gf·cm)
FRT-E2(E9)-300(G*)	$(3 \pm 0.8) \times 10^{-3}$ N·m (3.0 ± 8 gf·cm)
FRT-E2(E9)-400(G*)	$(4 \pm 1) \times 10^{-3}$ N·m (4.0 ± 10 gf·cm)

*Max. rotation speed	50rpm
*Max. cycle rate	10 cycle/min
*Operating temperature	0~50°C
*Weight	0.32g (with gear : 0.41g)
*Body and cap material	Polycarbonate (PC)
*Rotating shaft material	Polyacetal (POM)
*Gear material	Polyacetal (POM)
*Oil type	Silicone oil

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

Note 3) Torque can be customized by changing the oil viscosity (see Customizable Torque Chart on page 52)

Note 4) Model E9 is a customized product with a one-sided mounting

## Gear Specifications

	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

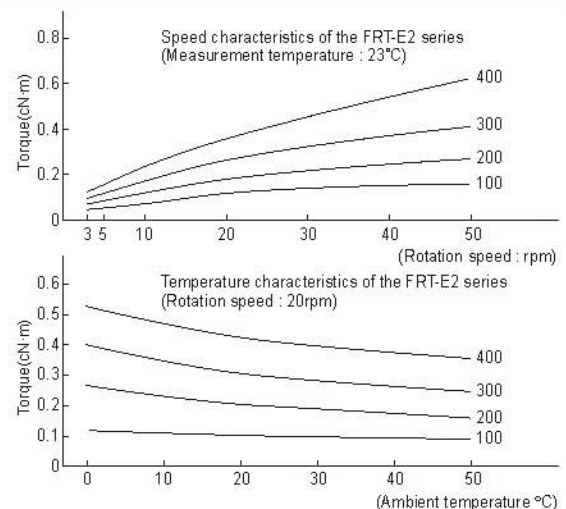
## Damper Characteristics

### 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.






### <Specifications>

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

- \*Max. rotation speed 50rpm
- \*Max. cycle rate 10 cycle/min
- \*Operating temperature 0~50°C
- \*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

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

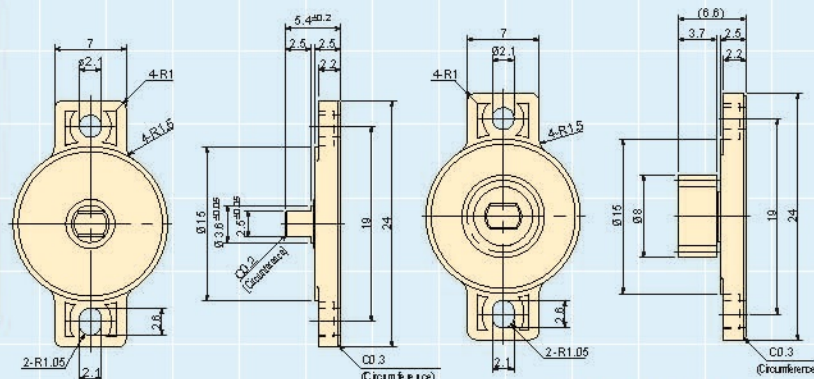
Note 2) Models with gear bears G1, G2, or G3 at the end of their model numbers

Note 3) Torque can be customized by changing the oil viscosity (see Customizable Torque Chart on page 52) 

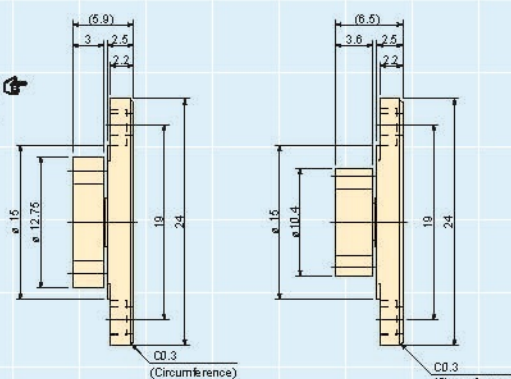
Note 4) The diagrams above are outline drawings of FRT-G2-\*\*\*. Please refer to the diagrams at the right for G2 and G3.

### 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 coefficient	—	+0.375	—



<FRT-G2-\*\*\*G1>



<FRT-G2-\*\*\*G2>

<FRT-G2-\*\*\*G3>

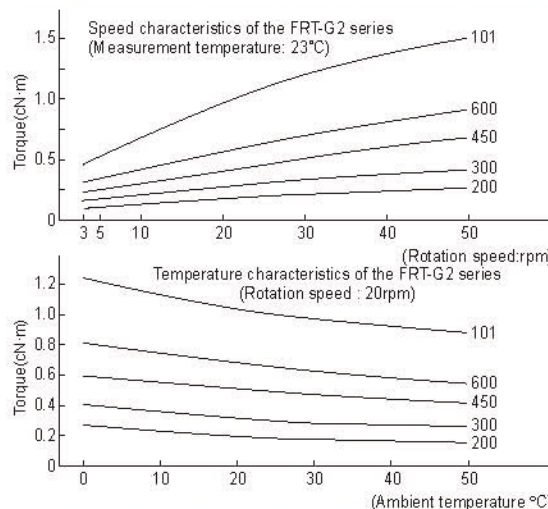
### Damper Characteristics

#### 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.



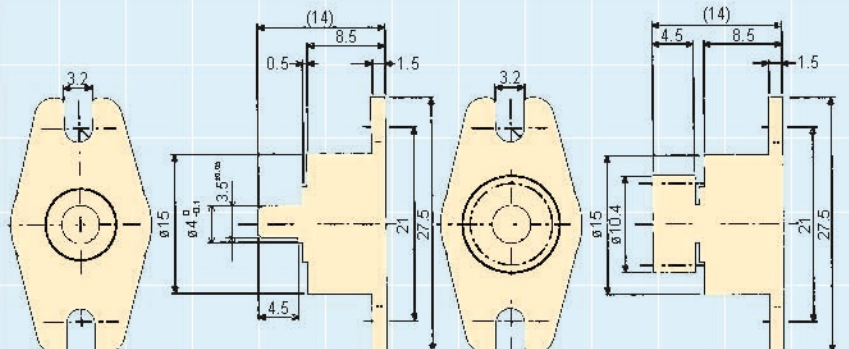


Soft Silent Safety

# FRT/FRN-C2 Series

RoHS Compliant

Rotary Damper [Bi-Directional] [Uni-Directional] Fixed



## <Specifications>

Model	Rated torque	Damping direction
FRT-C2-201(G1)	$(20 \pm 6) \times 10^{-3} \text{ N} \cdot \text{m}$ (200 ± 60 gf · cm)	Both directions
FRT-C2-301(G1)	$(30 \pm 8) \times 10^{-3} \text{ N} \cdot \text{m}$ (300 ± 80 gf · cm)	Both directions
FRN-C2-R301(G1)	$(30 \pm 8) \times 10^{-3} \text{ N} \cdot \text{m}$	Clockwise
FRN-C2-L301(G1)	$(300 \pm 80 \text{ gf} \cdot \text{cm})$	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 52)

*Max. rotation speed	50rpm
*Max. cycle rate	10 cycle/min
*Operating temperature	0~50°C
*Weight	FRT-C2 : 2.1g, FRN-C2 : 3.2g (with gear : +0.3g)
*Body and cap material	Polycarbonate (PC)
*Rotating shaft material	Polyacetal (POM), metal (only in FRN-C2-*301)
*Gear material	Polyacetal (POM)
*Oil type	Silicone oil

## Gear Specifications

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

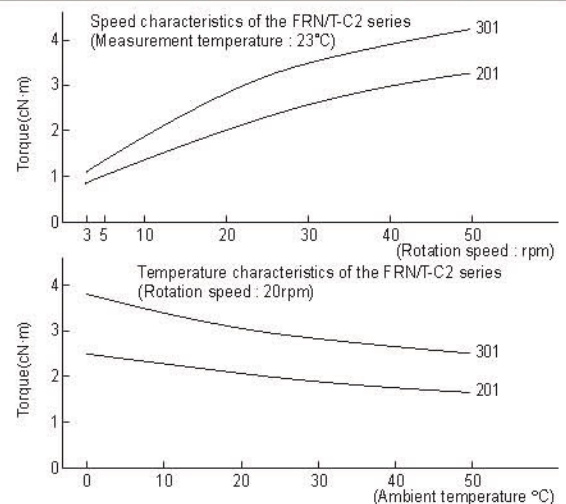
## Damper Characteristics

### 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.

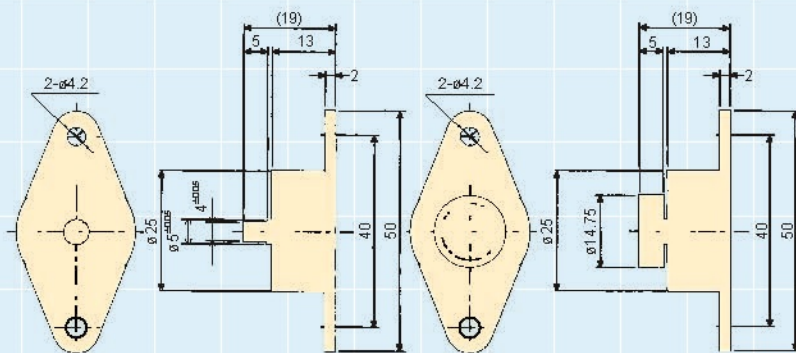




# FRT/FRN-D2 Series

RoHS Compliant

Rotary Damper [Bi-Directional] [Uni-Directional] Fixed



## <Specifications>

Model	Rated torque	Damping direction
FRT-D2-501(G2)	$(50 \pm 10) \times 10^{-3} \text{ N} \cdot \text{m}$ (500 ± 100 gf · cm)	Both directions
FRT-D2-102(G2)	$(100 \pm 20) \times 10^{-3} \text{ N} \cdot \text{m}$ (1000 ± 200 gf · cm)	Both directions
FRT-D2-152(G2)	$(150 \pm 30) \times 10^{-3} \text{ N} \cdot \text{m}$ (1500 ± 300 gf · cm)	Both directions
FRN-D2-R501(G2)	$(50 \pm 10) \times 10^{-3} \text{ N} \cdot \text{m}$ (500 ± 100 gf · cm)	Clockwise
FRN-D2-L501(G2)	$(50 \pm 10) \times 10^{-3} \text{ N} \cdot \text{m}$ (500 ± 100 gf · cm)	Counter-clockwise
FRN-D2-R102(G2)	$(100 \pm 20) \times 10^{-3} \text{ N} \cdot \text{m}$ (1000 ± 200 gf · cm)	Clockwise
FRN-D2-L102(G2)	$(100 \pm 20) \times 10^{-3} \text{ N} \cdot \text{m}$ (1000 ± 200 gf · cm)	Counter-clockwise
FRN-D2-R152(G2)	$(150 \pm 30) \times 10^{-3} \text{ N} \cdot \text{m}$ (1500 ± 300 gf · cm)	Clockwise
FRN-D2-L152(G2)	$(150 \pm 30) \times 10^{-3} \text{ N} \cdot \text{m}$ (1500 ± 300 gf · cm)	Counter-clockwise

*Max. rotation speed	50rpm
*Max. cycle rate	10 cycle/min
*Operating temperature	0~50°C
*Weight	FRT-D2 : 8.3g, FRN-D2 : 11.8g (with gear: +0.8g)
*Body and cap material	Polycarbonate (PC)
*Rotating shaft material	Polyacetal, metal (FRT: POM, FRN: SUS)
*Gear material	Polyacetal (POM)
*Oil type	Silicone oil

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

Note 2) Gear model number has G2 at the end

Note 3) Torque can be customized by changing the oil viscosity (see Customizable Torque Chart on page 52)

## Gear Specifications

Type	Profile shifted spur gear
Tooth profile	Involute
Module	1.0
Pressure angle	20°
Number of teeth	12
Pitch circle diameter	ø12
Addendum modification coefficient	+0.375

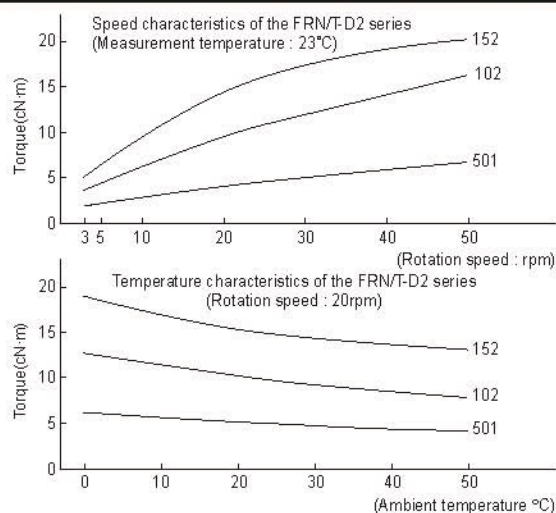
## Damper Characteristics

### 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

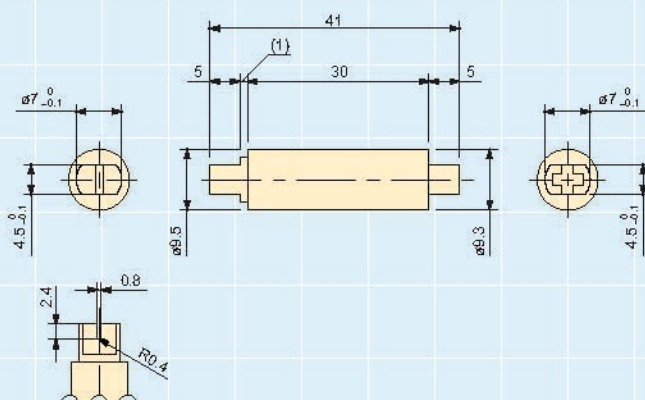
A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the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





## Rotary Damper [Bi-Directional]

## Fixed



Model	Rated torque
FRT-S1-201	$(20 \pm 6) \times 10^{-3} \text{ N} \cdot \text{m}$ ( 2 0 0 $\pm$ 6 0 g f $\cdot$ c m )
FRT-S1-301	$(30 \pm 8) \times 10^{-3} \text{ N} \cdot \text{m}$ ( 3 0 0 $\pm$ 8 0 g f $\cdot$ c m )

(See Customizable Torque Chart on page 52.) 

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

**Speed characteristics of the FRT-S1 series**  
(Measurement temperature : 23°C)

Rotation speed (rpm)	Torque (cN·m) for 301	Torque (cN·m) for 201
5	1.4	1.0
10	2.2	1.4
20	3.1	2.0
30	3.6	2.3
40	3.9	2.5
50	4.1	2.6

**Temperature characteristics of the FRT-S1 series**  
(Rotation speed : 20rpm)

Ambient temperature (°C)	Torque (cN·m) for 301	Torque (cN·m) for 201
0	4.5	3.0
10	3.8	2.6
20	3.2	2.1
30	2.9	1.9
40	2.7	1.8
50	2.6	1.7



# FRT-N1 Series

RoHS Compliant

Rotary Damper [Bi-Directional]

Fixed



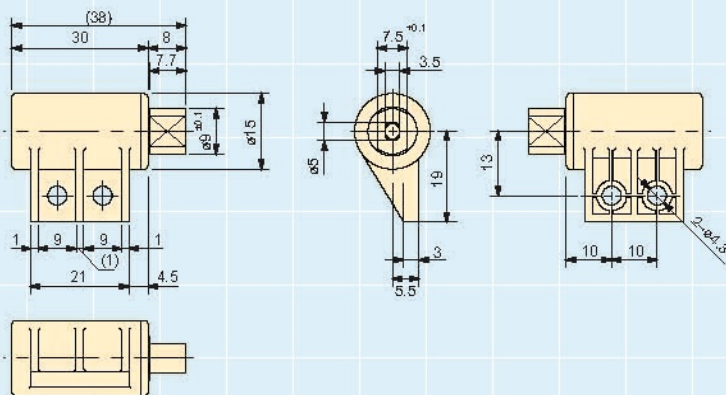
## <Specifications>

Model	Rated torque
FRT-N1-102	$(100 \pm 20) \times 10^{-3} \text{ N} \cdot \text{m}$ $(1000 \pm 200 \text{ gf} \cdot \text{cm})$
FRT-N1-182	$(180 \pm 36) \times 10^{-3} \text{ N} \cdot \text{m}$ $(1800 \pm 360 \text{ gf} \cdot \text{cm})$

Note 1) Rated torque measured at a rotational speed of 20 rpm at 23°C

Note 2) Torque can be customized by changing the oil viscosity.

(See Customizable Torque Chart on page 52.)



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

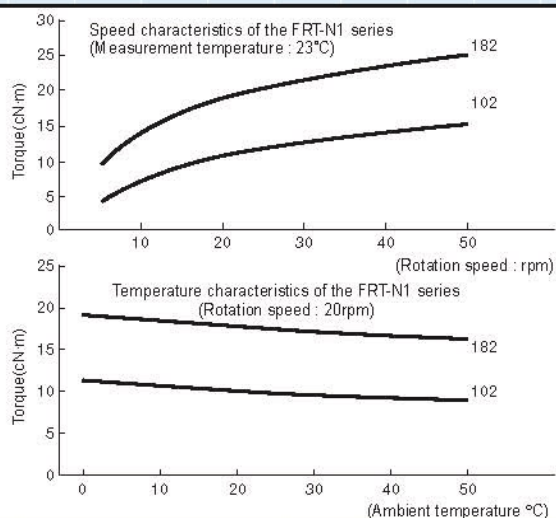
## Damper Characteristics

### 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

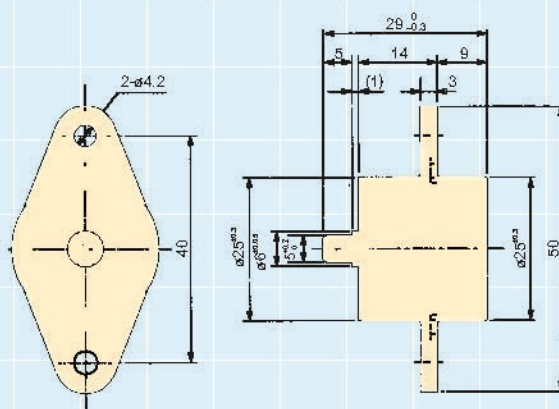
A rotary damper's torque varies according to the ambient temperature. In addition, as shown in the graph to the right, the torque decreases as the ambient temperature increases, and the torque increases as the ambient temperature decreases. This is because the viscosity of the silicone oil inside the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





## Rotary Damper [Bi-Directional]

## Fixed



Model	Rated torque
FRT-L1-202	$(200 \pm 40) \times 10^{-3} \text{ N} \cdot \text{m}$ (2000 ± 400 gf · cm)
FRT-L1-302	$(300 \pm 60) \times 10^{-3} \text{ N} \cdot \text{m}$ (3000 ± 600 gf · cm)

*Max. rotation speed	50rpm
*Max. cycle rate	10 cycle/min
*Operating temperature	0~50°C
*Weight	14.1g
*Body and cap material	Polycarbonate (PC)
*Rotating shaft material	Polyacetal (POM)
*Oil type	Silicone oil

**Speed characteristics of the FRT-L1 series (Measurement temperature : 23°C)**

Rotation speed (rpm)	Torque (cN·m) at 302	Torque (cN·m) at 202
3	11	8
5	14	10
10	20	14
20	30	20
30	35	24
40	38	26
50	40	28

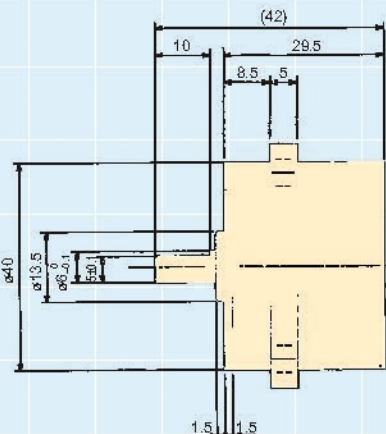
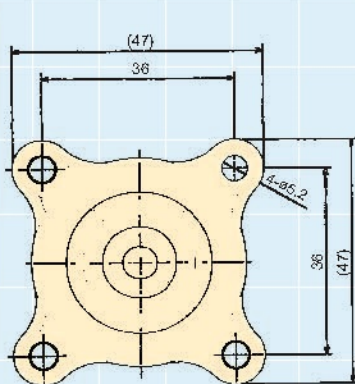
**Temperature characteristics of the FRT-L1 series (Rotation speed : 20rpm)**

Ambient temperature (°C)	Torque (cN·m) at 302	Torque (cN·m) at 202
0	37	24
10	34	22
20	32	20
30	30	19
40	28	18
50	28	18

# FRT/FRN-K2 Series

RoHS Compliant


Rotary Damper [Bi-Directional] [Uni-Directional] Fixed



## <Specifications>

Model	Rated torque	Damping direction
FRT-K2-103	$1 \pm 0.2 \text{ N} \cdot \text{m}$ ( $10 \pm 2 \text{ kgf} \cdot \text{cm}$ )	Both directions
FRN-K2-R103	$1 \pm 0.2 \text{ N} \cdot \text{m}$	Clockwise
FRN-K2-L103	( $10 \pm 2 \text{ kgf} \cdot \text{cm}$ )	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 Customizable Torque Chart on page 52) 

Note 3) Dampers with gear can also be custom ordered.

