

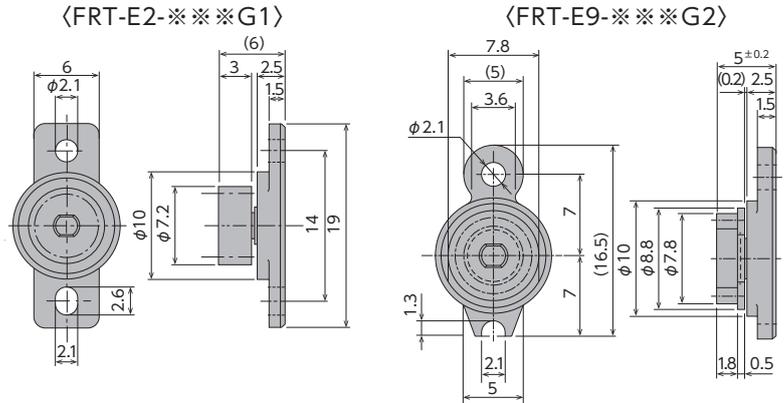
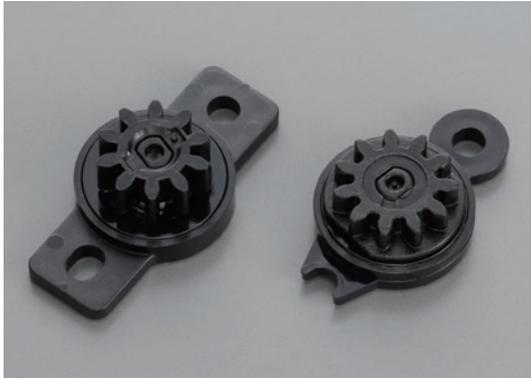
Rotary Damper

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

FRT-E2/E9 Series

RoHS Compliant

●Products specification might be changed without notice.



Specifications

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

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

Note 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 178)
 Note 4) Model E9 is a customized product with a one-sided mounting

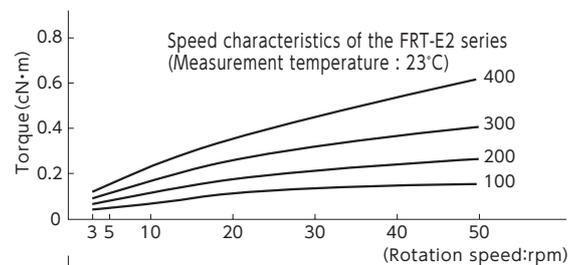
Gear Specifications

| Model | G1 (for E2) | G2 (for E9) |
|-----------------------|--------------------|--------------------|
| Type | Standard spur gear | Standard spur gear |
| Tooth profile | Involute | |
| Module | 0.6 | |
| Pressure angle | 20° | |
| Number of teeth | 10 | 11 |
| Pitch circle diameter | $\phi 6$ | $\phi 6.6$ |

Damper Characteristics

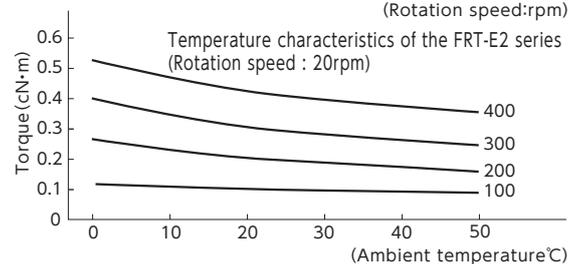
1. Speed characteristics

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



2. Temperature characteristics

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



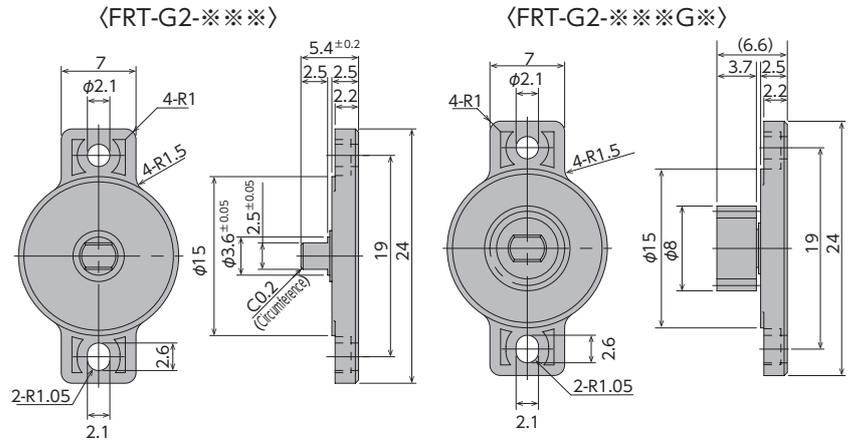
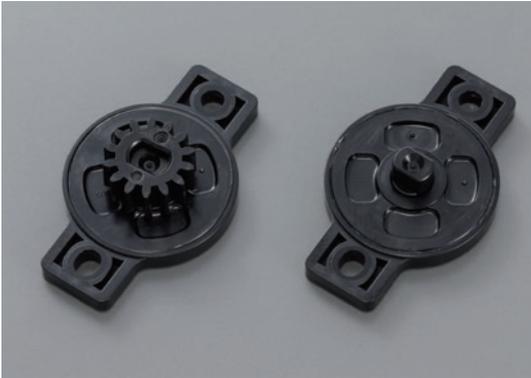
Rotary Damper

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

FRT-G2 Series

RoHS Compliant

●Products specification might be changed without notice.



Specifications

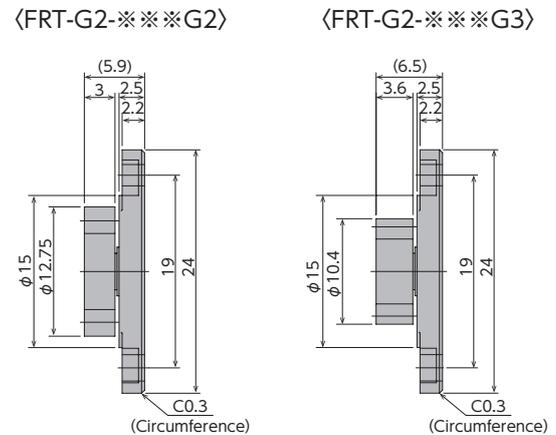
| Model | Rated torque |
|----------------|--|
| FRT-G2-200(G*) | $(2\pm 0.7)\times 10^{-3}\text{N}\cdot\text{m}$ 20±7 gf·cm |
| FRT-G2-300(G*) | $(3\pm 0.8)\times 10^{-3}\text{N}\cdot\text{m}$ 30±8 gf·cm |
| FRT-G2-450(G*) | $(4.5\pm 1)\times 10^{-3}\text{N}\cdot\text{m}$ 45±10 gf·cm |
| FRT-G2-600(G*) | $(6\pm 1.2)\times 10^{-3}\text{N}\cdot\text{m}$ 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 10cycle/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 178)
 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 | - | +0.375 | - |



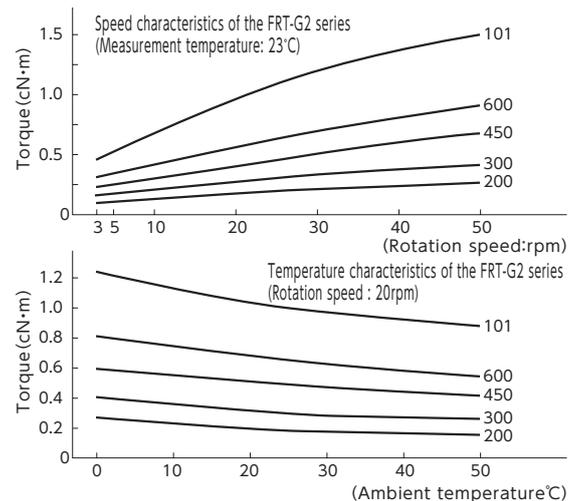
Damper Characteristics

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.



New products
1 Soft Absorber
2 Rotary Damper
3 Magnum Series
4 Speed Controller
5 Helical Isolator
6 Model Selection Form

Rotary Damper

Fixed Type

Bi-Directional

Uni-Directional

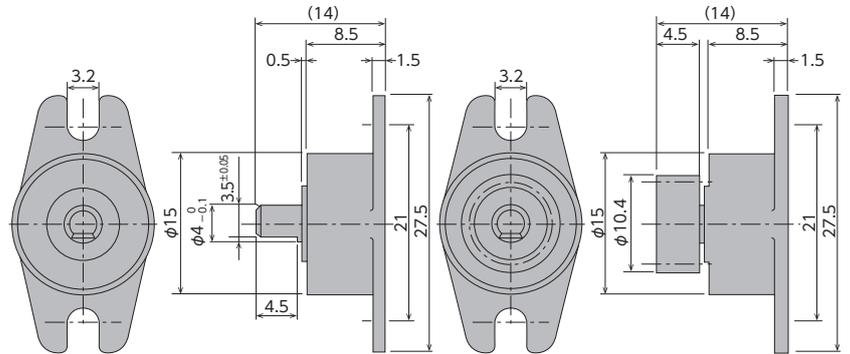
Adjustable type

Self-adjusting

FRT/FRN-C2 Series

RoHS Compliant

●Products specification might be changed without notice.



Specifications

| Model | Rated torque | Damping direction |
|------------------|--|-------------------|
| FRT-C2-201 (G1) | $(20\pm 6)\times 10^{-3}\text{N}\cdot\text{m}$ 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±80 gf·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 178)

● There are dampers that generate torque in both directions and one-way torque in the CW direction or CCW direction when the rotating axle is viewed from the top.

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

Gear Specifications

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

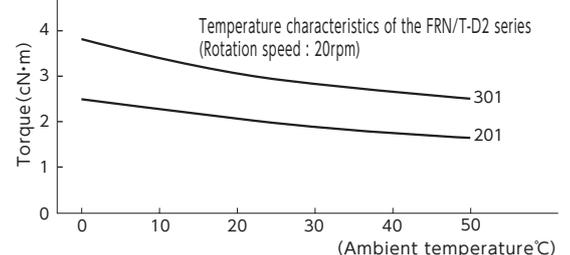
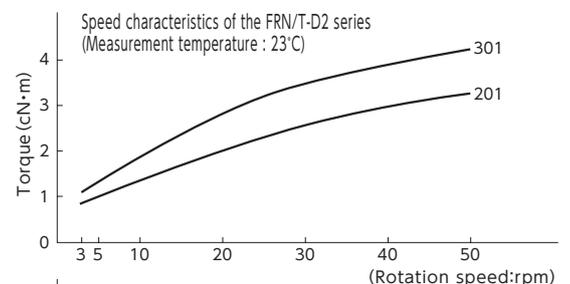
Damper Characteristics

1. Speed characteristics

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

2. Temperature characteristics

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



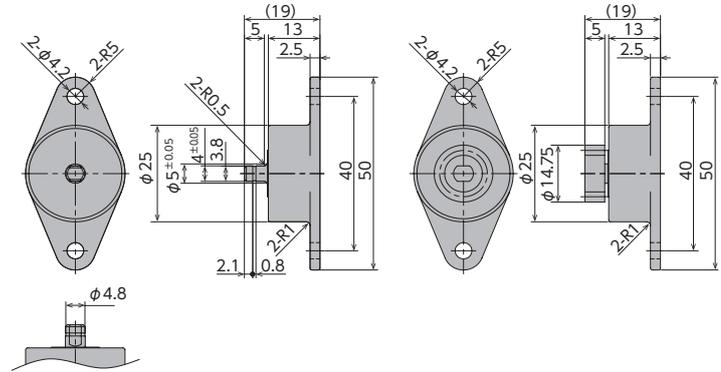
Rotary Damper

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

FRT/FRN-D3 Series

RoHS Compliant

● Products specification might be changed without notice.