Note 4) FRT/N-K2 series is a modified series of the FRT/N-K1 series to accommodate bearings

- \*Max. rotation speed 50rpm
- \*Max. cycle rate 10 cycle/min
- \*Operating temperature 0~50°C
- \*Weight FRT-K2 : 78.3g, FRN-K2 : 56.6g
- \*Body and cap material Polycarbonate + glass fiber
- \*Rotating shaft material Metal (SUS)
- \*Oil type Silicone oil

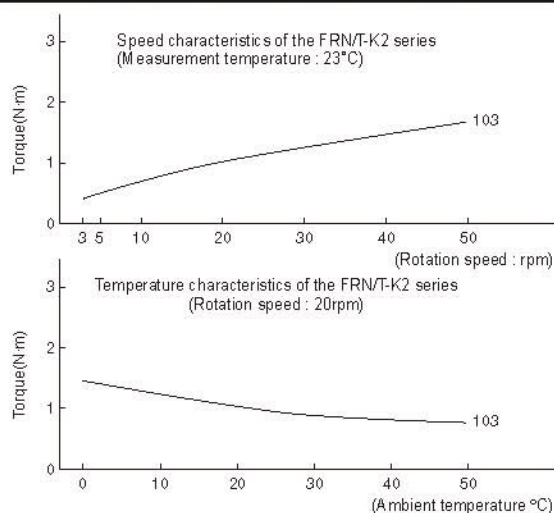
## Damper Characteristics

### 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.

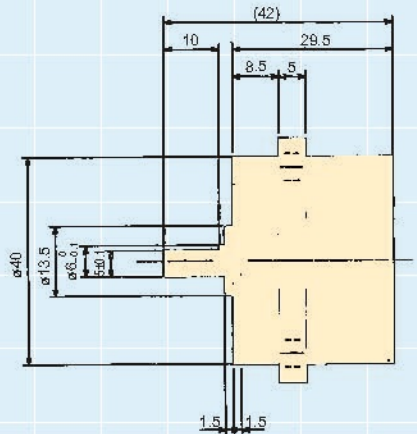
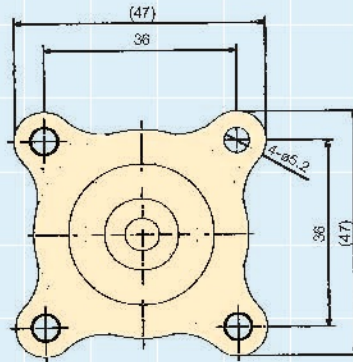




# FRT/FRN-F2 Series

RoHS Compliant

Rotary Damper [Bi-Directional] [Uni-Directional] Fixed



## <Specifications>

Model	Rated torque	Damping direction
FRT-F2-203	$2 \pm 0.4 \text{ N} \cdot \text{m}$ ( $20 \pm 4 \text{ kgf} \cdot \text{cm}$ )	Both directions
FRT-F2-303	$3 \pm 0.8 \text{ N} \cdot \text{m}$ ( $30 \pm 8 \text{ kgf} \cdot \text{cm}$ )	Both directions
FRT-F2-403	$4 \pm 1 \text{ N} \cdot \text{m}$ ( $40 \pm 10 \text{ kgf} \cdot \text{cm}$ )	Both directions
FRN-F2-R203	$2 \pm 0.4 \text{ N} \cdot \text{m}$	Clockwise
FRN-F2-L203	( $20 \pm 4 \text{ kgf} \cdot \text{cm}$ )	Counter-clockwise

*Max. rotation speed	50rpm
*Max. cycle rate	10 cycle/min
*Operating temperature	0~50°C
*Weight	FRT-F2 : 115.6g, FRN-F2 : 93.2g
*Body and cap material	Polycarbonate + glass fiber
*Rotating shaft material	Metal (SUS)
*Oil type	Silicone oil

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 Customizable Torque Chart on page 52)

Note 3) Dampers with gear can also be custom ordered.

Note 4) FRT/N-F2 series is a modified series of the FRT/N-F1 series to accommodate bearings

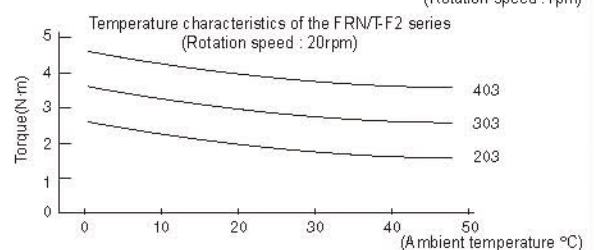
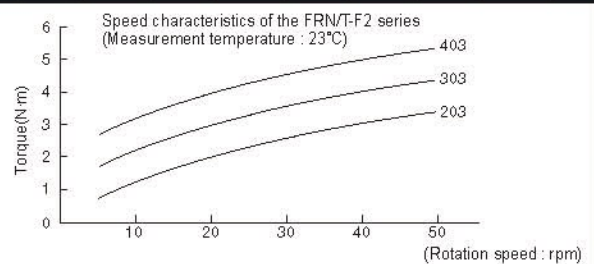
## Damper Characteristics

### 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.



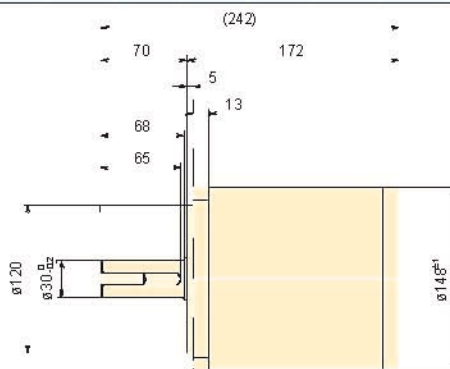
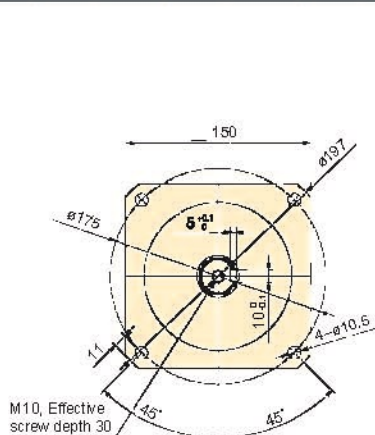


## <Specifications>

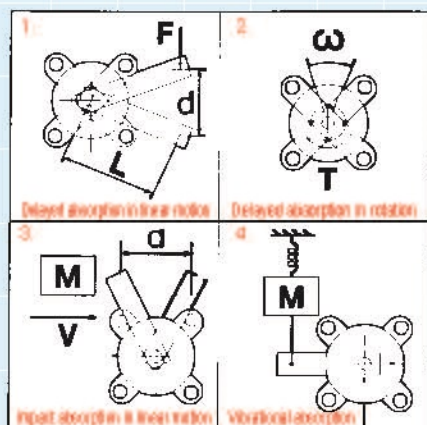
Model	Rated torque
FRT-SB1	360 ± 120 N·m/(rad/sec)

Note 1) Measured at 23°C±2°C

*Operating temperature	-20~60℃
*Weight	11.5 ± 0.5 kg
*Rotating shaft	Iron
*Cap, bottom	Aluminum
*Main body	Iron
*Oil type	Silicone oil



### <How to Calculate the Damping Constant>



- |  |  |
|--|--|
| <p><b>1. Delayed absorption in linear motion</b></p> <p>Formula (N·m/(rad/sec)) = <math>\frac{FL^2t}{d}</math></p> | <p>F = Force or mass applied to the lever tip (N)</p> <p>L = Distance between the centre of the damper shaft and the lever's point of application (m)</p> <p>d = Distance travelled by lever (m)</p> <p>t = Travelling time of the lever (sec)</p> |
| <p><b>2. Delayed absorption in rotation</b></p> <p>Formula (N·m/(rad/sec)) = <math>\frac{T}{\omega}</math></p>     | <p>T = Torque applied to shaft (N·m)</p> <p>ω = Angular velocity(rad/sec)</p>  |
| <p><b>3. Impact absorption in linear motion</b></p> <p>Formula (N·m/(rad/sec)) = <math>\frac{MVL^2}{d}</math></p>  | <p>M = Mass(kg)</p> <p>V = Velocity(m/sec)</p> <p>L = Distance between the centre of the damper shaft and the lever's point of application (m)</p> <p>d = Distance travelled by lever (m)</p>  |
| <p><b>4. Vibrational absorption</b></p> <p>Formula (N·m/(rad/sec)) = <math>\frac{MfL^2}{0.08}</math></p>           | <p>M = Mass(kg)</p> <p>f = Vibrational frequency(Hz)</p> <p>L = Distance between the centre of the damper shaft and the lever's point of application (m)</p>   |

<Possible application>

### Anti-vibration damper for Ferris wheel gondolas



# FRN-P2 Series

RoHS Compliant

Rotary Damper [Uni-Directional] Adjustable



*Max. rotation speed	50rpm	*Body and cap material	PBT
*Max. cycle rate	10 cycle/min	*Rotating shaft material	SUS
*Operating temperature	0~50°C	*Gear, adjustment knob	POM
*Weight	84g	*Oil type	Silicone oil

## <Specifications>

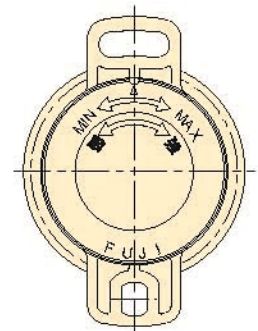
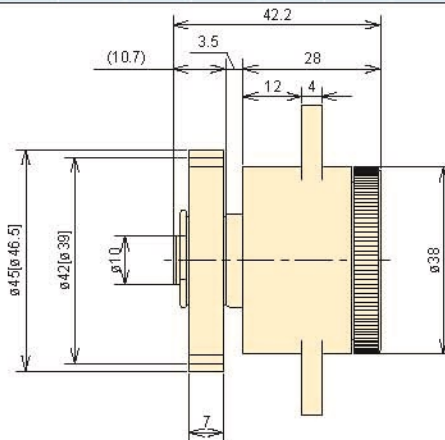
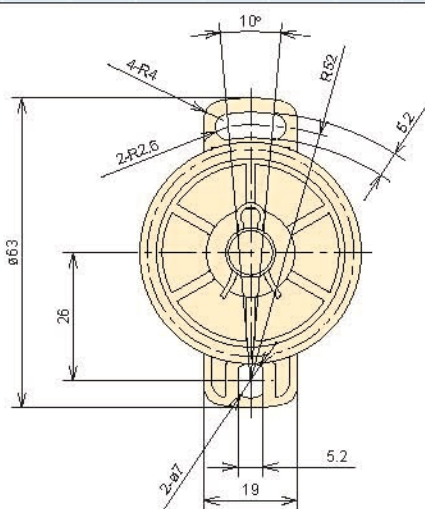
Model	Rated torque	Damping direction
FRN-P2-R202(G*)	0.20±0.04 N·m (2.0±0.4 kgf·cm)	Clockwise direction
FRN-P2-L202(G*)		Counterclockwise direction
FRN-P2-R102(G*)	0.10±0.02 N·m (1.0±0.2 kgf·cm)	Clockwise direction
FRN-P2-L102(G*)		Counterclockwise direction
FRN-P2-R501(G*)	0.05±0.01 N·m (0.5±0.1 kgf·cm)	Clockwise direction
FRN-P2-L501(G*)		Counterclockwise direction

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

## Gear Specifications

	G1	*G2
Type	Standard spur gear	
Tooth profile	Involute	
Module	1.5	3.0
Pressure angle	20°	
Number of teeth	28	13
Pitch circle diameter	ø42	ø39
Addendum modification coefficient	—	+0.25

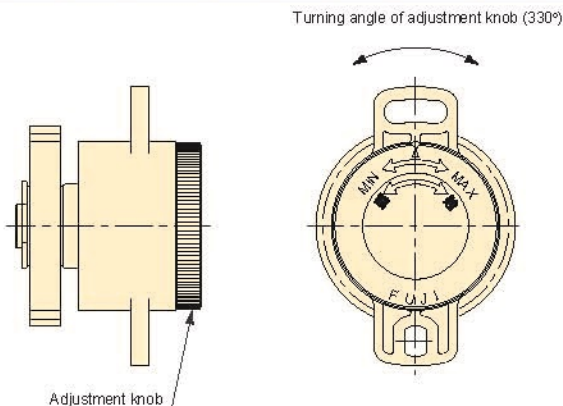
\*G2 – Available soon



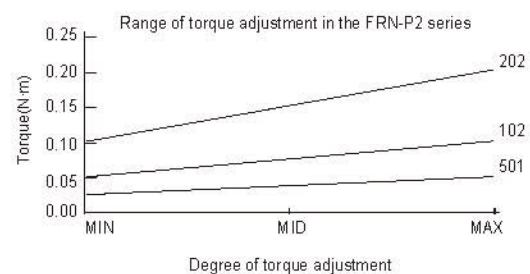
Dimensions of G2 gear are in [ ]

## How to Adjust Torque

## Range of Torque Adjustment



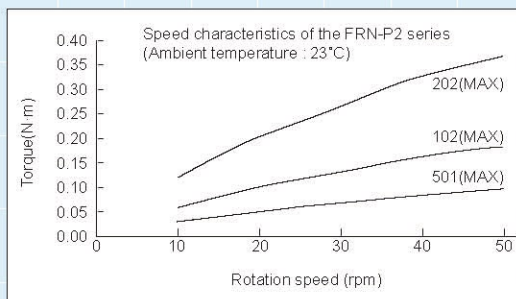
Turn the adjustment knob clockwise to increase damper torque and counterclockwise to decrease it.



### Damper Characteristics

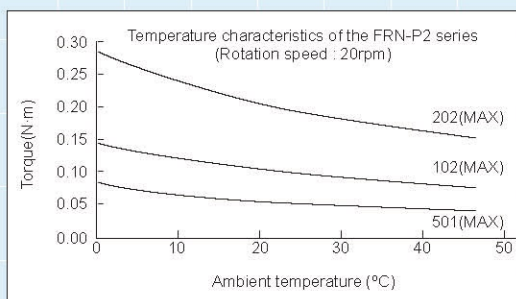
#### 1. Speed characteristics

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. Torque at 20rpm is shown in this catalogue. In addition, please note that the starting torque slightly differs from the rated torque.

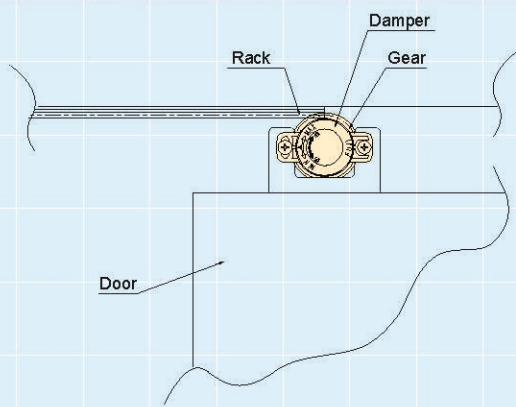


#### 2. Temperature characteristics

A rotary damper's torque varies according to the ambient temperature. In general, as shown in the graph to the right, the torque decreases as the temperature increases, 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.



### Example of Using a Damper

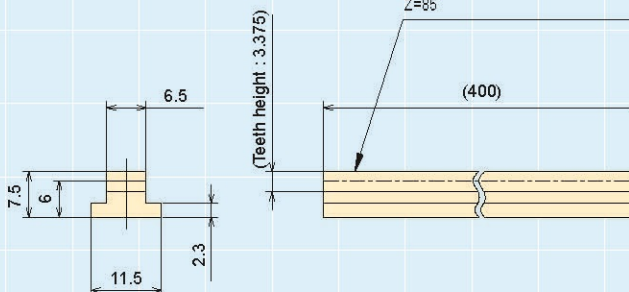


Application of the FRN-P2 Series

### Option Rack

G1 Rack : ROP-020P2-1

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





# FDT-47A/FDN-47A Series

RoHS Compliant

Disk Damper [Bi-Directional] [Uni-Directional] Fixed

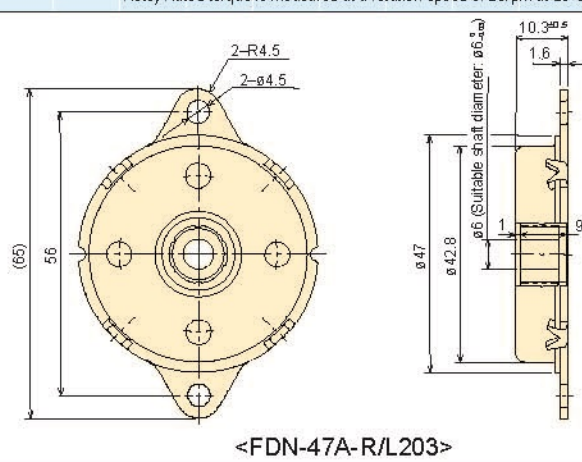
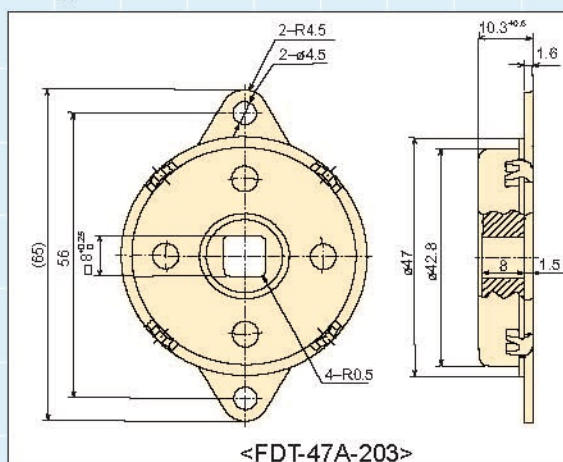


*Max. rotation speed	50rpm
*Max. cycle rate	12 cycle/min
*Operating temperature	-10~50°C
*Weight	FDT-47A : 50g, FDN-47A : 55g
*Main body material	Iron (SPFC)
*Rotor (shaft) material	Nylon (with glass)
*Oil type	Silicone oil

## <Specifications>

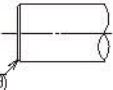
Model	Rated torque	Damping direction
FDT-47A-103	1±0.2N·m (10±2 kgf·cm)	Both directions
FDT-47A-163	1.6±0.3N·m (16±3 kgf·cm)	Both directions
FDT-47A-203	2±0.3N·m (20±3 kgf·cm)	Both directions
FDN-47A-R103	1±0.2N·m (10±2 kgf·cm)	Clockwise
FDN-47A-L103	1±0.2N·m (10±2 kgf·cm)	Counter-clockwise
FDN-47A-R163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

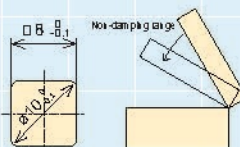
Note) Rated torque is measured at a rotation speed of 20rpm at 23°C±3°C



## How to Use the Damper

- Dampers may generate torque in both directions, clockwise, or counter-clockwise.
- Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
- 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	ø6 <sub>-0.03</sub>
Surface hardness	HRC55 or higher
Quenching depth	0.5mm or higher
Surface roughness	1.0Z or lower
Chamfer end (Damper insertion side)	 R0.2-R0.3 (or R0.2-R0.3)
- 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 one-way clutch.)
- 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.
 

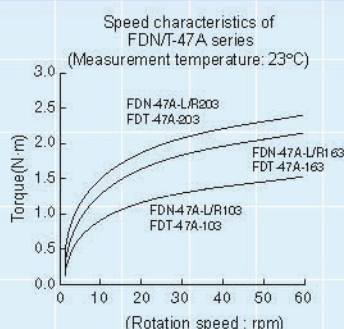


<Recommended dimensions for the corresponding shaft>

## Damper Characteristics

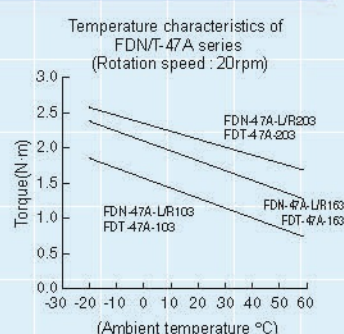
### 1. Speed characteristics

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.