Specifications

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

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

Gear Specifications

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

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

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

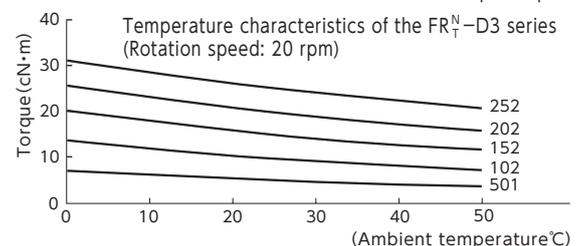
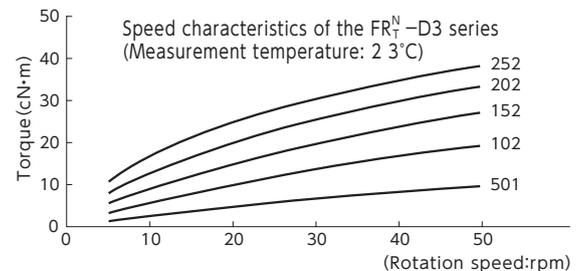
Damper Characteristics

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.



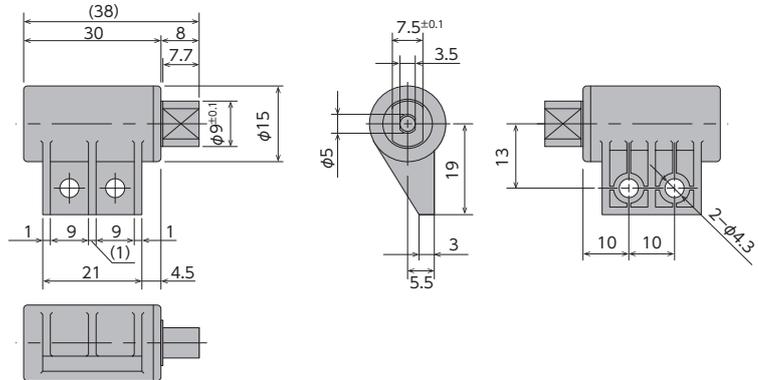
Rotary Damper

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

FRT-N1 Series

RoHS Compliant

●Products specification might be changed without notice.



Specifications

| Model | Rated torque |
|------------|--|
| FRT-N1-102 | $(100 \pm 20) \times 10^{-3} \text{N}\cdot\text{m}$ $1,000 \pm 200 \text{gf}\cdot\text{cm}$ |
| FRT-N1-182 | $(180 \pm 36) \times 10^{-3} \text{N}\cdot\text{m}$ $1,800 \pm 360 \text{gf}\cdot\text{cm}$ |

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 178.)

- * Max. rotational speed 50rpm
- * Max. cycle rate 10cycle /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

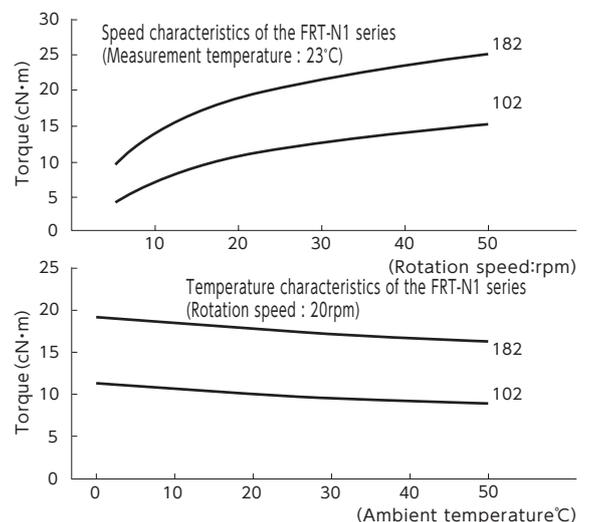
Damper Characteristics

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.



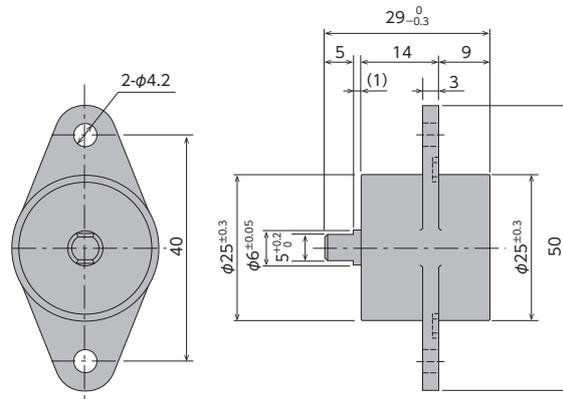
Rotary Damper

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

FRT-L1 Series

RoHS Compliant

● Products specification might be changed without notice.



Specifications

| Model | Rated torque |
|------------|--|
| FRT-L1-202 | $(200 \pm 40) \times 10^{-3} \text{N}\cdot\text{m}$ 2,000±400 gf·cm |
| FRT-L1-302 | $(300 \pm 60) \times 10^{-3} \text{N}\cdot\text{m}$ 3,000±600 gf·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 178.)

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

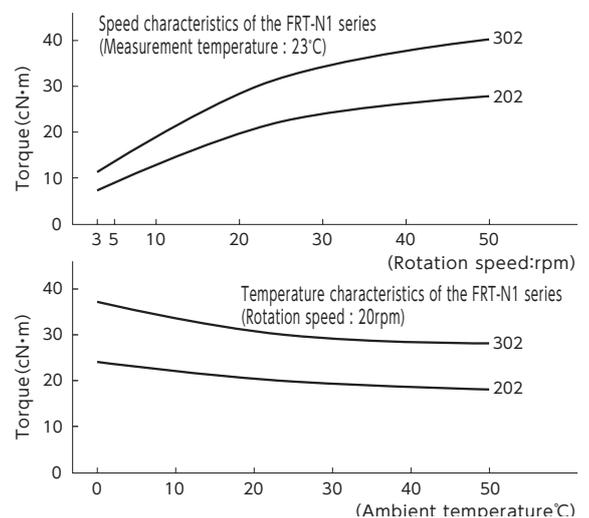
Damper Characteristics

1. Speed characteristics

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

2. Temperature characteristics

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



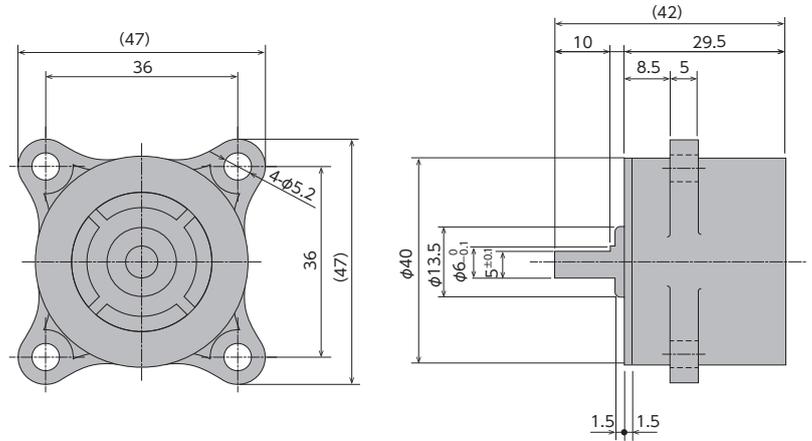
Rotary Damper

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

FRT/FRN-K2 Series

RoHS Compliant

● Products specification might be changed without notice.



Specifications

| Model | Rated torque | Damping direction |
|-------------|--|-------------------|
| FRT-K2-103 | $1 \pm 0.2 \text{ N}\cdot\text{m}$ ($10 \pm 2 \text{ kgf}\cdot\text{cm}$) | 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 |

- * Max. rotational speed: 50rpm
- * Max. cycle rate: 10cycle /min
- * Operating temperature: $0 \sim 50^\circ\text{C}$
- * Weight: FRT-K2 : 78.3g, FRN-K2 : 56.6g
- * Main body 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 178)

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

● An FRT type damper generates torque in both directions and an FRN type generates one-way torque in the CW direction (R) or CCW direction (L) when the rotating axle is viewed from the top.

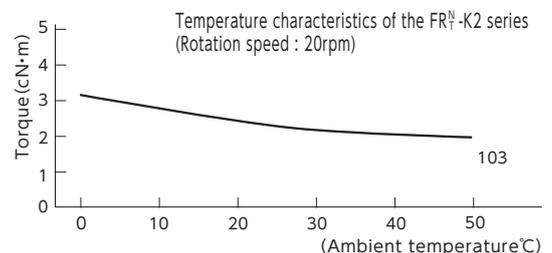
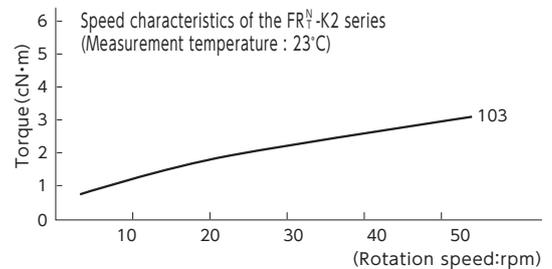
Damper Characteristics

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

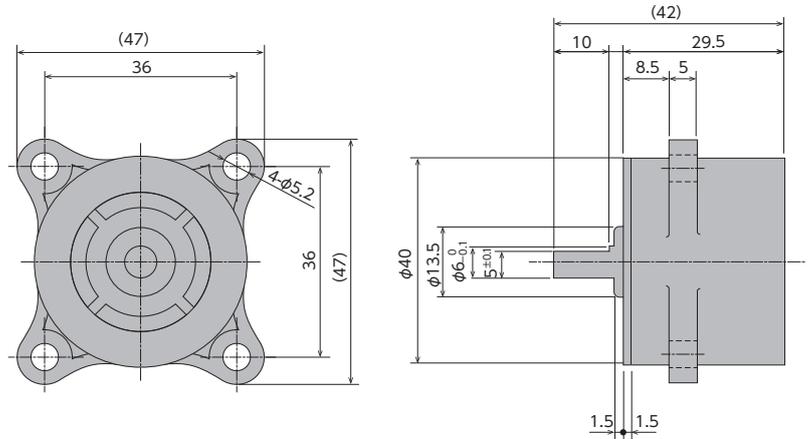
Fixed Type

Bi-Directional
Adjustable typeUni-Directional
Self-adjusting

FRT/FRN-F2 Series

RoHS Compliant

● Products specification might be changed without notice.