# FDT-57A/FDN-57A Series

RoHS Compliant

Disk Damper [Bi-Directional] [Uni-Directional] Fixed

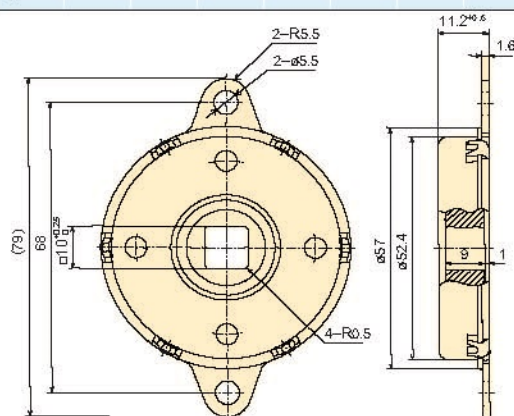


- \*Max. rotation speed 50rpm
- \*Max. cycle rate 12 cycle/min
- \*Operating temperature  $-10\sim 50^{\circ}\text{C}$
- \*Weight FDT-57A : 75g, FDN-57A : 94g
- \*Main body material Iron (SPFC)
- \*Rotor (shaft) material Nylon (with glass)
- \*Oil type Silicone oil

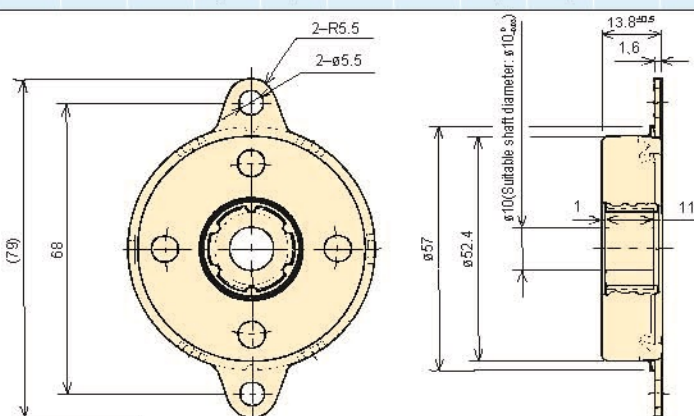
## <Specifications>

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

Note) Rated torque is measured at a rotation speed of 20rpm at  $23^{\circ}\text{C}\pm 3^{\circ}\text{C}$



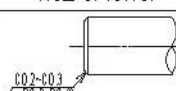
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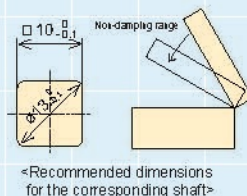
<FDN-57A-R/L553>

## How to Use the Damper

- Dampers may generate torque in both directions, clockwise, or counter-clockwise.
- Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
- 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	$\phi 10_{-0.03}^{+0.03}$
Surface hardness	HRC55 or higher
Quenching depth	0.5mm or higher
Surface roughness	1.0Z or lower
Chamfer end (Damper insertion side)	 $C0.2\sim C0.3$ (or R0.2~R0.3)

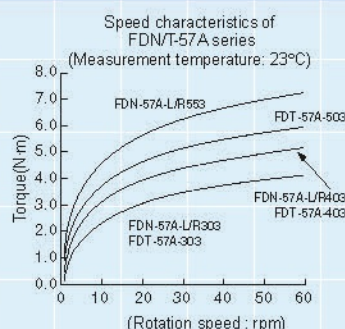
- To insert a shaft into FDN-57A, insert the shaft while spinning it in the idling direction of the one-way clutch. (Do not force the shaft in from the regular direction. This may damage the one-way clutch.)
- When using FDT-57A, please ensure that a shaft with specified angular dimensions is inserted 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.



## Damper Characteristics

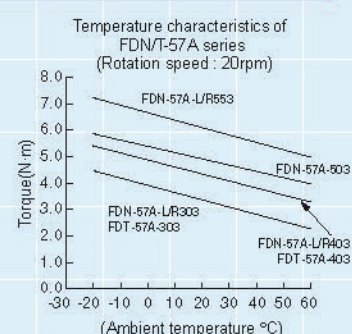
### 1. Speed characteristics

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.





# FDT-63A/FDN-63A Series

RoHS Compliant

Disk Damper [Bi-Directional] [Uni-Directional] Fixed

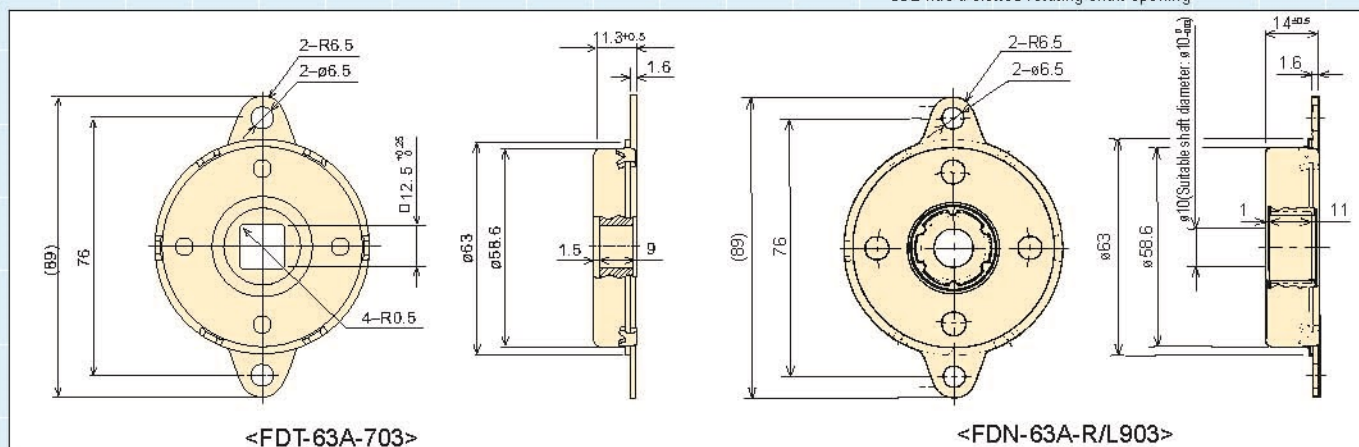


*Max. rotation speed	50rpm
*Max. cycle rate	12 cycle/min
*Operating temperature	-10~50°C
*Weight	FDT-63A : 92g, FDN-63A : 115g
*Main body material	Iron (SPFC)
*Rotor (shaft) material	Nylon (with glass)
*Oil type	Silicone oil

## <Specifications>

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

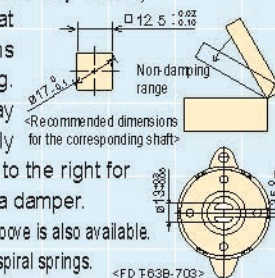
Note) Rated torque is measured at a rotation speed of 20rpm at 23°C±3°C  
63B has a slotted rotating shaft opening



## How to Use the Damper

- Dampers may generate torque in both directions, clockwise, or counter-clockwise.
- Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
- 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.
- 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.)
- 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.
- A damper shaft connecting to a part with slotted groove is also available. The slotted groove type is excellent for usage with spiral springs.

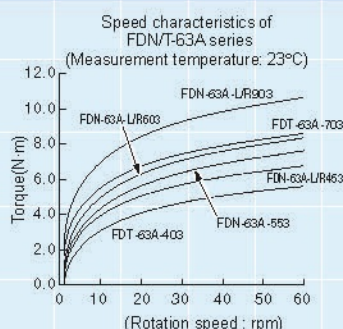
Shaft's external dimensions	ø10 <sub>-0.03</sub>
Surface hardness	HRC55 or higher
Quenching depth	0.5mm or higher
Surface roughness	1.0Z or lower
Chamfer end (Damper insertion side)	 R0.2-R0.3 (or R0.2-R0.3)



## Damper Characteristics

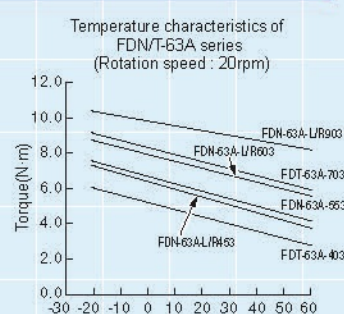
### 1. Speed characteristics

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.





Soft Silent Safety

# FDT-70A/FDN-70A Series

RoHS Compliant

Disk Damper [Bi-Directional] [Uni-Directional] Fixed



## <Specifications>

Model	Rated torque	Damping direction
FDT-70A-903	8.7±0.8 N·m (87±8.0 kgf·cm)	Both directions
FDT-70B-903		
FDN-70A-R114	11±1.1 N·m (110±11 kgf·cm)	Clockwise
FDN-70A-L114		Counter-clockwise

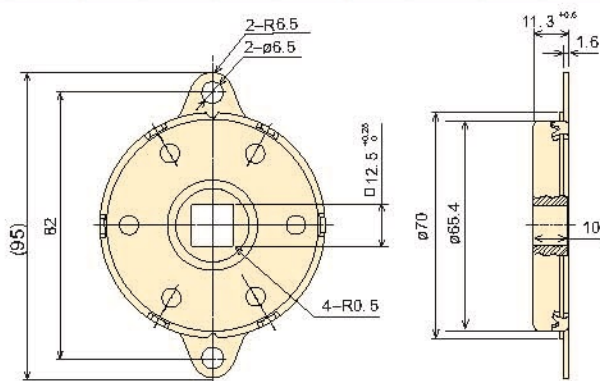
Note) Rated torque is measured at a rotation speed of 20rpm at 23°C±3°C  
70B has a slotted rotating shaft opening

*Max. rotation speed	50rpm
*Max. cycle rate	12 cycle/min
*Operating temperature	-10~50°C
*Weight	FDT-70A : 112g, FDN-70A : 136g
*Main body material	Iron (SPFC)
*Rotor (shaft) material	Nylon (with glass)
*Oil type	Silicone oil

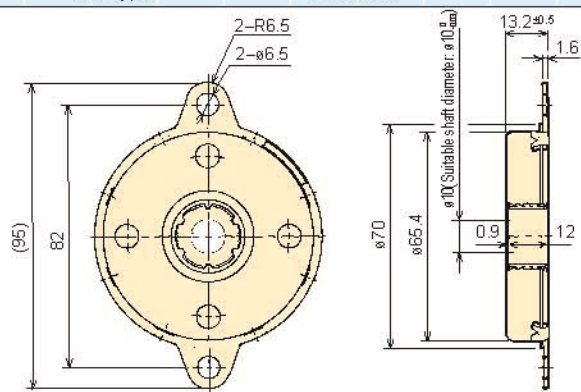
1. Rotary Damper

2. Soft Absorber

3. Model Selection Form



<FDT-70A-903>



<FDN-70A-R/L114>

## How to Use the Damper

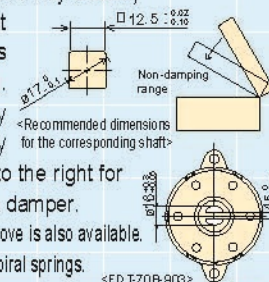
1. Dampers may generate torque in both directions, clockwise, or counter-clockwise.
2. Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.

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.

Shaft's external dimensions	ø10 <sub>-0.03</sub>
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 (or R0.2~R0.3)

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.)

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.



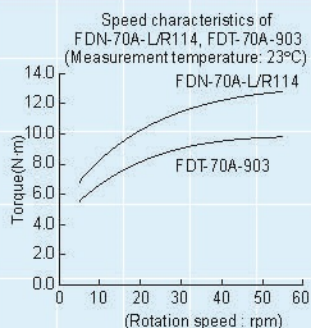
6. A damper shaft connecting to a part with slotted groove is also available. The slotted groove type is excellent for usage with spiral springs.

<FDT-70B-903>

## Damper Characteristics

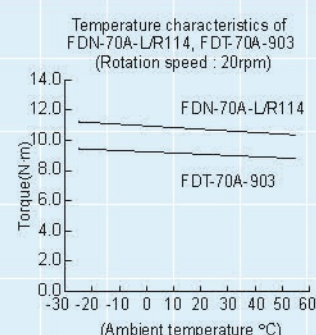
### 1. Speed characteristics

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.





# FYN-M1 Series

RoHS Compliant

Vane Damper [Uni-Directional]

Fixed

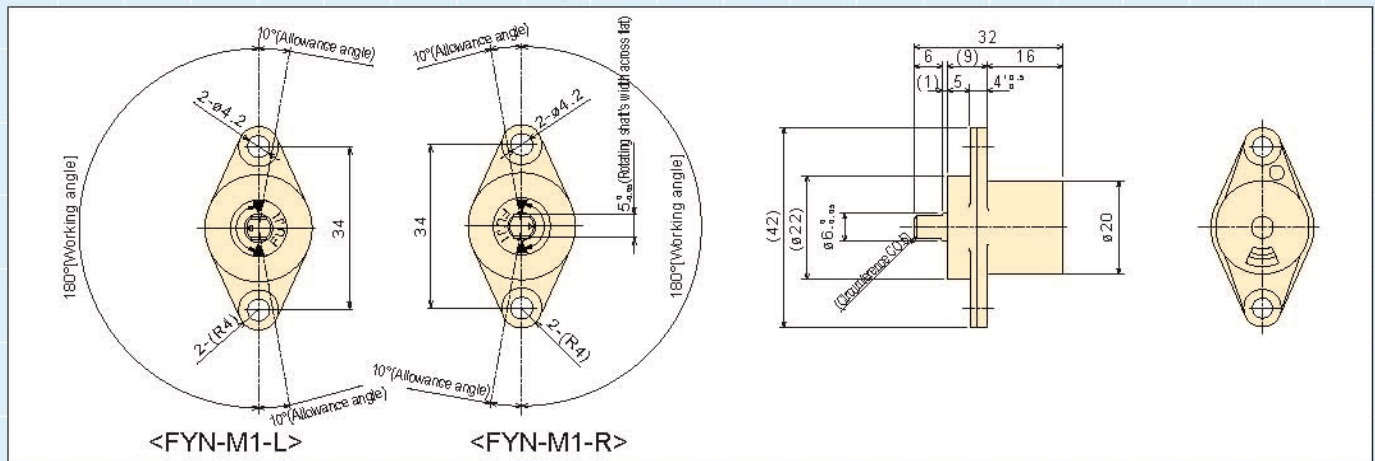


## <Specifications>

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

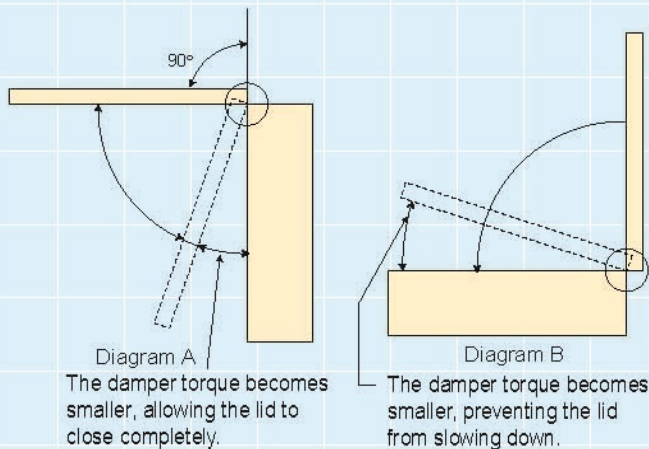
*Max. angle	180°
*Max. cycle rate	6 cycle/min
*Operating temperature	-5~50°C
*Weight	17±2g
*Main body	Polybutylene terephthalate (PBT)
*Cap material	Polybutylene terephthalate (PBT)
*Rotating shaft material	Zinc die-cast (ZDC)
*Oil type	Silicone oil
*Cap colour	R: Black, L: Gray

Note) Measured at 23°C±2°C



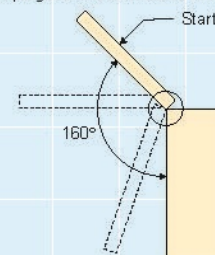
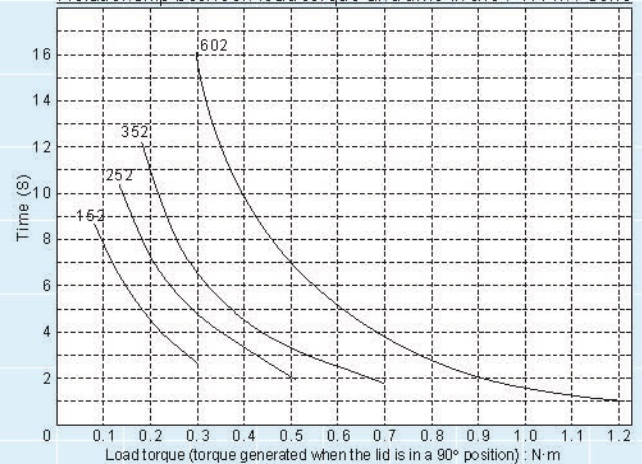
## How to Use the Damper

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.

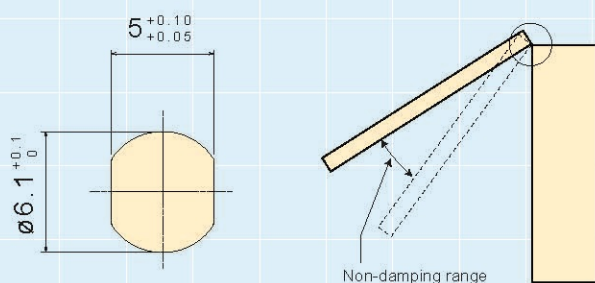


2. Below is a graph showing the relationship between the load torque and the time when a lid is closed from a 160° angle, as shown in the diagram.

Relationship between load torque and time in the FYN-M1 series

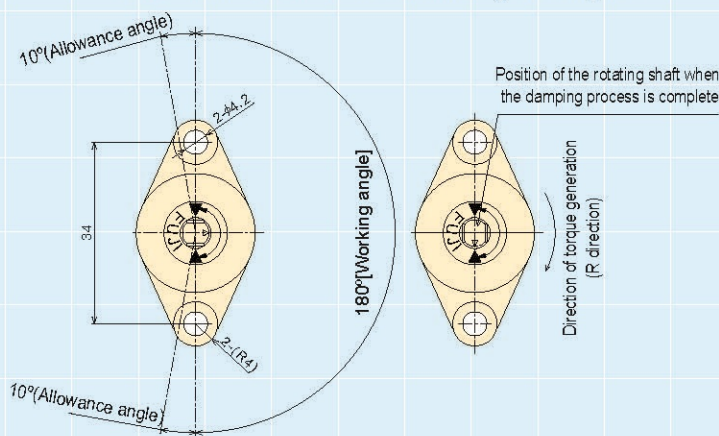


3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing.



<Recommended dimensions for a rotating shaft opening>

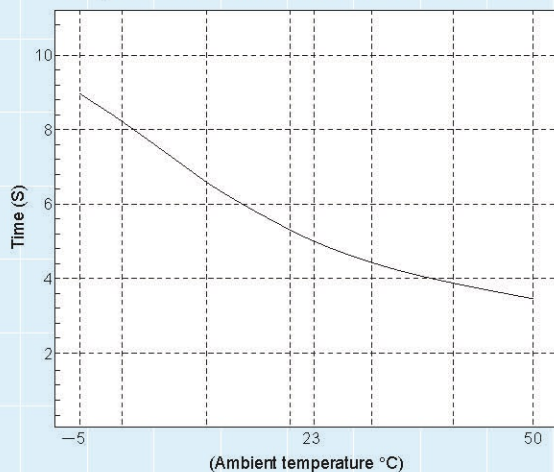
5. The standard for a damper's working angle is 180° with respect to the main body's attachment flange. Rotating the damper beyond this angle will cause damage to the damper. Please make sure that an external stopper is in place.



<FYN-M1-R>

4. The time it takes for a lid with a damper to close varies according 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 FYN-M1 series is a fixed type; its torque is non-adjustable. However, a customized order for a torque of 0.15 ~ 0.6N·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.



# FYN-P1 Series

RoHS Compliant

Vane Damper [Uni-Directional]

Fixed



## <Specifications>

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

Note) Measured at 23°C±2°C

\*Max. angle 115°

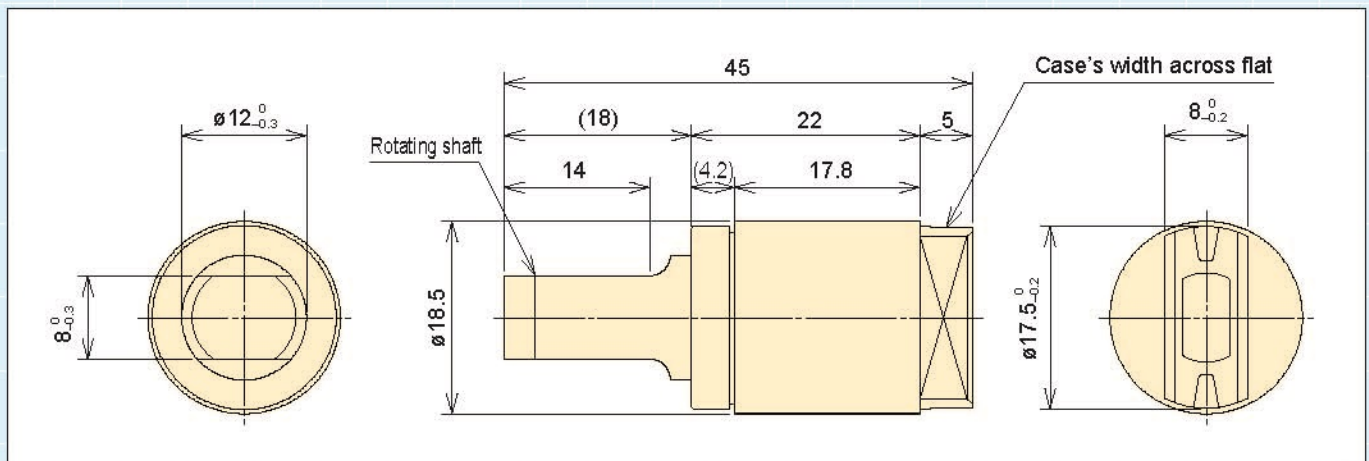
\*Operating temperature -5~50°C

\*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.