Specifications

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

- * Max. rotational speed 50rpm
- * Max. cycle rate 10cycle /min
- * Operating temperature 0 ~50°C
- * Weight FRT-K2 : 115.6g
FRN-K2 : 93.2g
- * Main body 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 Cutomizable Torque Chart on page 178)

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

● An FRT type damper generates torque in both directions and an FRN type generates one-way torque in the CW direction (R) or CCW direction (L) when the rotating axle is viewed from the top.

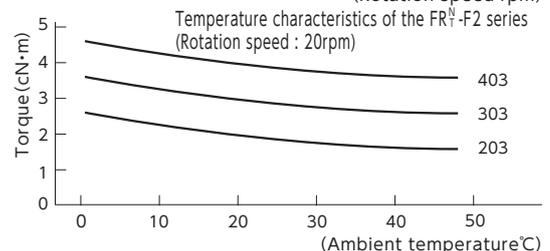
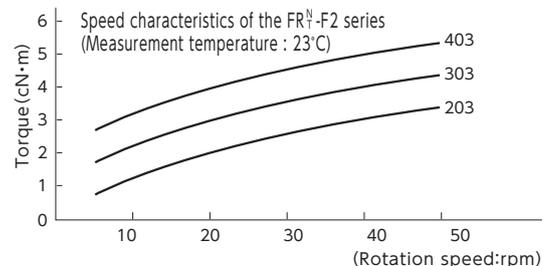
Damper Characteristics

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

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



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

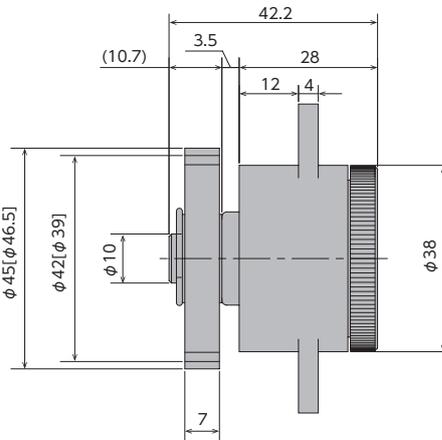
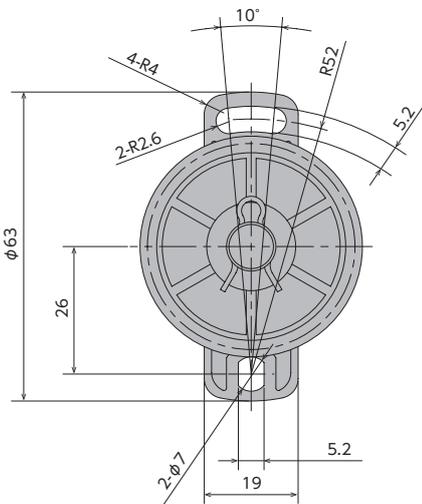
Specifications

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

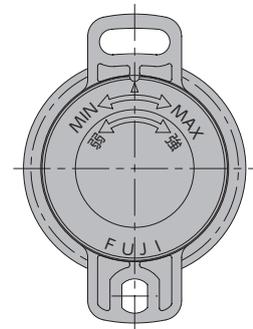
Note 1) Rated torque is measured at a rotation speed of 20rpm at 23°C (adjustment knob set at MAX)
 ● There are dampers that generate torque in the CW direction or CCW direction when the rotating axle is viewed from the top.

Gear Specifications

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

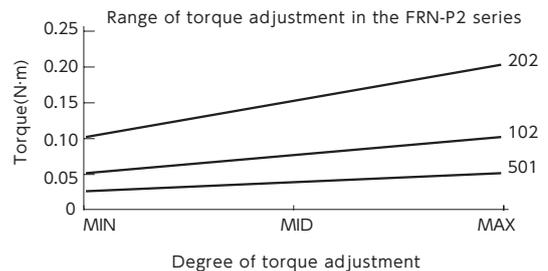
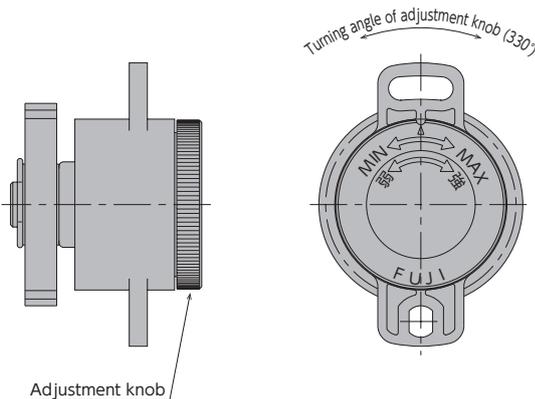


Dimensions of G2 gear are in []



How to Adjust Torque

Range of Torque Adjustment



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

●Products specification might be changed without notice.