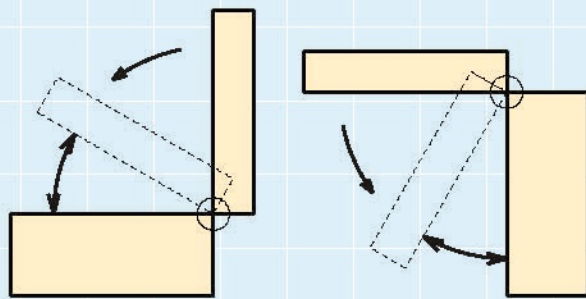


Diagram A

Diagram B

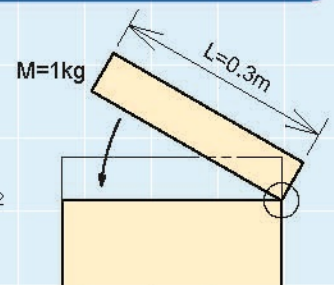
The damper torque becomes larger, preventing the lid from slowing down.

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

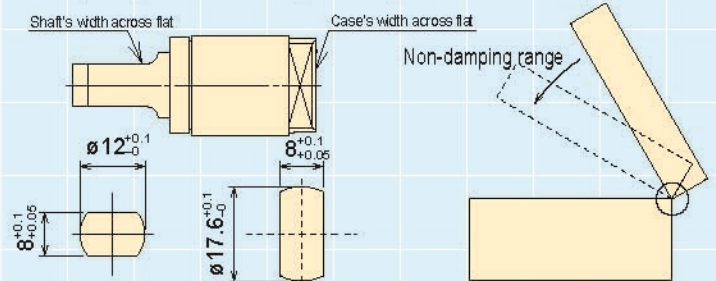
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example) Lid mass M : 1 kg  
Lid dimensions L : 0.3m  
Load torque :  $T = 1 \times 0.3 \times 9.8 \div 2 = 1.47 \text{ N·m}$

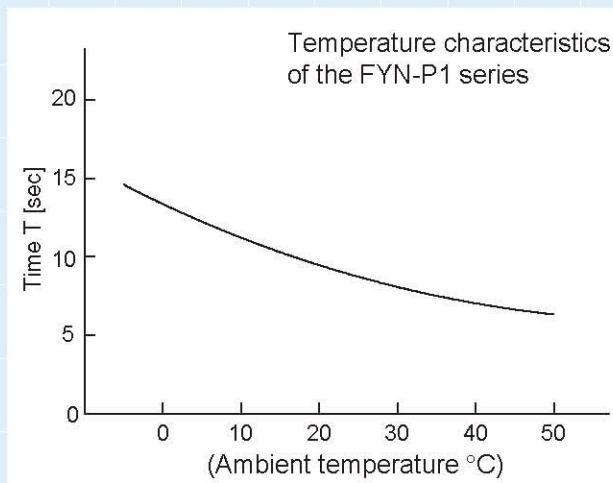
Based on the above calculation, FYN-P1-\*153 is selected.



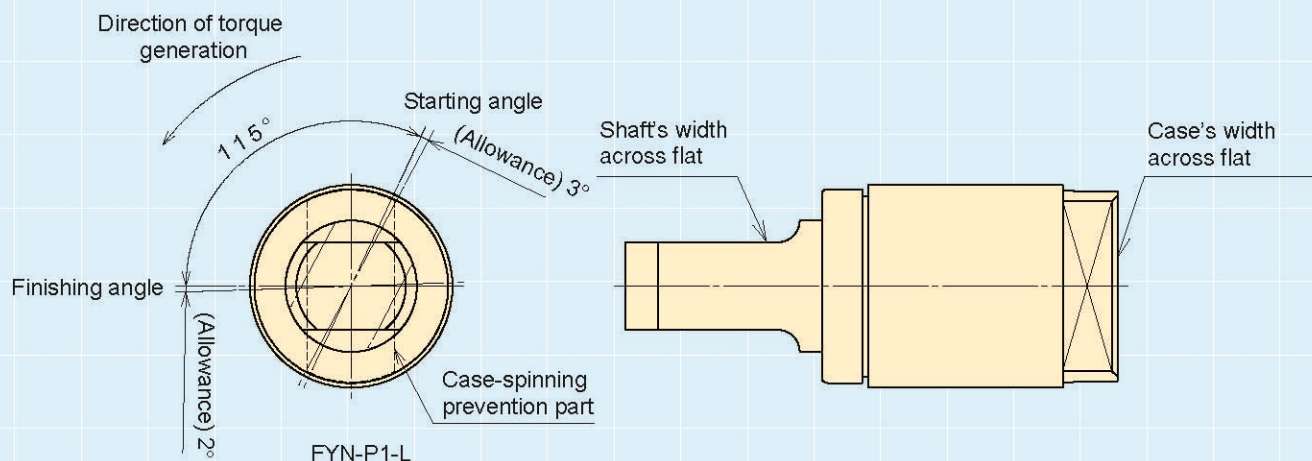
3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.



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.



5. The damper's working angle is  $115^\circ$ , 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  $90^\circ$  with respect to the width across flat.



6. The FYN-P1 series is a fixed type; its torque is non-adjustable. However, a customized order for a torque between the range of 1 ~1.8N·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.



Soft Silent Safety

# FYN-N1 Series

RoHS Compliant

Vane Damper [Uni-Directional]

Fixed

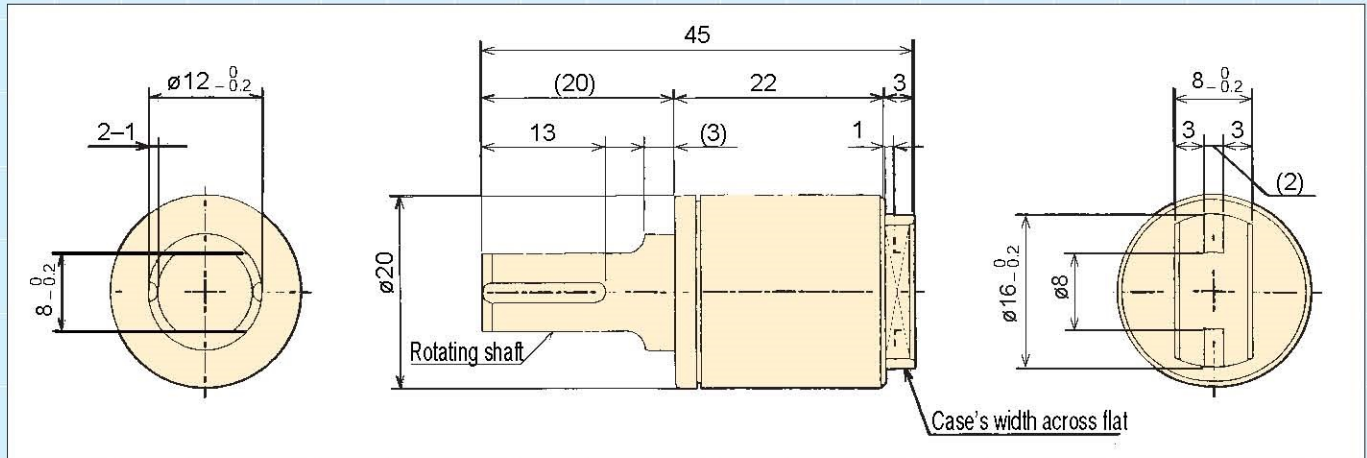


## <Specifications>

Model	Max. torque	Reverse torque	Damping direction
FYN-N1-R103	1 N·m	0.2 N·m	Clockwise
FYN-N1-L103	(10kgf·cm)	(2kgf·cm)	Counter-clockwise
FYN-N1-R203	2 N·m	0.4 N·m	Clockwise
FYN-N1-L203	(20kgf·cm)	(4kgf·cm)	Counter-clockwise
FYN-N1-R303	3 N·m	0.8 N·m	Clockwise
FYN-N1-L303	(30kgf·cm)	(8kgf·cm)	Counter-clockwise

Note) Measured at 23°C±2°C

*Max. angle	110°
*Operating temperature	-5~50°C
*Weight	12±1g
*Body and cap material	Polybutylene terephthalate (PBT)
*Rotating shaft material	Polyphenylene Sulphide (PPS)
*Oil type	Silicone oil



## How to Use the Damper

1. FYN-N1 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.

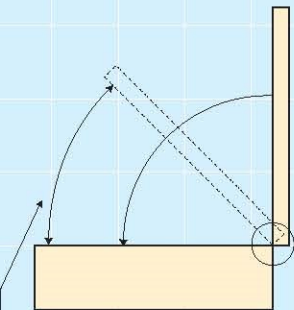


Diagram A

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

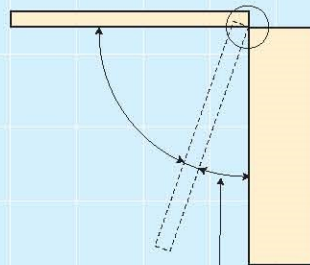


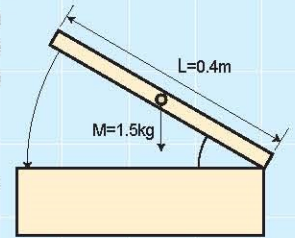
Diagram B

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

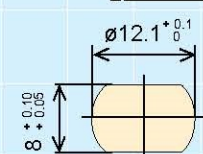
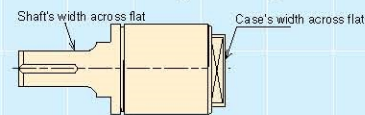
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example) Lid mass  $M$ : 1.5 kg  
Lid dimensions  $L$ : 0.4 m  
Load torque:  $T = 1.5 \times 0.4 \times 9.8 \div 2$   
 $= 2.94 \text{ N·m}$

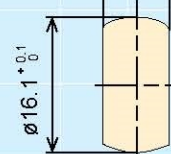
Based on the above calculation, FYN-N1-303 is selected.



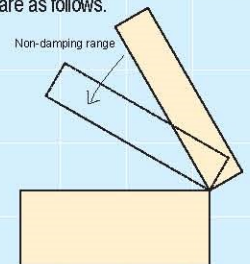
3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.



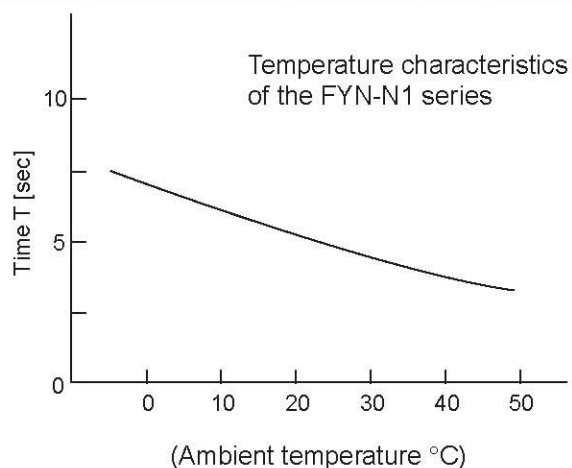
<Recommended dimensions for mounting a rotating shaft>



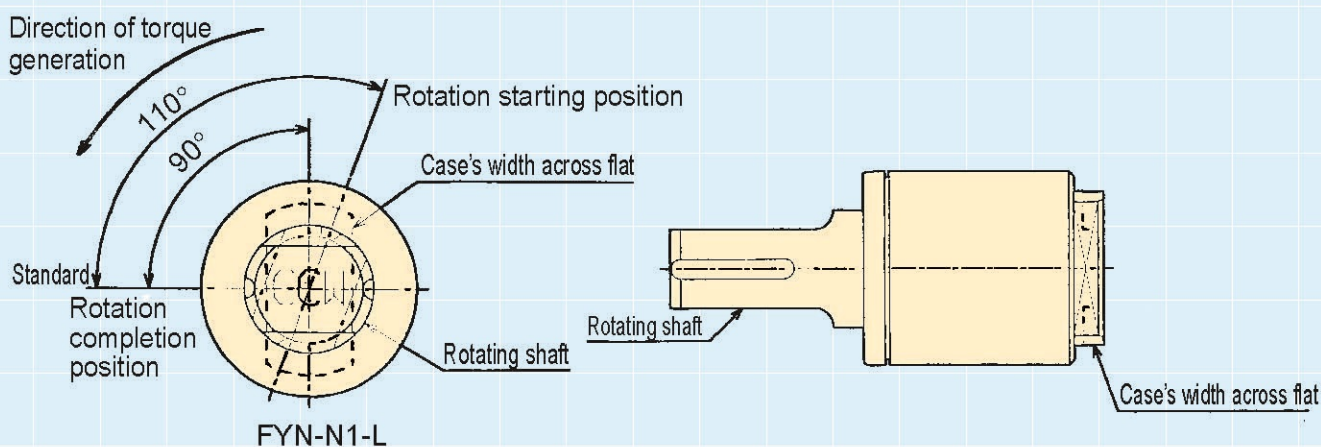
<Recommended dimensions for mounting the main body>



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  $110^\circ$ , 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  $90^\circ$  with respect to the width across flat.



6. FYN-N1 series is a fixed type; its torque is non-adjustable. However, a customized order for a torque between the range of  $1 \sim 3\text{N}\cdot\text{m}$  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.



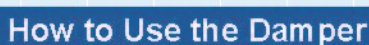
## Vane Damper [Uni-Directional]

## Fixed



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

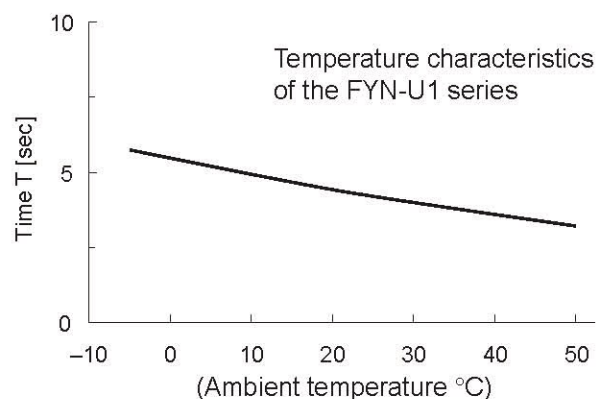
Silicone oil



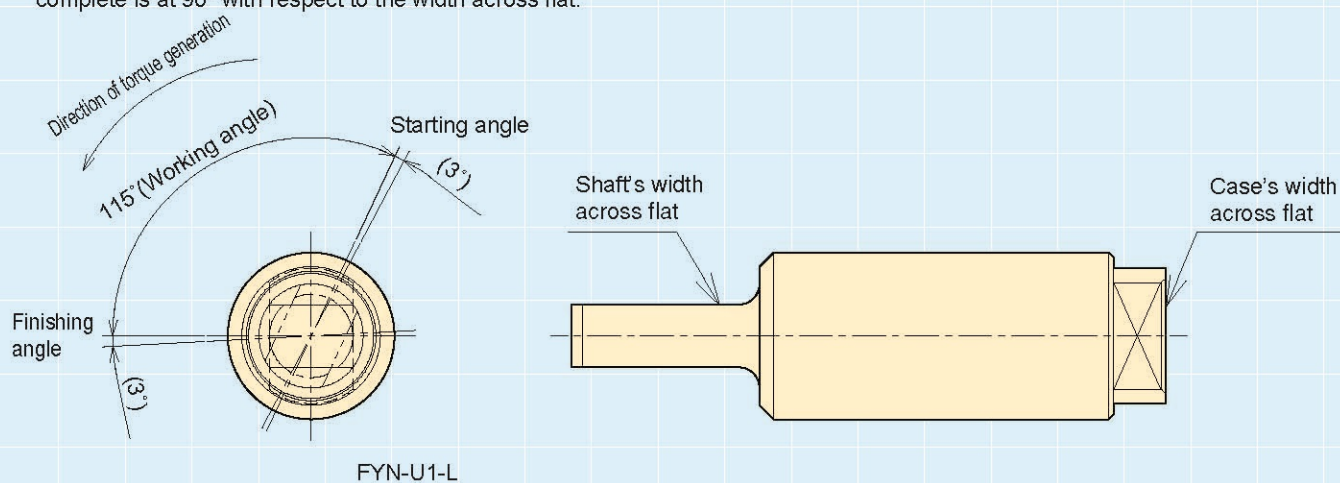
- 



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  $115^\circ$ , 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  $90^\circ$  with respect to the width across flat.



6. The FYN-U1 series is a fixed type; its torque is non-adjustable. However, a customized order for a torque between the range of 1 ~ 3N·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.



Soft Silent Safety

# FYN-K1 Series

RoHS Compliant

Vane Damper [Uni-Directional]

Fixed

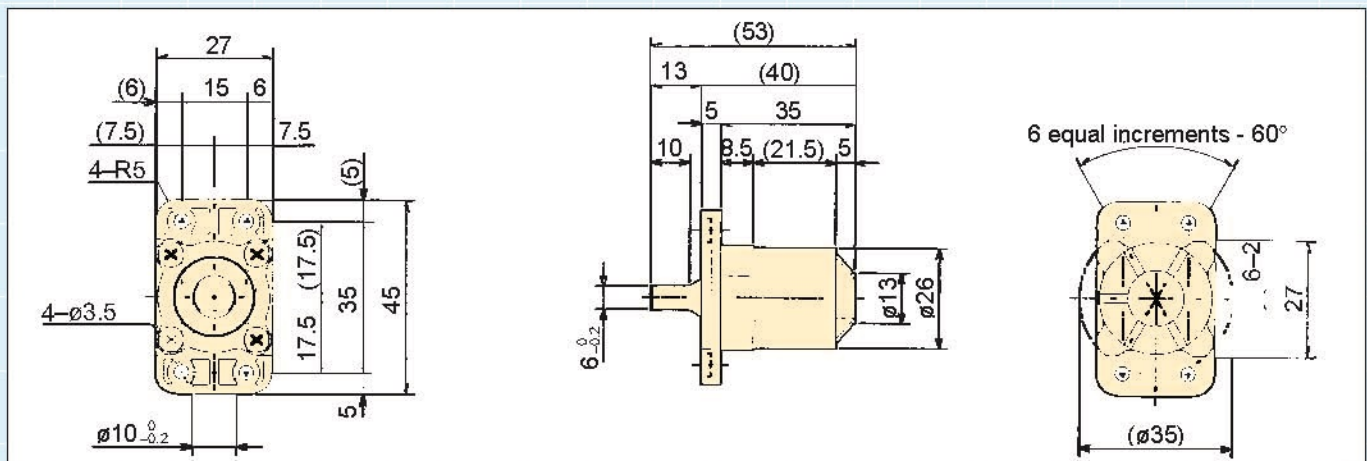


## <Specifications>

Model	Max. torque	Reverse torque	Damping direction
FYN-K1-R403	4 N·m	1 N·m	Clockwise
FYN-K1-L403	(40kgf·cm)	(10kgf·cm)	Counter-clockwise

Note) Measured at 23°C±2°C

*Max. angle	108°
*Operating temperature	-5~50°C
*Weight	33±3g
*Body and cap material	Polybutylene terephthalate (PBT)
*Rotating shaft material	Polyphenylene Sulphide (PPS)
*Oil type	Silicone oil



## How to Use the Damper

1. FYN-K1 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.

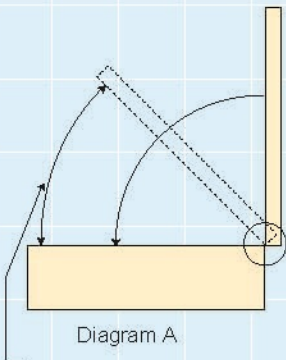


Diagram A

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

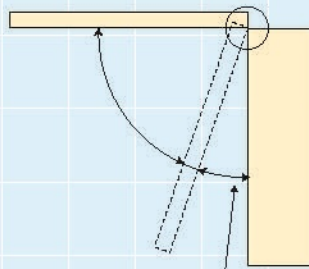


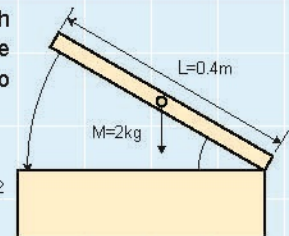
Diagram B

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

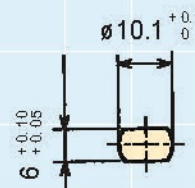
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example) Lid mass  $M$ : 2 kg  
Lid dimensions  $L$ : 0.4 m  
Load torque:  $T = 2 \times 0.4 \times 9.8 \div 2 = 3.92 \text{ N·m}$

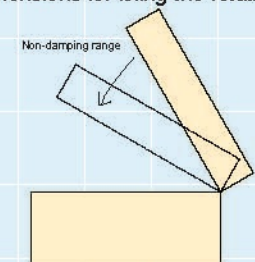
Based on the above calculation, FYN-K1-\*403 is selected.