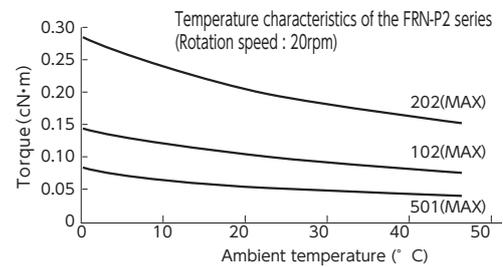
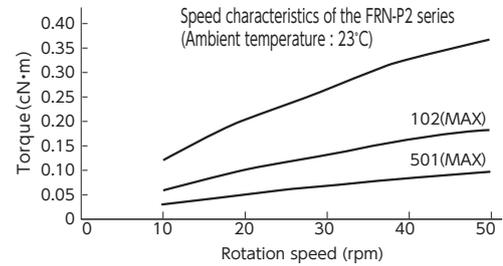
Characteristics

1. Speed characteristics

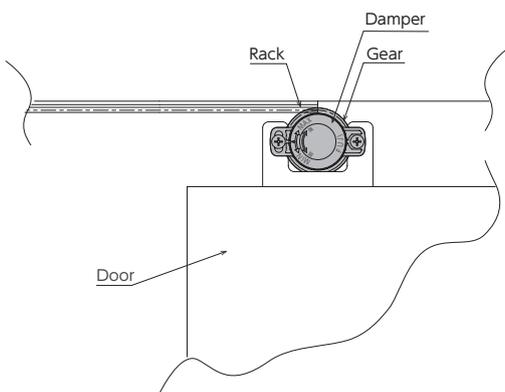
A rotary damper's torque varies according to the rotation speed. In general, as shown in the graph to the right, the torque increases as the rotation speed increases, and the torque decreases as the rotation speed decreases. In addition, please note that the starting torque slightly differs from the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

2. Temperature characteristics

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



Example of Using a Damper



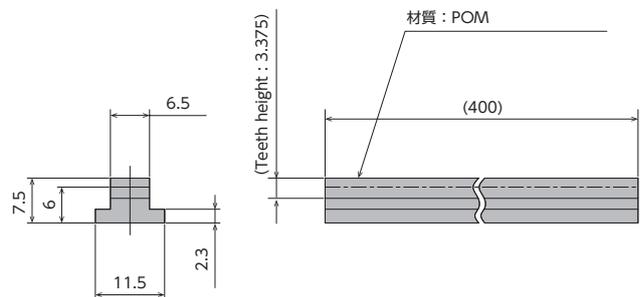
Application of the FRN-P2 Series

Option Rack

G1 Rack : ROP-020P2-1

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

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



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

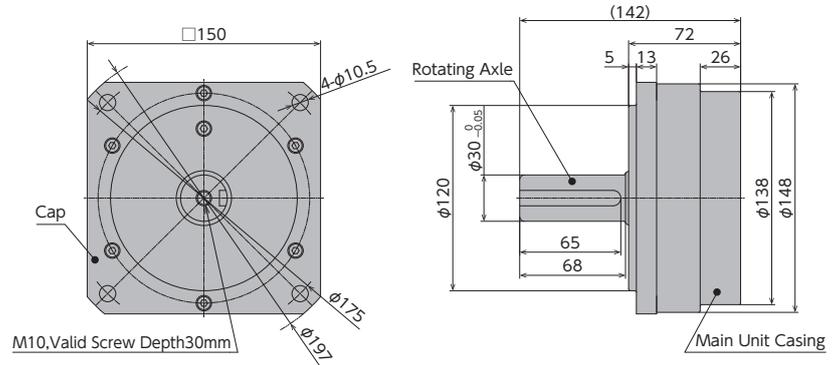
Rotary Damper

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

FRT-W1

RoHS Compliant

●Products specification might be changed without notice.



Specifications

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

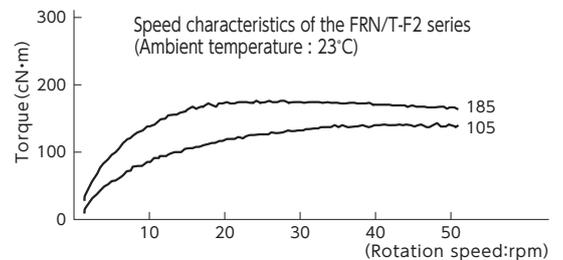
Note 1) Rated torque measured at a rotation speed of 20rpm at 23°C

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

Damper Characteristics

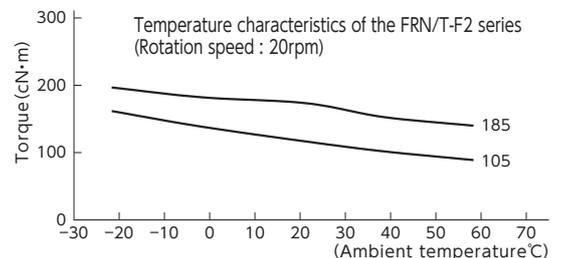
1. Speed characteristics

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



2. Temperature characteristics

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



Disk Damper

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

FDT-47A/FDN-47A Series

RoHS Compliant

●Products specification might be changed without notice.

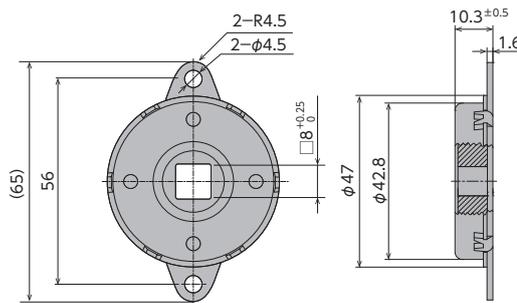


- * Max. rotation speed 50rpm
- * Max. cycle rate 12cycle /min
- * Operating temperature -10~50°C
- * Weight FDT-47A : 50g
 FDN-47A : 55g
- * Main body material Iron (SPFC)
- * Rotating (shaft) material Nylon (with glass)
- * Oil type Silicone oil

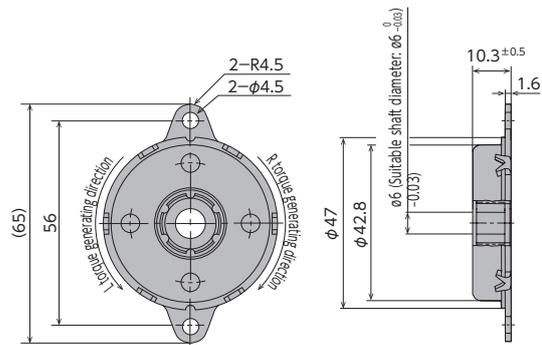
Specifications

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

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



<FDT-47A-※※※>

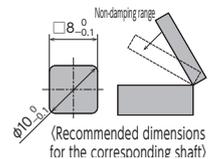


<FDN-47A-R/L※※※>

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.