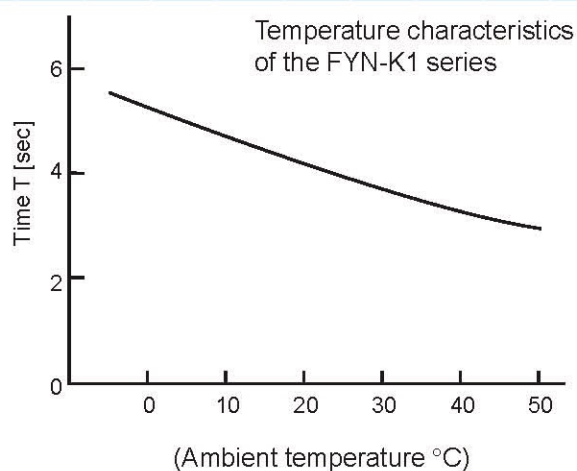
3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft are as follows.



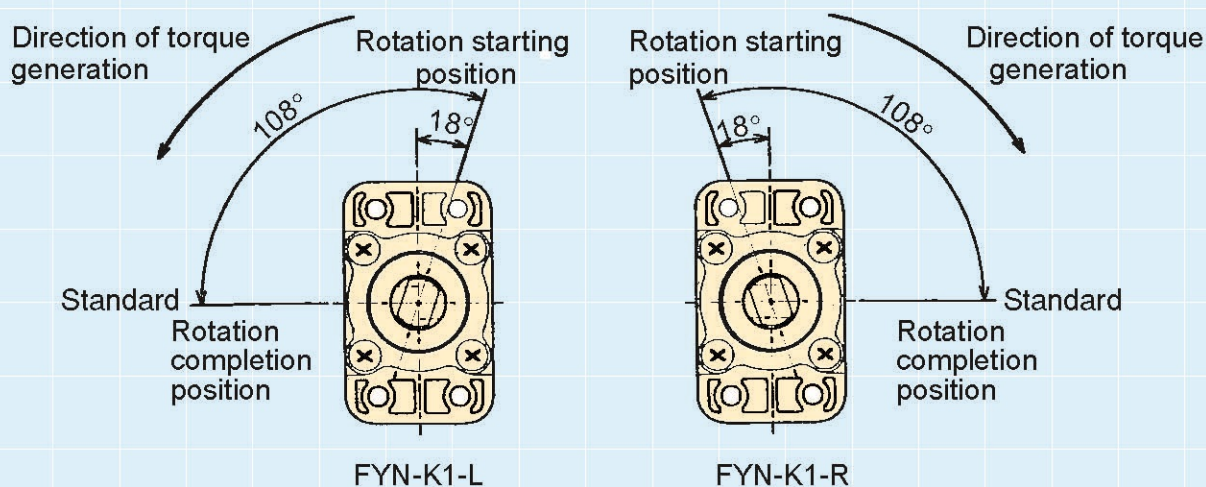
<Recommended dimensions for mounting a rotating shaft>



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  $108^\circ$ , as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place.



Detailed diagram of the damper's working angles

6. The FYN-K1 series is a fixed type; its torque is non-adjustable. However, a customized order for a torque between the range of 2 ~ 4N·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.



Soft Silent Safety

# FYN-D3 Series

RoHS Compliant

Vane Damper [Uni-Directional]

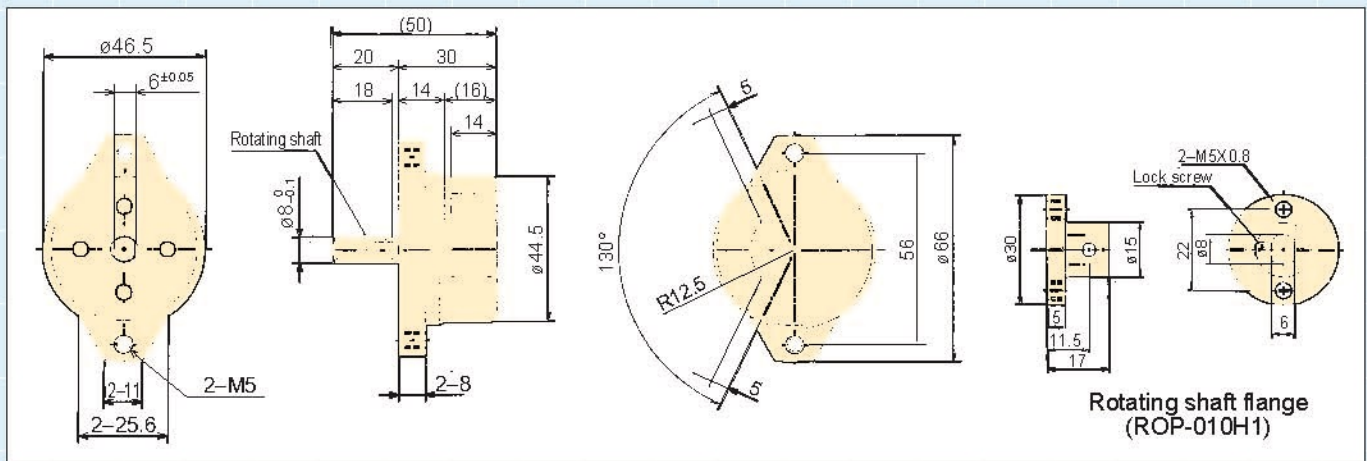
Fixed



## <Specifications>

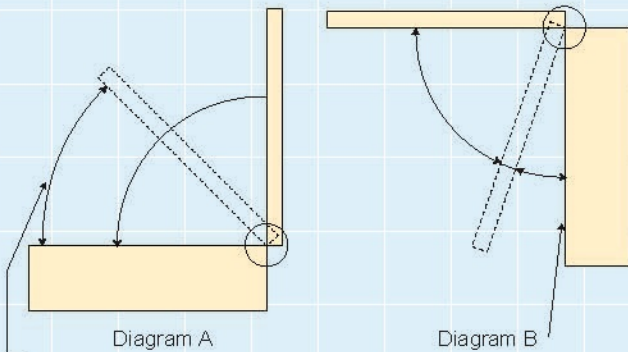
Model	Max. torque	Reverse torque	Damping direction
FYN-D3-R503	5 N·m	1 N·m	Clockwise
FYN-D3-L503	(50kgf·cm)	(10kgf·cm)	Counter-clockwise
FYN-D3-R703	7 N·m	1 N·m	Clockwise
FYN-D3-L703	(70kgf·cm)	(10kgf·cm)	Counter-clockwise
FYN-D3-R104	10 N·m	2 N·m	Clockwise
FYN-D3-L104	(100kgf·cm)	(20kgf·cm)	Counter-clockwise

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



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

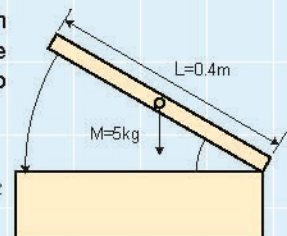
The damper torque becomes larger, preventing the lid from closing completely.

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

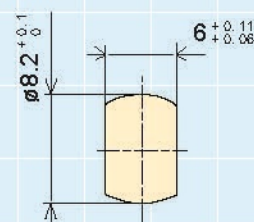
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example) Lid mass  $M$  : 5 kg  
Lid dimensions  $L$  : 0.4m  
Load torque :  $T = 5 \times 0.4 \times 9.8 \div 2 = 9.8 \text{ N·m}$

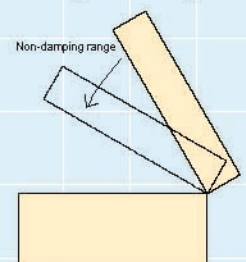
Based on the above calculation, FYN-D3-104 is selected.



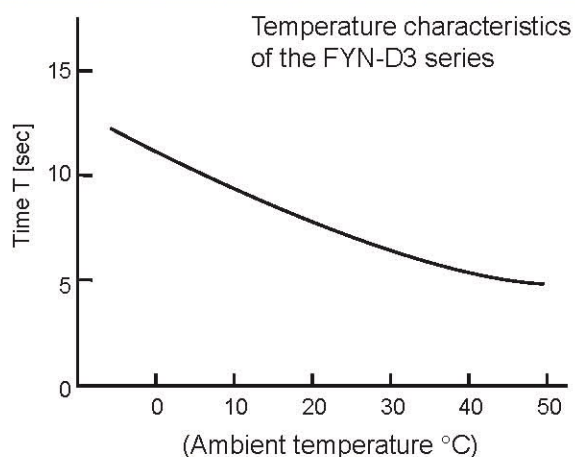
3. When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft are as follows.



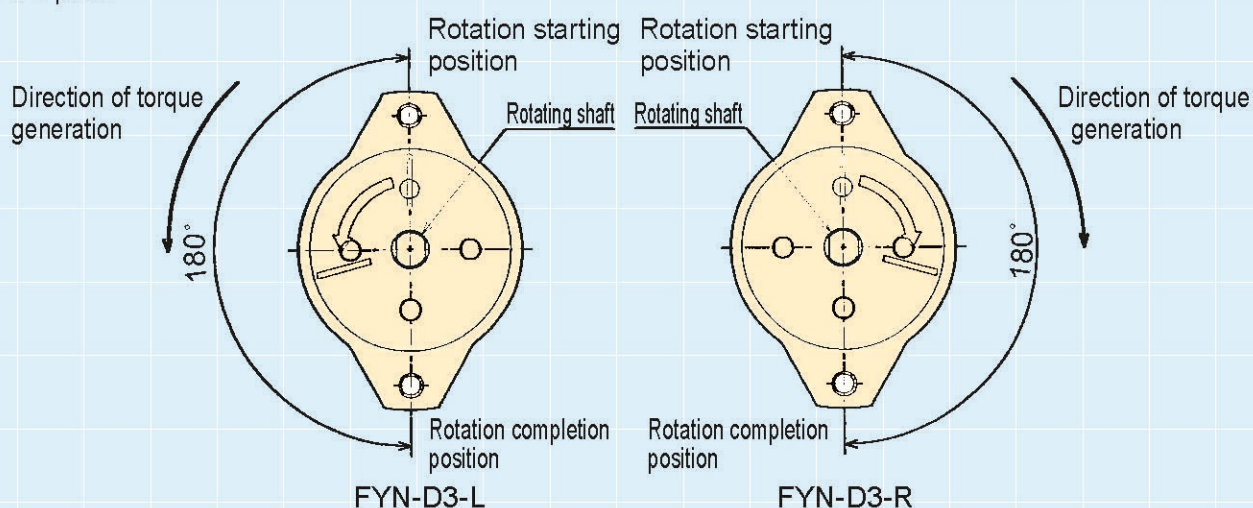
<Recommended dimensions for mounting a rotating shaft>



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  $180^\circ$  with respect to the attachment flange, as shown below. Please determine where to attach it according to your needs. Also, rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place.



6. The FYN-D3 series is a fixed type; its torque is non-adjustable. However, a customized order for a torque between the range of 5 ~ 10N·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.



Soft Silent Safety

# FYT/FYN-D1 (D2) Series

RoHS Compliant

Vane Damper [Bi-Directional] [Uni-Directional] Fixed



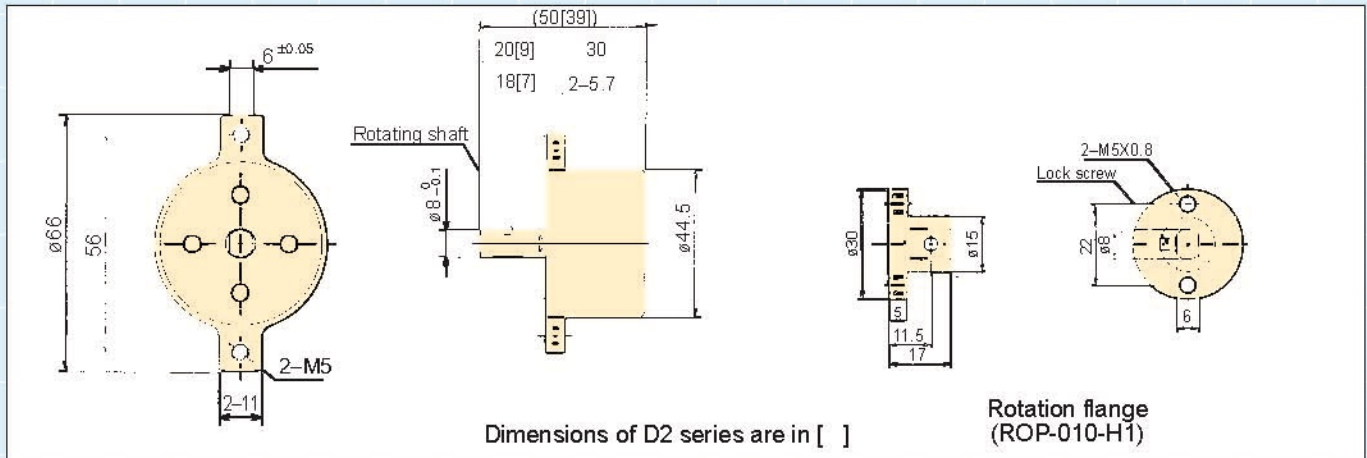
## <Specifications>

Model	Max. torque	Reverse torque	Damping direction
FYT-D1(2)-104	10 N·m (100kgf·cm)	—	Both directions
FYN-D1(2)-R104	10 N·m (100kgf·cm)	0.5 N·m (5kgf·cm)	Clockwise
FYN-D1(2)-L104	10 N·m (100kgf·cm)	0.5 N·m (5kgf·cm)	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°C
*Weight	D1:215±10g, D2:210±10g
*Body and cap material	Zinc die-cast (ZDC)
*Rotating shaft material	S25C
*Oil type	Silicone oil
*Option	Rotation flange : ROP-010-H1



## How to Use the Damper

1. FYT-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 counter-clockwise directions in the FYT-D1 series. Unlike the FYN-D1 series, it does not have a fixed orifice for adjusting torque. Therefore, torque remains constant at any angle.

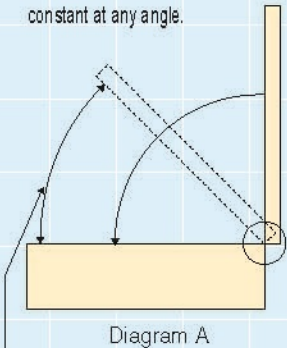


Diagram A

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

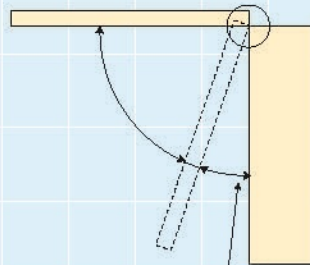


Diagram B

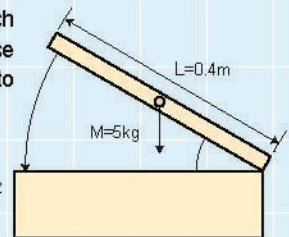
The damper torque becomes larger, preventing the lid from closing completely.

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

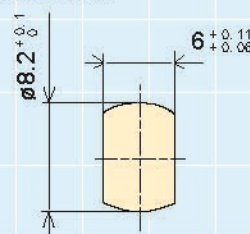
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example) Lid mass M : 5 kg  
Lid dimensions L : 0.4m  
Load torque :  $T = 5 \times 0.4 \times 9.8 \div 2 = 9.8 \text{ N·m}$

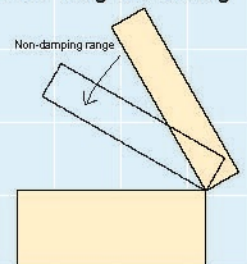
Based on the above calculation, FYT-D1-\*104 is selected.



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 are as follows.



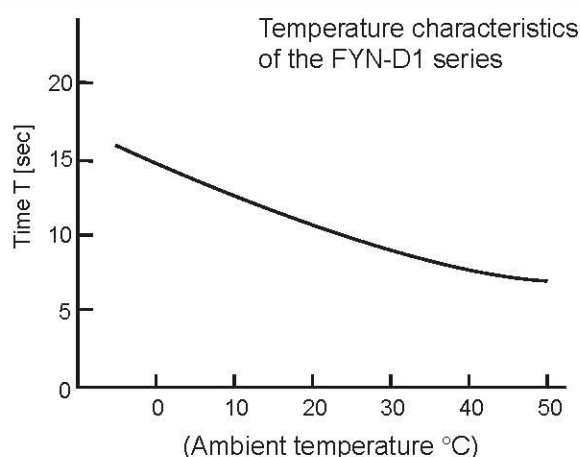
<Recommended dimensions for mounting a rotating shaft>



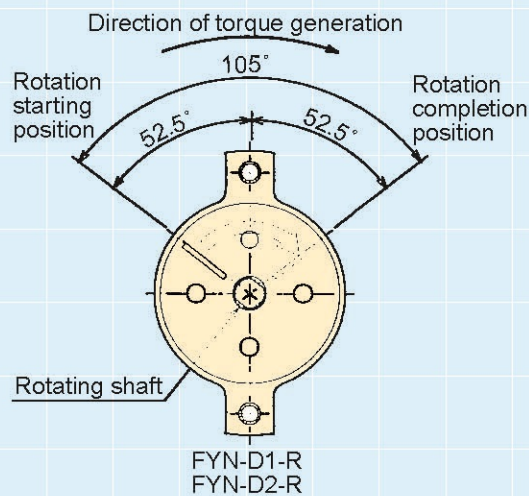
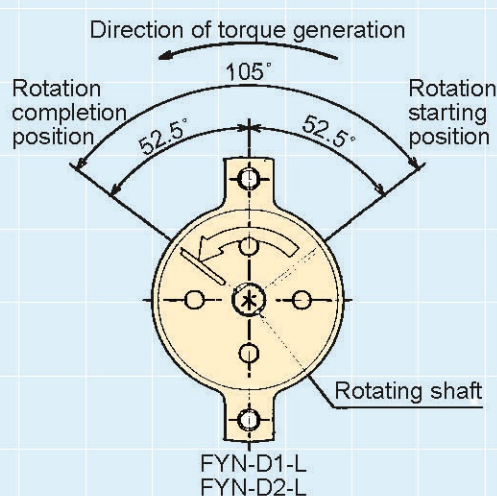
# FYT/FYN-D1 (D2) Series

## Vane Damper [Bi-Directional] [Uni-Directional] Fixed

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  $\pm 52.5^\circ$  with respect to the attachment flange, as shown below. Please determine where to attach it according to your needs. Also, rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place.



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.



Soft Silent Safety

# FYT/FYN-H1 (H2) Series

RoHS Compliant

Vane Damper [Bi-Directional] [Uni-Directional]

Adjustable



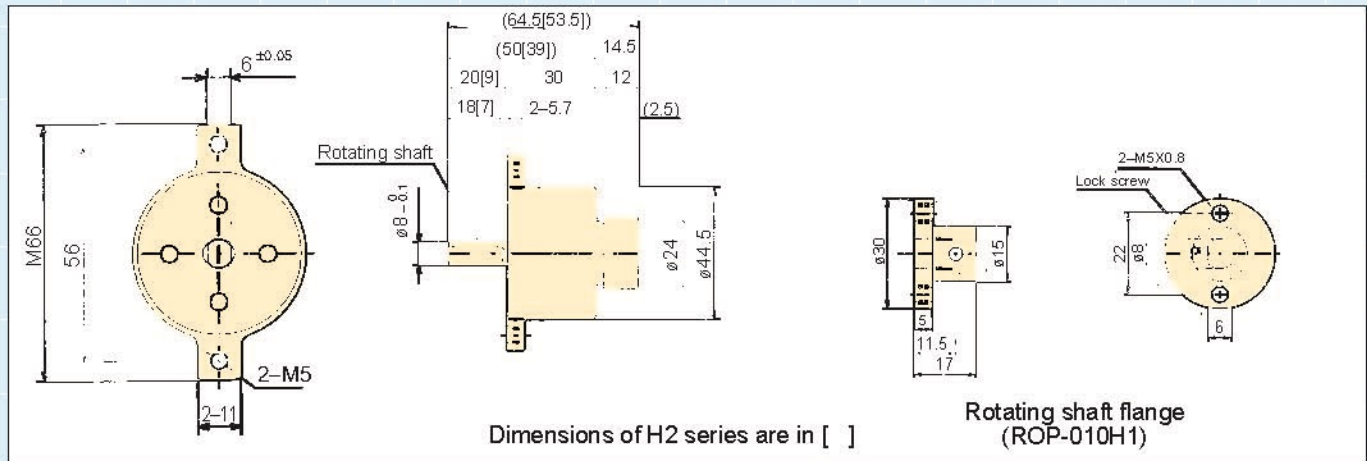
## <Specifications>

Model	Max. torque	Reverse torque	Damping direction
FYT-H1(2)-104	10 N·m (100kgf·cm)	—	Both directions
FYN-H1(2)-R104	10 N·m (100kgf·cm)	0.5 N·m (5kgf·cm)	Clockwise
FYN-H1(2)-L104	10 N·m (100kgf·cm)	0.5 N·m (5kgf·cm)	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°C
- \*Weight H1:240±10g, H2:235±10g
- \*Body and cap material Zinc die-cast (ZDC)
- \*Rotating shaft material S25C
- \*Oil type Silicone oil



## 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 counter-clockwise directions in the FYT-H1 series. Unlike the FYN-H1 series, it does not have a fixed orifice for adjusting torque. Therefore, torque remains constant at any angle.

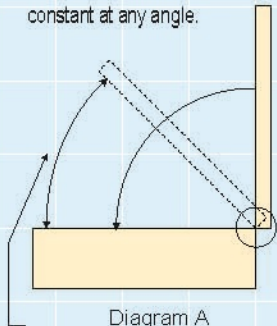


Diagram A

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

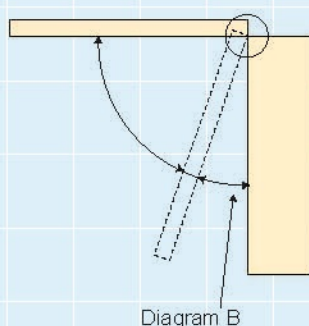


Diagram B

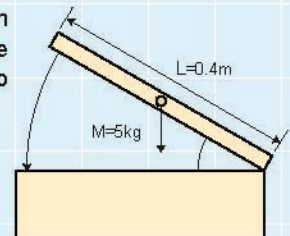
The damper torque becomes larger, preventing the lid from closing completely.

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

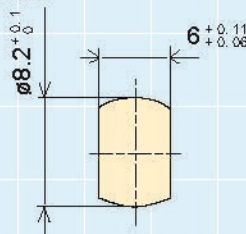
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example) Lid mass  $M$ : 5 kg  
Lid dimensions  $L$ : 0.4m  
Load torque:  $T = 5 \times 0.4 \times 9.8 \div 2 = 9.8 \text{ N·m}$

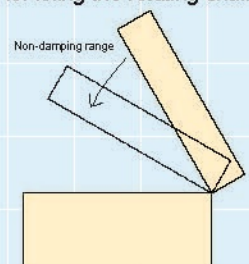
Based on the above calculation, FYN-H1-104 is selected.



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 are as follows.



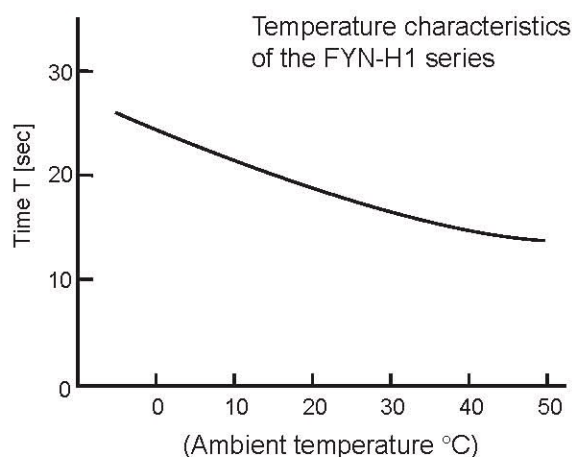
<Recommended dimensions for mounting a rotating shaft>



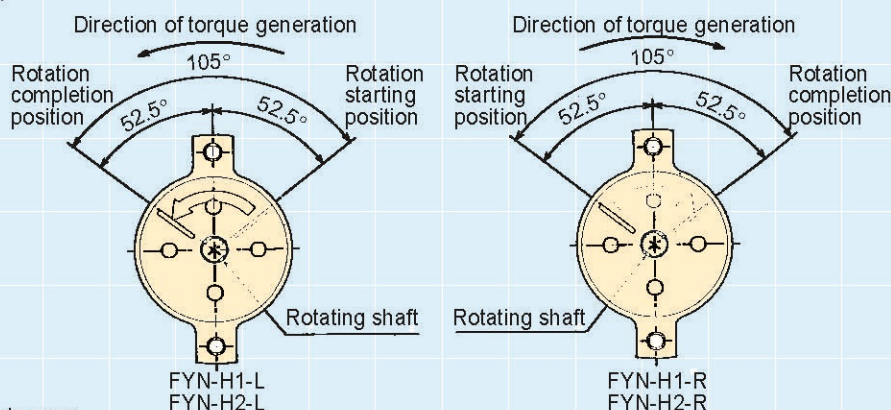
# FYT/FYN-H1 (H2) Series

Vane Damper [Bi-Directional] [Uni-Directional] Adjustable

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.

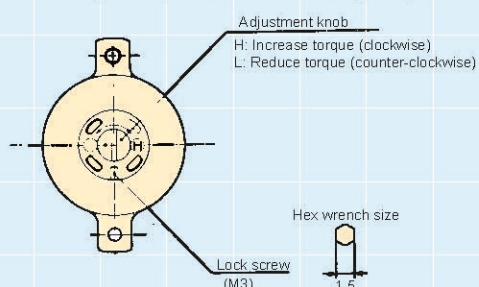


5. The damper's working angle is  $\pm 52.5^\circ$  with respect to the attachment flange, as shown below. Please determine where to attach it according to your needs. Also, rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place.



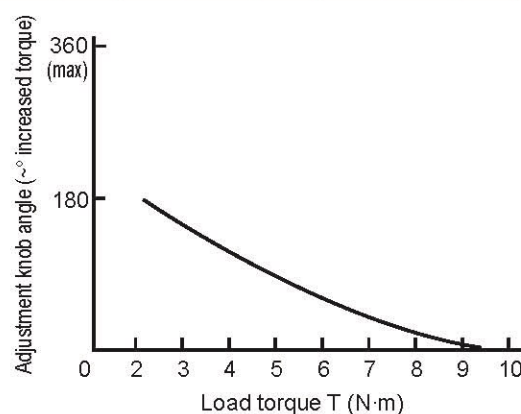
6. How to adjust the damper

- 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  $360^\circ$ . Turning the knob more than  $360^\circ$  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.



<Range of torque adjustment>

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



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



Soft Silent Safety

# FYN-S1 Series

RoHS Compliant

Vane Damper [Uni-Directional]

Self-adjusting

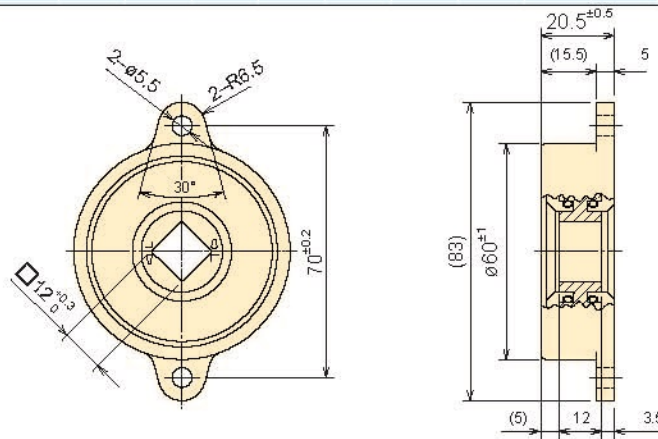


## <Specifications>

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

Note) Measured at 23°C±2°C

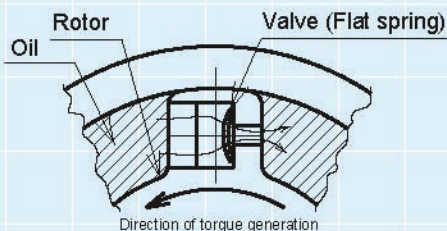
*Max. angle	130°
*Operating temperature	-5~50°C
*Weight	220±10g
*Main body material	Zinc die-cast (ZDC)
*Cap material	Zinc die-cast (ZDC)
*Rotor material	Polyacetal (POM)
*Oil type	Silicone oil



## How to Use the Damper

### 1. Operating characteristics of self-adjusting oil pressure dampers

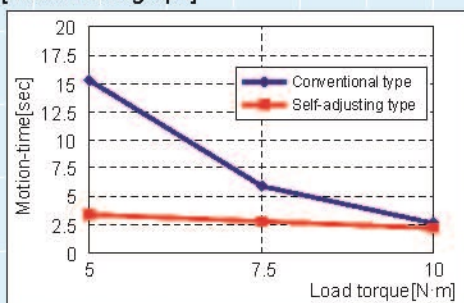
In a conventional vane damper, the damping strength (damping constant) does not change regardless of the load torque used. Because of this, its working speed is slower when the load torque is small, and faster when the load torque is large. However, because the self-adjusting FYN-S1 series is designed 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.



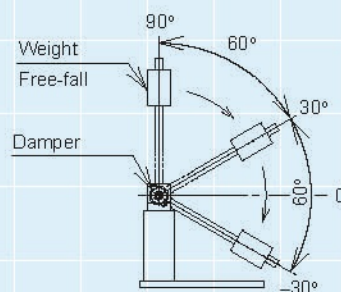
### [Operating principles of the self-adjusting type]

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]



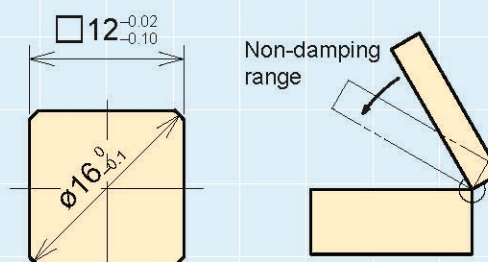
[Measurement conditions for the motion-time graph]



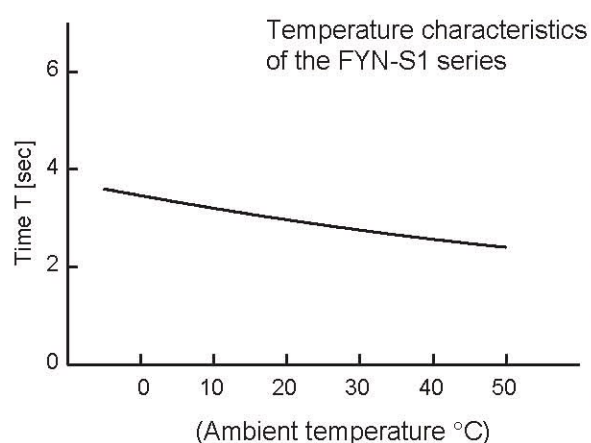
- Load torque T 5~10N·m
- Measured angle 30°~30°
- Measurement temperature 23°C±2°C

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.

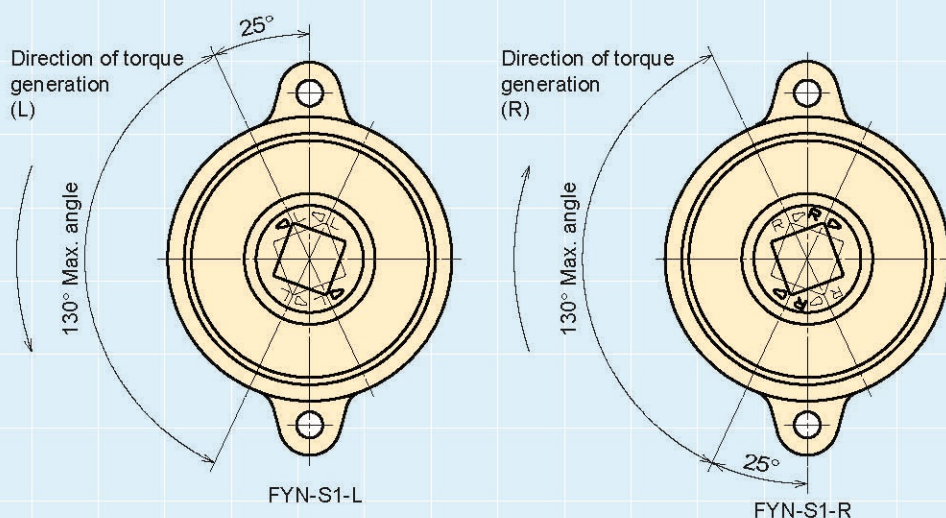
2. When using the damper, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. Also, please ensure a tight fit between the shaft and the damper shaft's opening. Without a tight fit, the non-damping range becomes larger in a closing motion, etc., and 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 [Bi-Directional] [Uni-Directional]

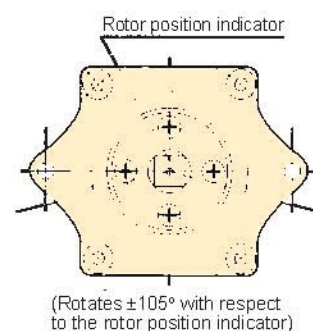
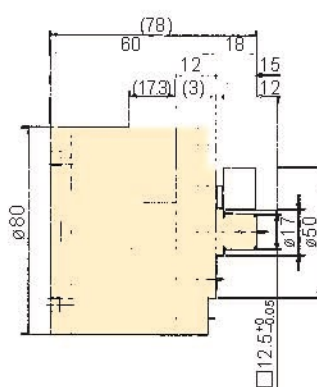
## Adjustable



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

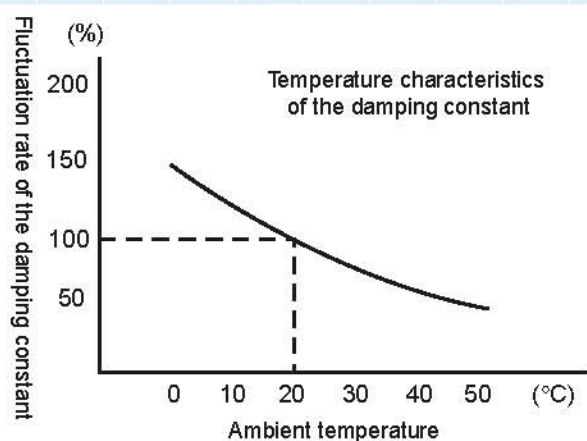
Note) Measured at 23°C±2°C

*Max. angle	210°
*Operating temperature	0~50°C
*Weight	1.75kg
*Body and cap material	Zinc die-cast (ZDC)
*Rotating shaft material	Alloy steel
*Oil type	Silicone oil



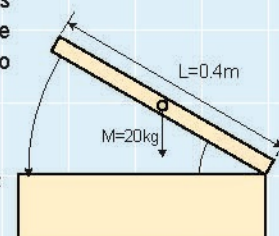
## How to Use the Damper

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.



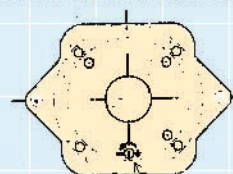
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example) Lid mass  $M : 20 \text{ kg}$   
Lid dimensions  $L : 0.4\text{m}$   
Load torque :  $T = 0.4 \times 20 \times 9.8 \div 2$   
 $= 39.2 \text{ N}\cdot\text{m}$



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.

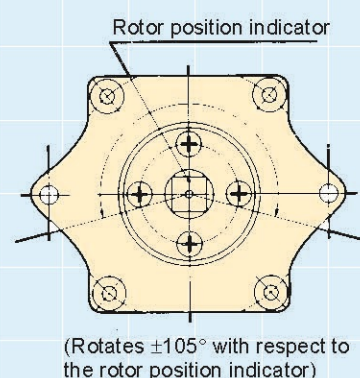
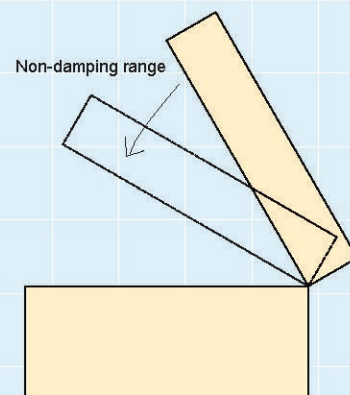
The damping constant increases when turned to the + direction (right).  
The damping constant decreases when turned to the - direction (left).



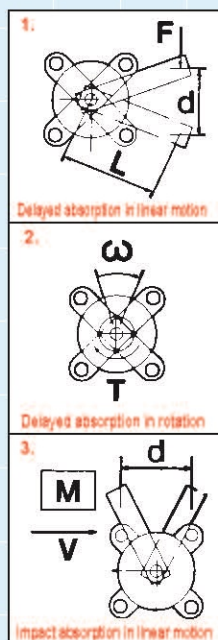
Torque adjustment screw

### <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  $\pm 105^\circ$ , 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.



### <How to Calculate the Damping Constant for Vane Dampers>



#### 1. Delayed absorption in linear motion

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

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

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

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

#### 3. Impact absorption in linear motion

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

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)



Soft Silent Safety

# FYN-T1 Series

RoHS Compliant

Vane Damper [Uni-Directional]

Fixed

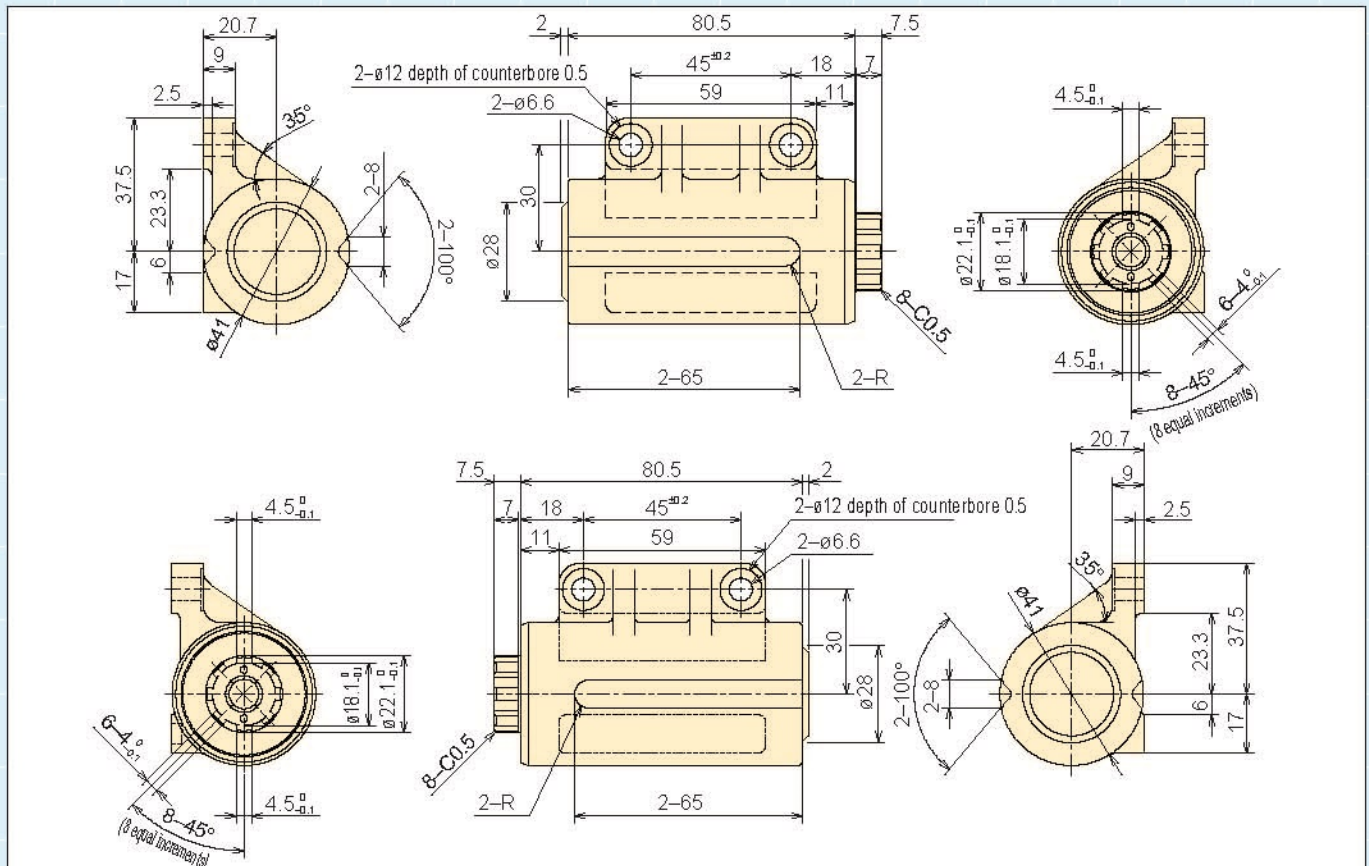


## <Specifications>

Model	Max. torque	Reverse torque	Damping direction
FYN-T1-R604	60 N·m	3 N·m	Clockwise
FYN-T1-L604	(800kgf·cm)	(30kgf·cm)	Counter-clockwise