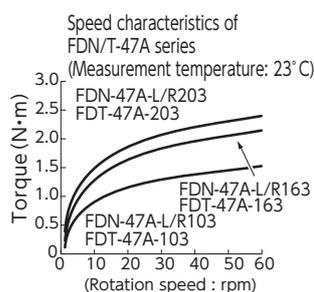
| | |
|-------------------------------------|----------------------------|
| Shaft's external dimensions | $\phi 6_{-0.03}^0$ |
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) | $C0.2-C0.3$ (or R0.2-R0.3) |
- 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 oneway 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.
- Please contact us when a continuous rotation is planned.



Damper Characteristics

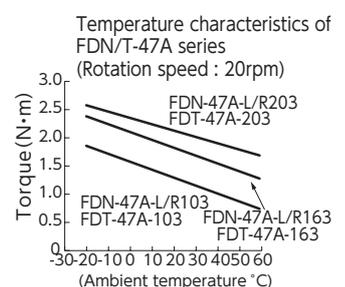
1. Speed characteristics

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



2. Temperature characteristics

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



Disk Damper

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

FDT-57A/FDN-57A Series

RoHS Compliant

●Products specification might be changed without notice.

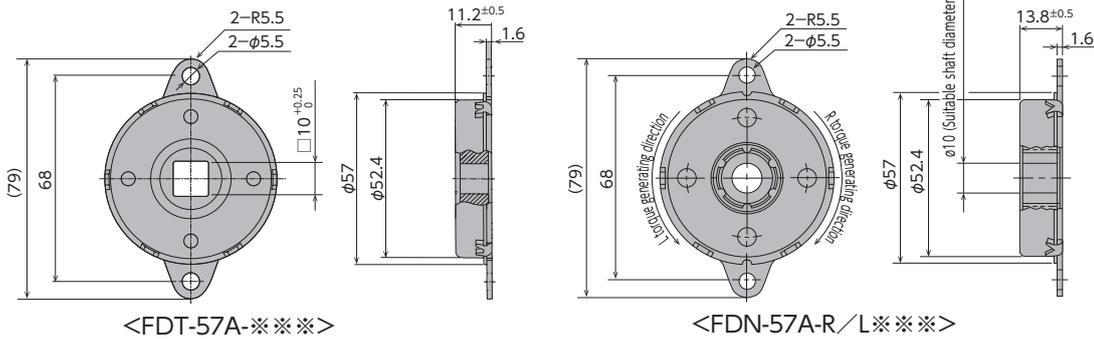


- * Max. rotation speed 50rpm
- * Max. cycle rate 12cycle /min
- * Operating temperature -10~50°C
- * Weight FDT-57A : 75g
FDN-57A : 94g
- * Main body material Iron (SPFC)
- * Rotating (shaft) material Nylon (with glass)
- * Oil type Silicone oil

Specifications

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

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

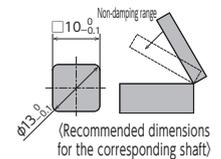


How to Use the Damper

- 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 | $\phi 10_{-0.03}^0$ |
| 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-R0.5) |

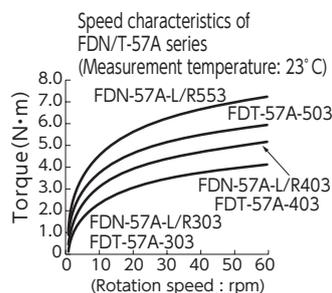
- To insert a shaft into FDN-57A, insert the shaft while spinning it in the idling direction of the one-way clutch. (Do not force the shaft in from the regular direction. This may damage the oneway clutch.)
- When using FDT-57A, please ensure that a shaft with specified angular dimensions is inserted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



Damper Characteristics

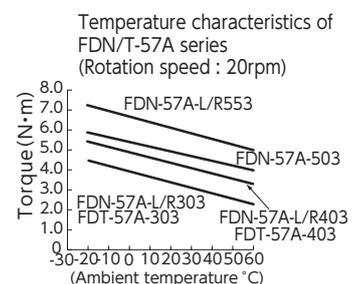
①1. Speed characteristics

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



②2. Temperature characteristics

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



Disk Damper

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

FDT-63A/FDN-63A Series

RoHS Compliant

●Products specification might be changed without notice.