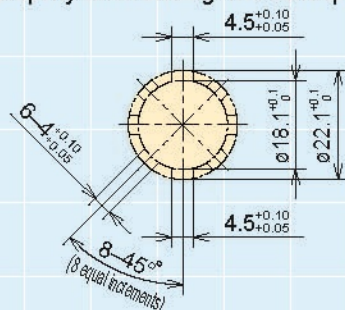
Note) Measured at 23°C±2°C

*Max. angle	110°
*Operating temperature	-5~50°C
*Weight	630±30g
*Material	Zinc die-cast (ZDC)
*Oil type	Silicone oil



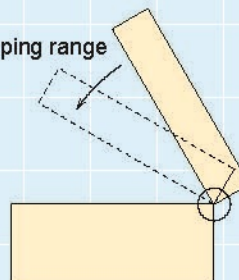
## How to Use the Damper

1. When connecting the rotating shaft to the 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 are as follows.



&lt;Recommended dimensions for mounting a rotating shaft&gt;

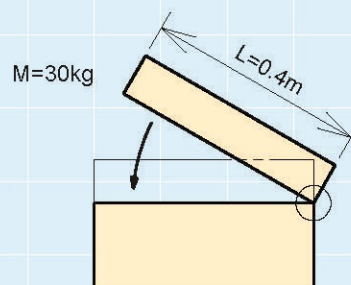
Non-damping range



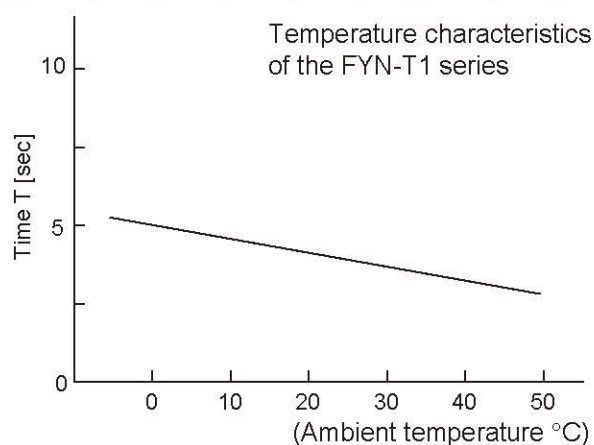
2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example) Lid mass  $M$  : 30 kg  
 Lid dimensions  $L$  : 0.4m  
 Load torque :  $T = 30 \times 0.4 \times 9.8 \div 2$   
 $= 58.8 \text{ N}\cdot\text{m}$

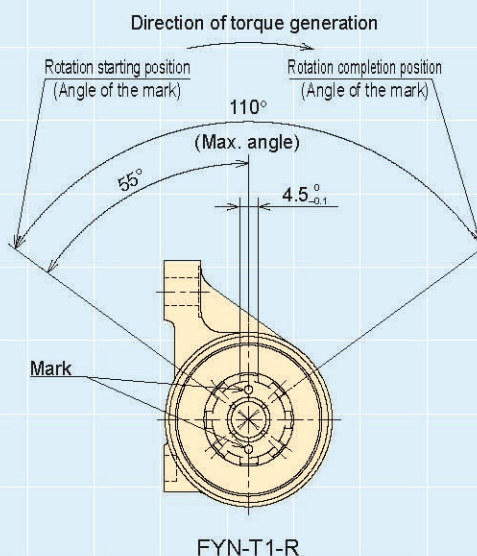
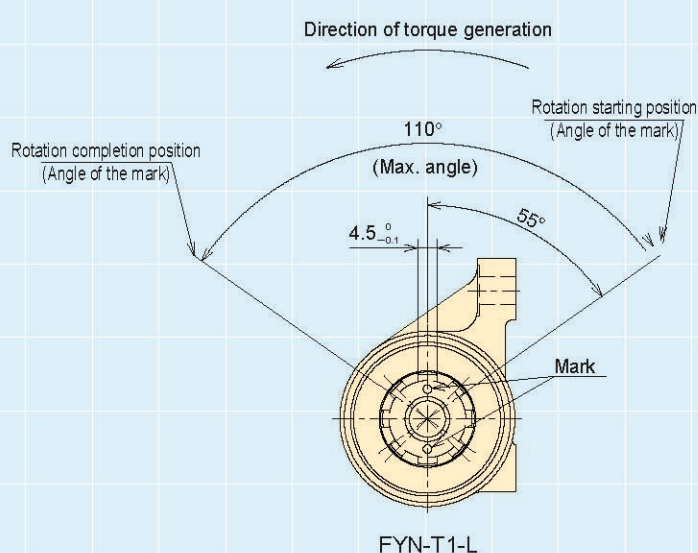
Based on the above calculation, FYN-T1-\*604 is selected.



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 surveyed time for the lid to close is shown in the graph to the right.



4. The damper's working angle is  $110^\circ$ , 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. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

6. The angular velocity in the reverse direction (opposite to the direction of torque generation) should be 1 rad/sec or less.

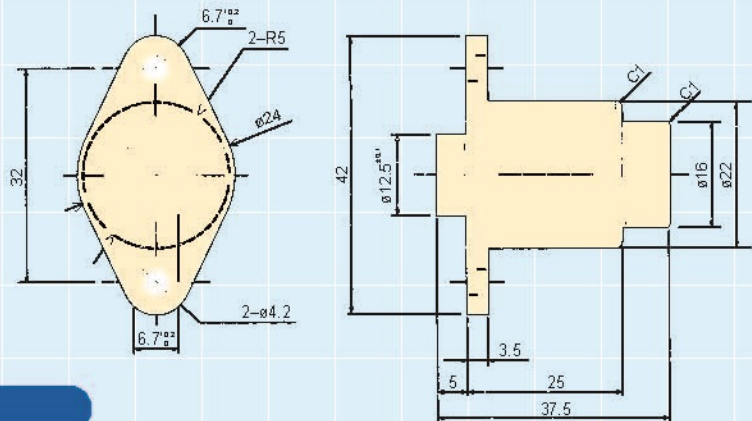


# FRX-A1 Series

RoHS Compliant

Leading Damper [Uni-Directional]

Fixed



## <Specifications>

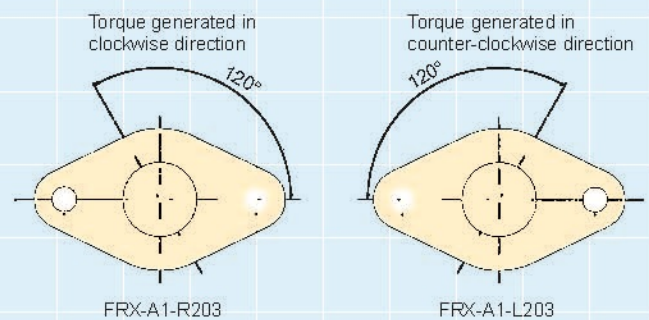
Model	Rated torque	Damping direction
FRX-A1-R203	$2 \pm 0.5 \text{ N} \cdot \text{m}$	Clockwise
FRX-A1-L203	$(20 \pm 5 \text{ kgf} \cdot \text{cm})$	Counter-clockwise

Note) Rated torque is measured at  $23 \pm 2^\circ\text{C}$

*Max. rotation speed	50rpm
*Max. cycle rate	10 cycle/min
*Operating temperature	$0 \sim 50^\circ\text{C}$
*Weight	$16 \pm 2\text{g}$
*Main body material	Polyacetal (POM)
*Rotating shaft material	Polyphenylene Sulphide (PPS)
*Oil type	Silicone oil

## How to Use the Damper

- There are two types of damper torque: clockwise and counter-clockwise.
- Please make sure that the rotating shaft has a bearing, as the damper itself is not fitted with one.
- When connecting the rotating shaft to the damper, please ensure a tight fit between them. Without a tight fit, the lid may not slow down properly when closing.
- Do not use the damper as a stopper. An external stopper must be attached at the rotation completion position.
- Please see the diagrams to the right for the damper's working angles. Rotating this damper beyond this angle will cause damage to the damper.

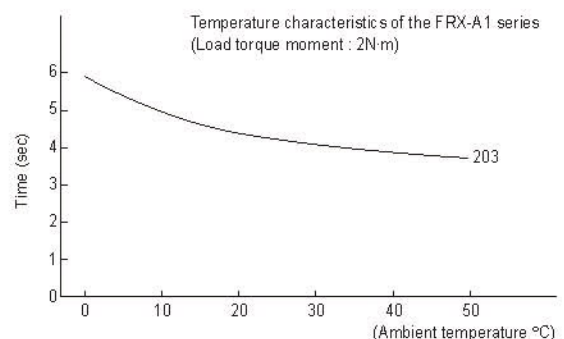


Working angle of a leading damper

## Damper Characteristics

### 1. Temperature characteristics

A leading damper's torque varies according to the operating environment. In general, 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 silicone oil inside the damper varies according to the temperature. When the temperature returns to normal, the torque will return to normal as well.

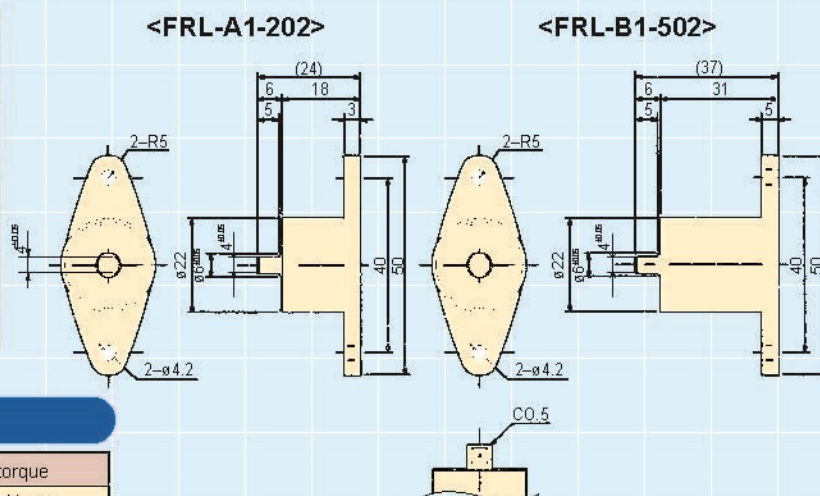


# FRL-A1/B1 Series

RoHS Compliant

Reverse Lock

(Click Mechanism)

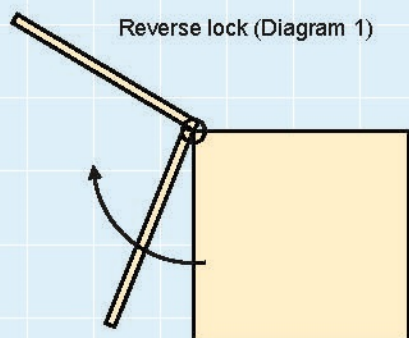


## <Specifications>

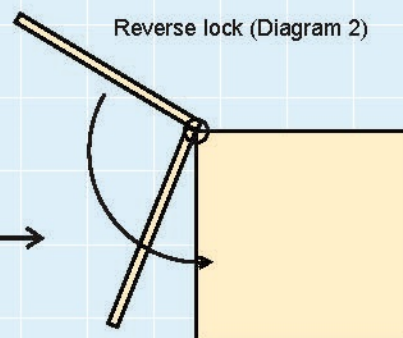
Model	Rated torque	Idling torque
FRL-A1-202	$0.2 \pm 0.04 \text{ N} \cdot \text{m}$ ( $2 \pm 0.4 \text{ kgf} \cdot \text{cm}$ )	$0.03 \text{ N} \cdot \text{m}$ ( $0.3 \text{ kgf} \cdot \text{cm}$ )
FRL-B1-502	$0.5 \pm 0.1 \text{ N} \cdot \text{m}$ ( $5 \pm 1 \text{ kgf} \cdot \text{cm}$ )	$0.05 \text{ N} \cdot \text{m}$ ( $0.5 \text{ kgf} \cdot \text{cm}$ )

## Principles of Reverse Lock

It is a click mechanism part that incorporates the principles of bearing clutch. Although the damping direction can be either clockwise or counter-clockwise, one side is always locked and the other damping direction is in a free state. For example, when opening and closing a lid on a piece of furniture, such as the one shown below, the lid is in a free state when it is lifted up to open, and a lock torque is applied in the closing direction so that the lid can be locked in at any angle. To close the lid, applying a small amount of force will release the lock, allowing the lid to close.



When a lid is being lifted, as shown in Diagram 1, a lock torque is applied in the closing direction, and the lid can be locked in at any position.



When pressure is applied to the lid in a closing direction, as shown in Diagram 2, the reverse lock is released and the lid can close freely.

Note) Please note that this product cannot be used on a lid with a mass that exceeds the rated torque of the reverse lock.



Soft Silent Safety

# FHD-A1 Series

RoHS Compliant

Hinge Damper [Uni-Directional]

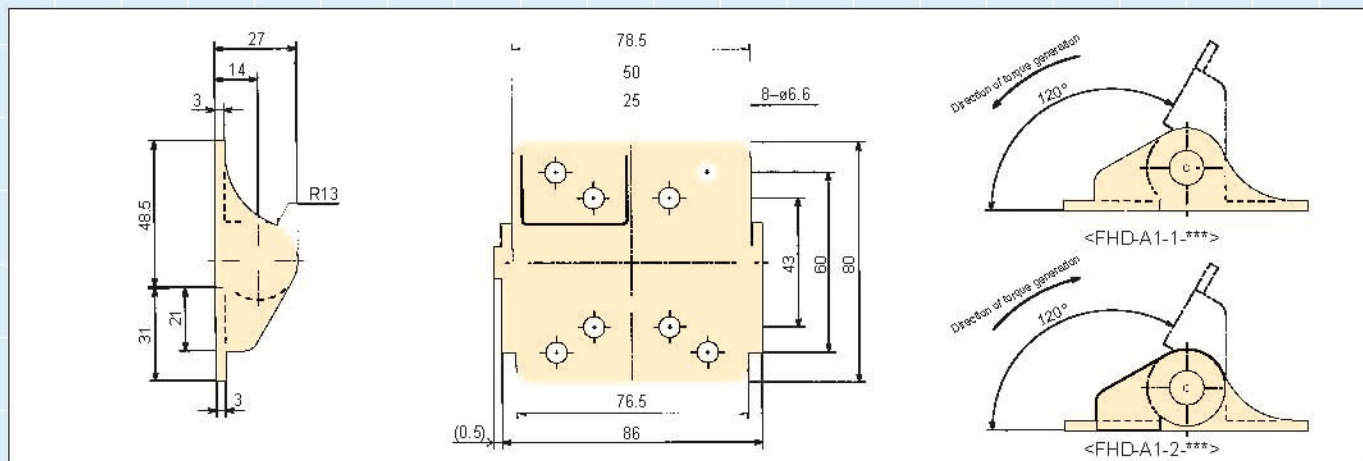
Fixed



## <Specifications>

Model	Max. torque	Max. reverse torque
FHD-A1-1-503	5 N·m (50 kgf·cm)	0.8 N·m or lower (8 kgf·cm or lower)
FHD-A1-2-503		
FHD-A1-1-104	10 N·m (100 kgf·cm)	1 N·m or lower (10 kgf·cm or lower)
FHD-A1-2-104		

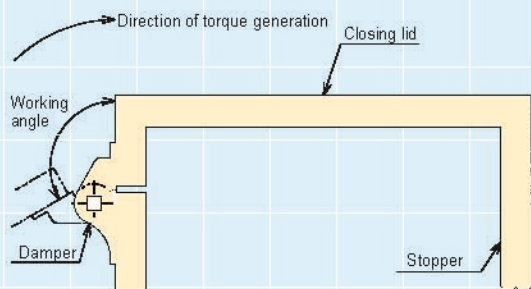
*Max. angle	120°	*Oil type	Silicone oil
*Operating temperature	-5~50°C		
*Weight	410g		
*Main body material	Zinc die-cast (ZDC) + silver coating		
*Hinge material	SUS304		



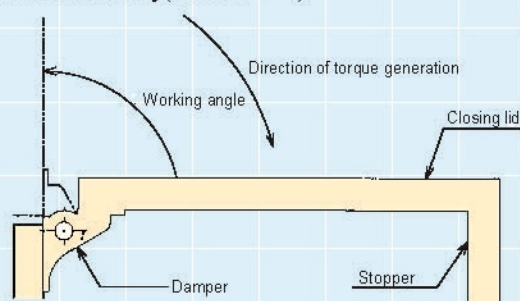
## How to Use the Damper

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

Attached externally(FHD-A1-1-\*\*\*)



Attached internally(FHD-A1-2-\*\*\*)

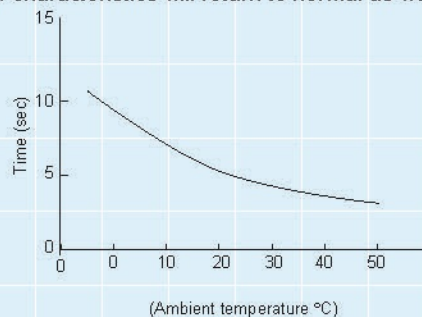


2. This damper is only for horizontal application. Please do not use this damper for vertical application.

## 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.



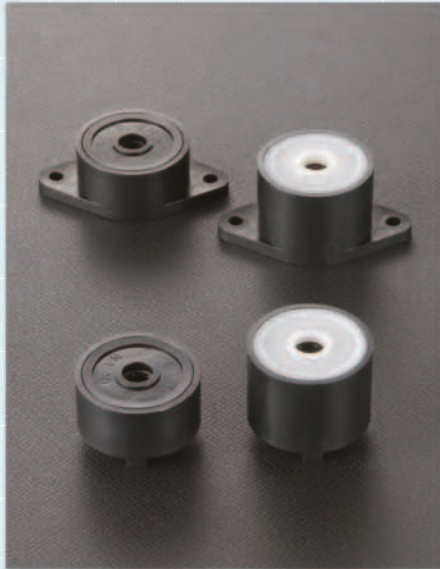


# FFD-25FS/FW/SS/SW Series

RoHS Compliant

Friction Damper [Uni-Directional]

Fixed



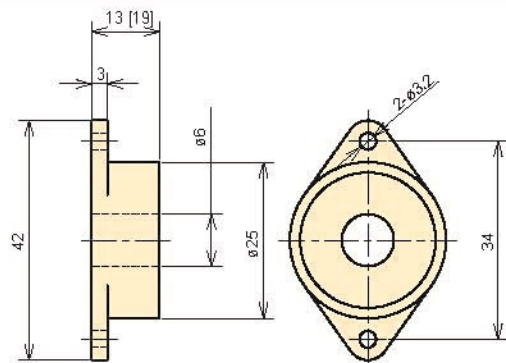
## <Specifications>

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

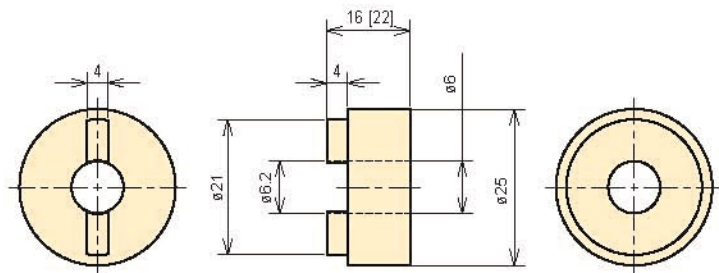
\*) Rated torque is measured at a rotation speed of 20rpm at 20~25°C

\*Max. rotation speed 30rpm  
 \*Max. cycle rate 13 cycle/min  
 \*Operating temperature -10~60°C(90%RH)

\*Weight FFD-25FS 13±2g  
 FFD-25FW 24±2g  
 FFD-25SS 12±2g  
 FFD-25SW 23±2g  
 \*Body and cap material POM  
 \*Cap colour R: Black L: White



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.
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 one-way clutch.)

Shaft's external dimensions	ø6 <sub>-0.03</sub>
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 (or R0.2~R0.3)

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

RoHS Compliant

Friction Damper [Uni-Directional]

Fixed



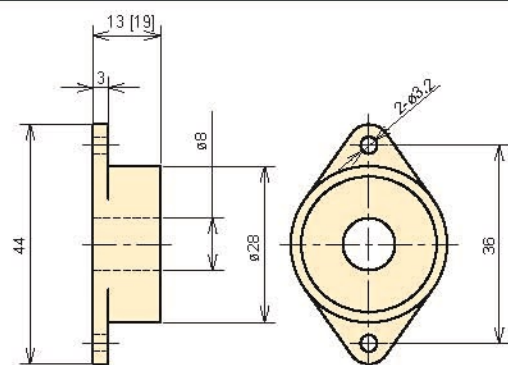
## <Specifications>

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

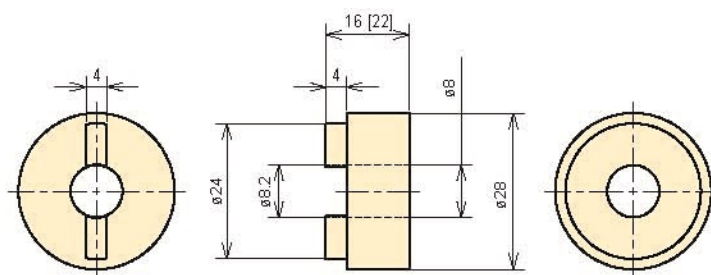
\*) Rated torque is measured at a rotation speed of 20rpm at 20~25°C

\*Max. rotation speed 30rpm  
 \*Max. cycle rate 13 cycle/min  
 \*Operating temperature -10~60°C(90%RH)

\*Weight FFD-28FS 14±2g  
 FFD-28FW 27±2g  
 FFD-28SS 14±2g  
 FFD-28SW 25±2g  
 \*Body and cap material POM  
 \*Cap colour R: Black L: White



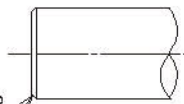
FFD-28FS-\*\*\*\*  
 (Dimension of FFD-28FW-\*\*\*\* are in [ ])



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

Shaft's external dimensions	ø8 <sub>-0.03</sub>
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 (or R0.2~R0.3)

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 one-way clutch.)



Soft Silent Safety

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

RoHS Compliant

Friction Damper [Uni-Directional]

Fixed



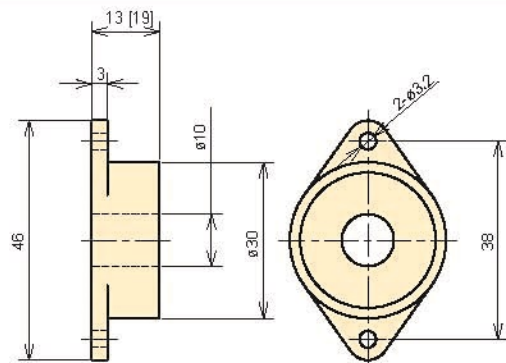
## <Specifications>

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

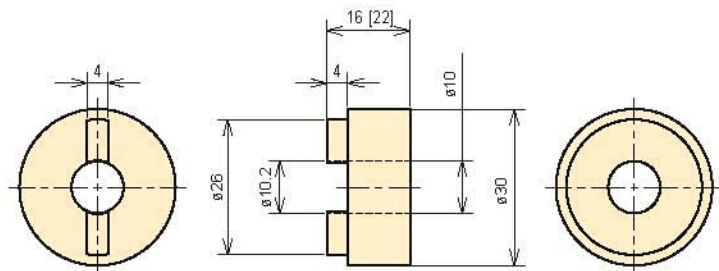
\*) Rated torque is measured at a rotation speed of 20rpm at 20~25°C

\*Max. rotation speed 30rpm  
 \*Max. cycle rate 13 cycle/min  
 \*Operating temperature -10~60°C(90%RH)

\*Weight FFD-30FS 17±2g  
 FFD-30FW 31±2g  
 FFD-30SS 16±2g  
 FFD-30SW 30±2g  
 \*Body and cap material POM  
 \*Cap colour R: Black L: White



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



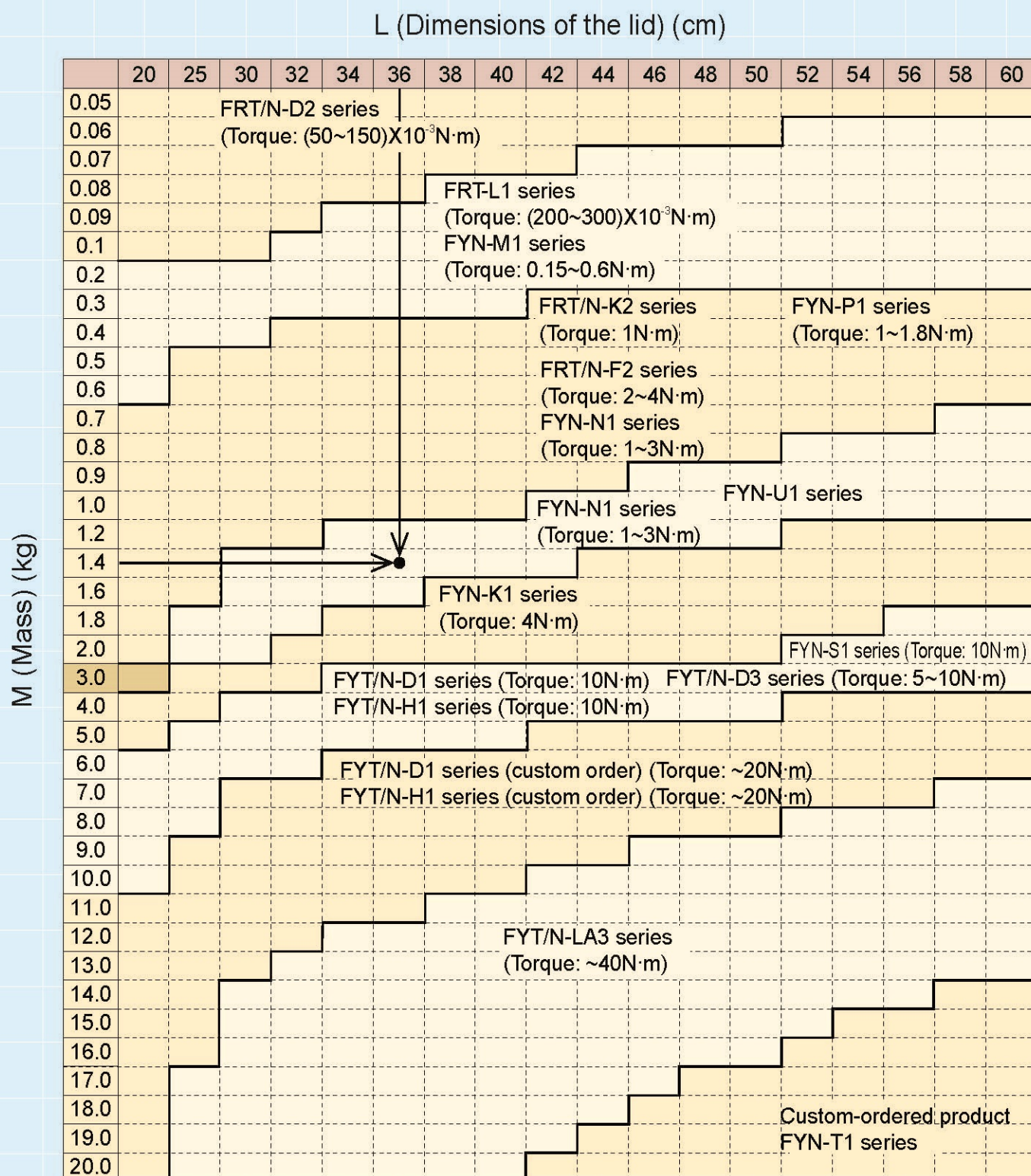
FFD-30SS-\*\*\*\*  
 (Dimension of FFD-30SW-\*\*\*\* are in [ ]) )

## How to Use the Damper

- The damper generates torque in both the clockwise and counter-clockwise directions. (A one-way clutch is built in inside the damper.)
- Please make sure that the shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
- It can be used as a free-stop for a load that is smaller than the rated torque.
- 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.
- 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 one-way clutch.)

Shaft's external dimensions	φ 10 <sub>-0.03</sub>
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 (or R0.2~R0.3)

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

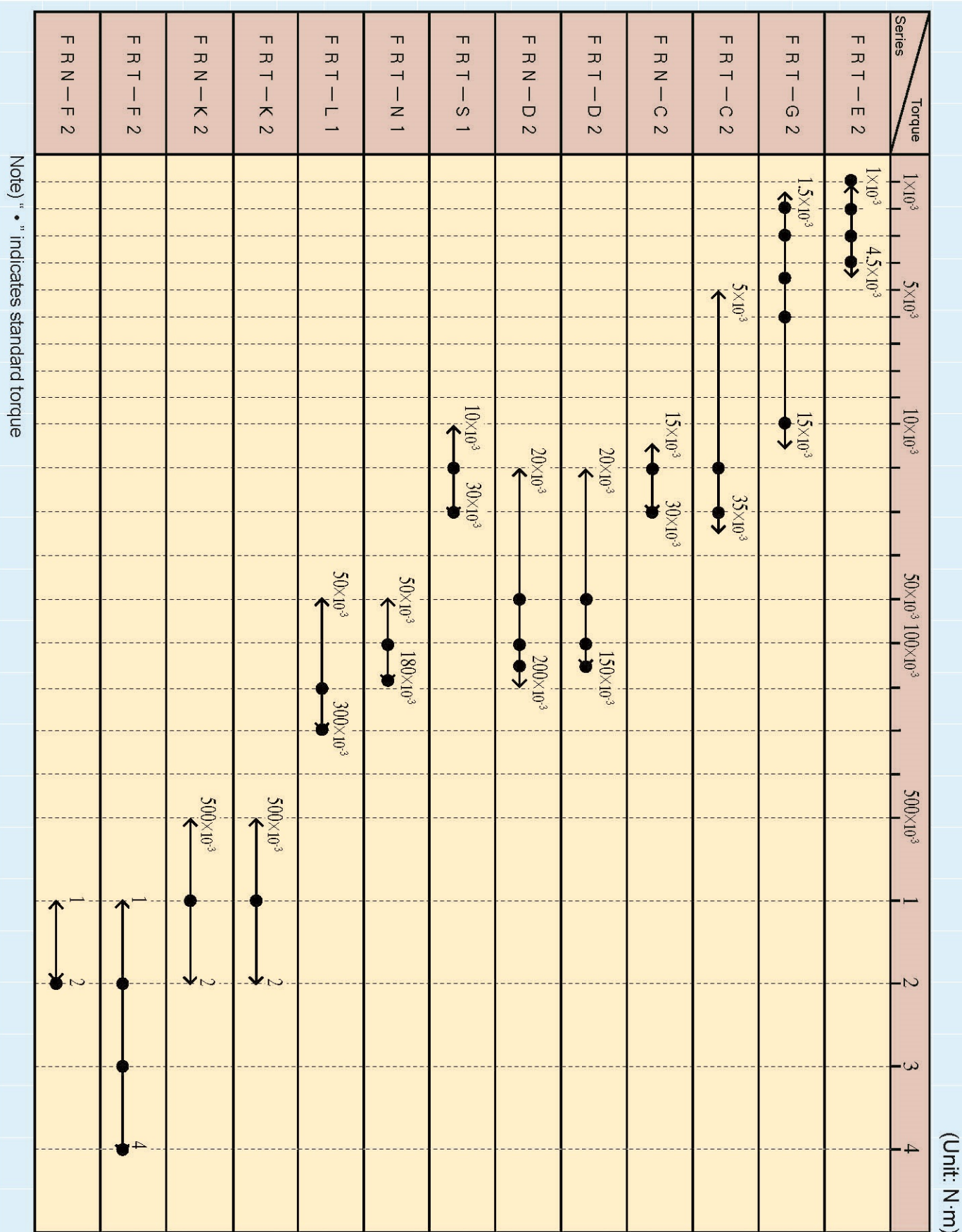


- ◆ How to use the table: Find the lid's mass (M) on the y-axis and the dimensions of the lid (L) on the x-axis. Locate the intersection and choose the damper that corresponds to that area.  
 Example: Lid's mass M.....1.4kg Selected model : FYN-N1  
 Dimensions of the lid L.....36cm

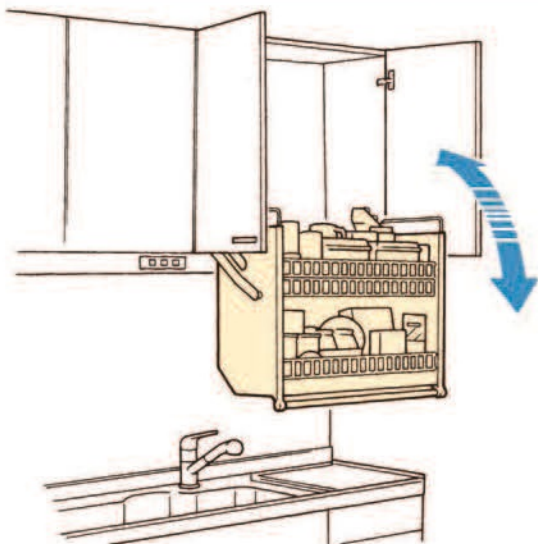
- ◆ This table should be used as a general guideline. The model selected based on this table is only a suggestion.



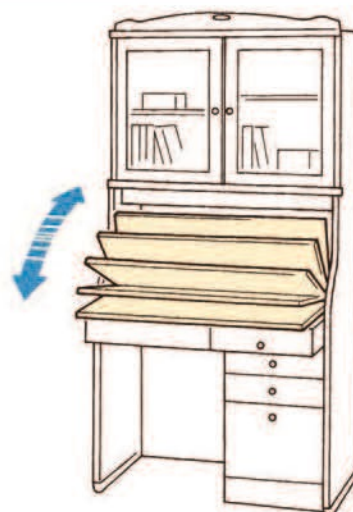
# Customizable Torque Chart for Rotary Dampers



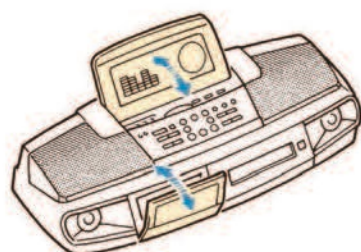
# Applications of Rotary Dampers



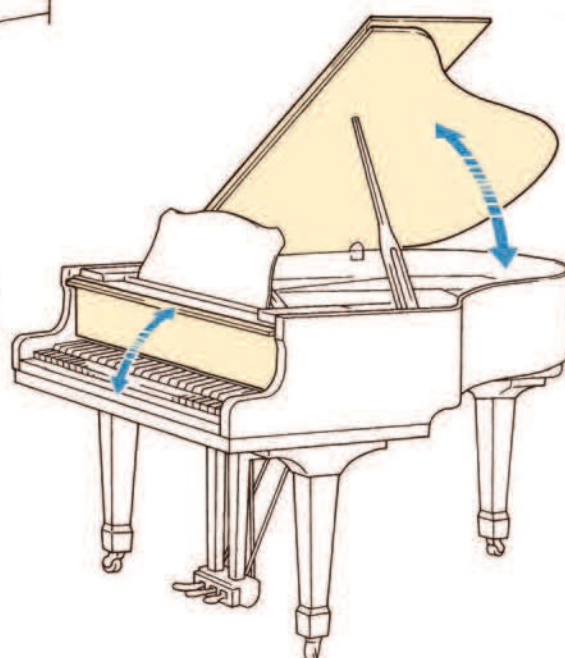
Kitchen units



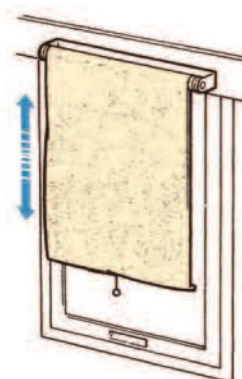
Writing desks



Stereo systems



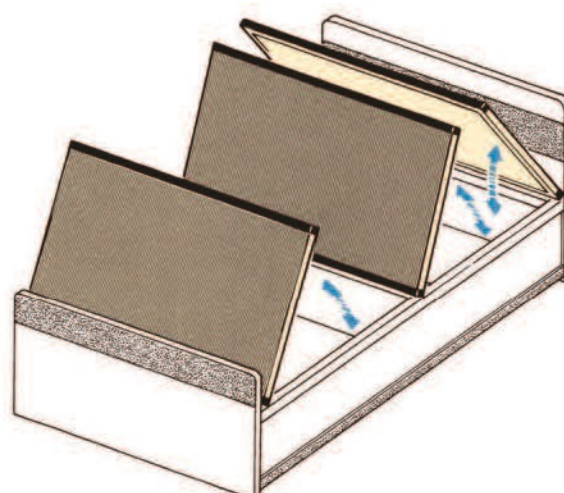
Pianos



Blinds



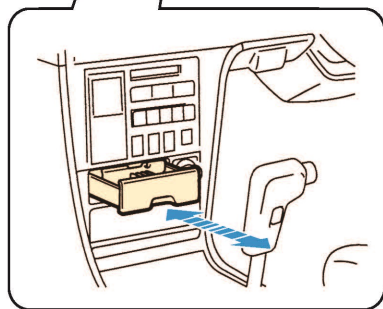
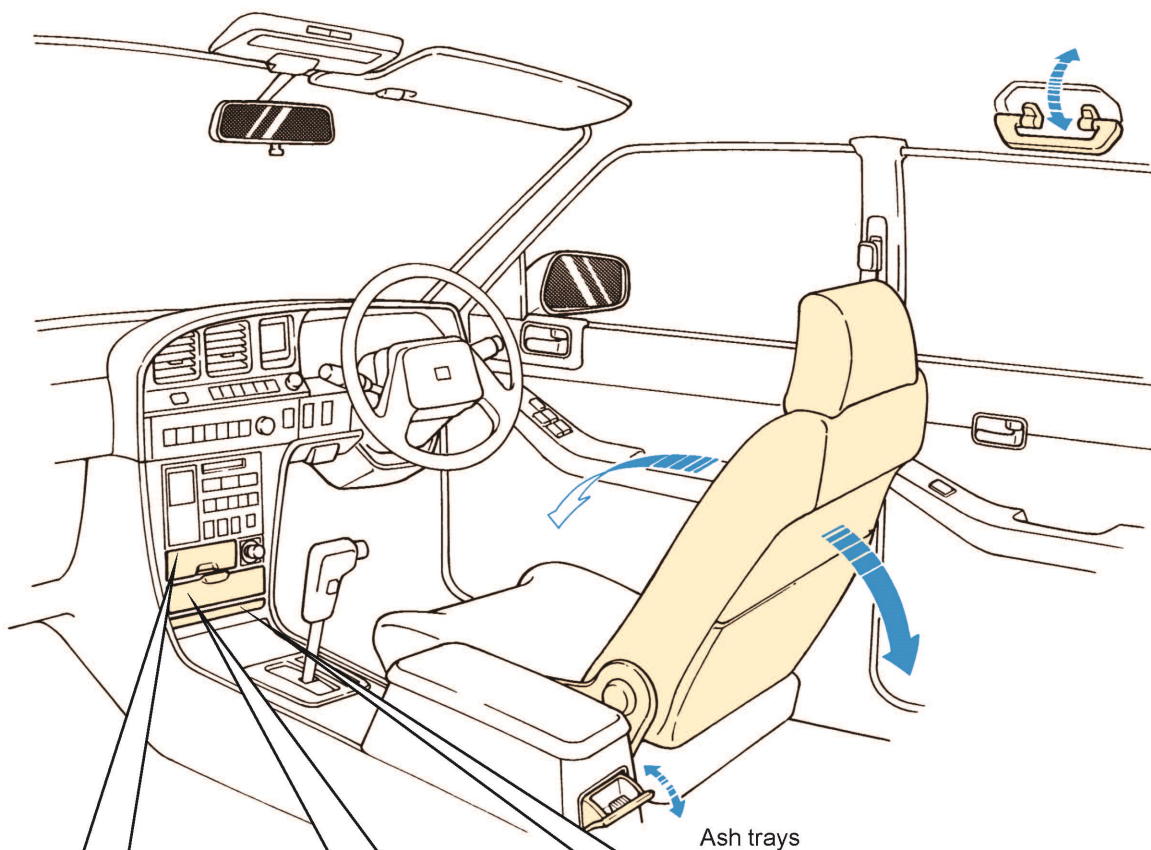
Western-style toilets



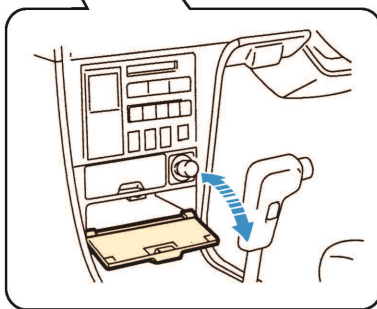
Collapsible beds



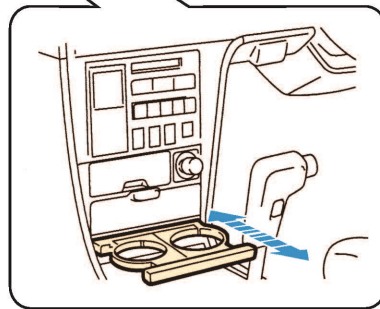
# Applications of Rotary Dampers



Ash trays



Storage compartments



Cup holders