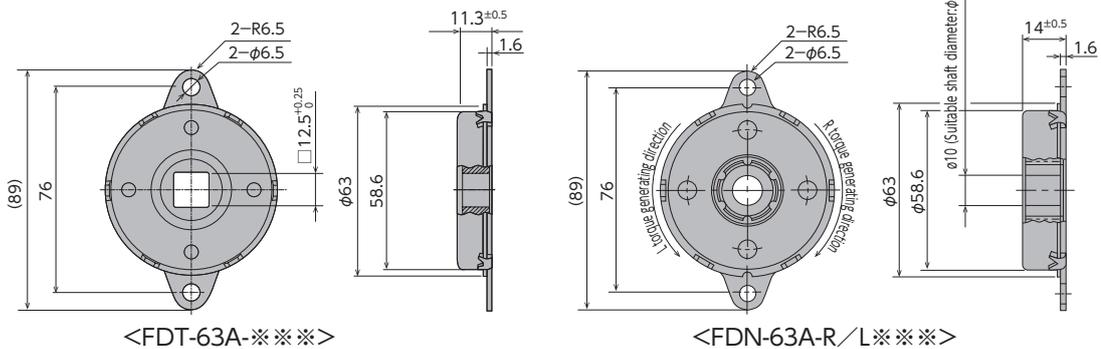


- * Max. rotation speed 50rpm
- * Max. cycle rate 12cycle /min
- * Operating temperature -10~50°C
- * Weight FDT-63A : 92g
 FDN-63A : 115g
- * Main body material Iron (SPFC)
- * Rotating (shaft) material Nylon (with glass)
- * Oil typepl Silicone oil

Specifications

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

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

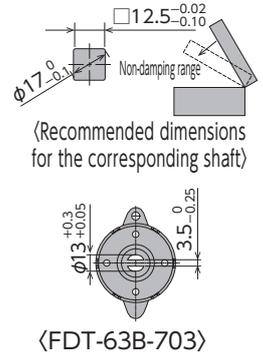


How to Use the Damper

- 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

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

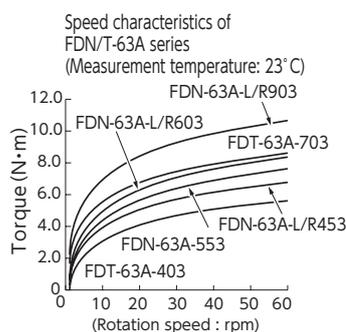
- from the regular direction. This may damage the one-way clutch.)
- When using FDT-63A, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. A wobbling shaft and damper shaft may not allow the lid to slow down properly when closing. Please see the diagrams 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
- Please contact us when a continuous rotation is planned.



Damper Characteristics

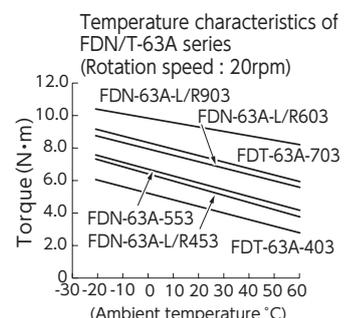
1. Speed characteristics

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



2. Temperature characteristics

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



Disk Damper

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

FDT-70A/FDN-70A Series

RoHS Compliant

●Products specification might be changed without notice.

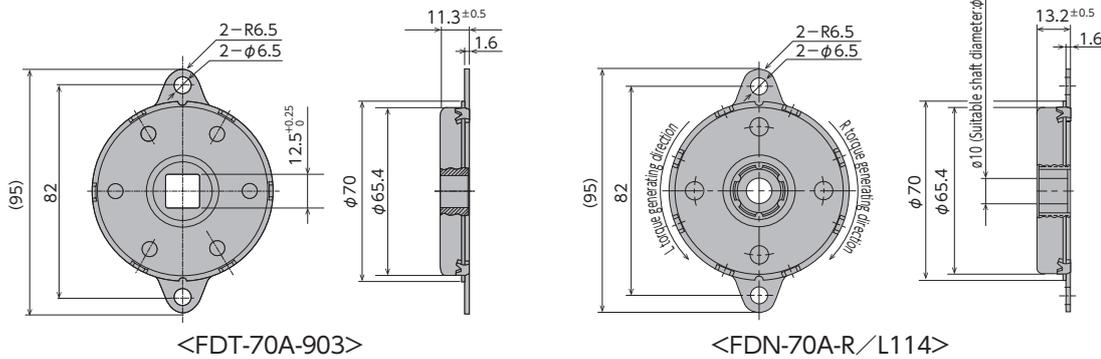


- * Max. rotation speed 50rpm
- * Max. cycle rate 12cycle /min
- * Operating temperature -10~50°C
- * Weight FDT-70A : 112g
FDN-70A : 136g
- * Main body material Iron (SPFC)
- * Rotating (shaft) material Nylon (with glass)
- * Oil type Silicone oil

Specifications

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

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

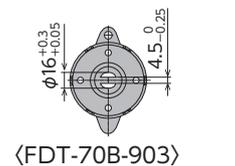
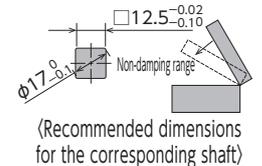


How to Use the Damper

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

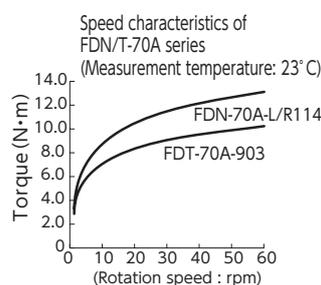
4. To insert a shaft into FDN-70A, insert the shaft while spinning it in the idling direction of the one-way clutch. (Do not force the shaft in from the regular direction. This may damage the one-way clutch.)
5. When using FDT-70A, please ensure that a shaft with specified angular dimensions is inserted 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
7. Please contact us when a continuous rotation is planned.



Damper Characteristics

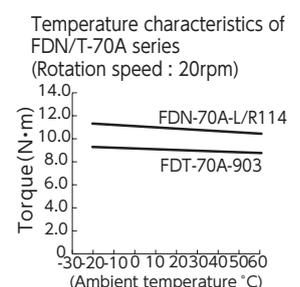
1. Speed characteristics

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



2. Temperature characteristics

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



Vane Damper

FYN-M1 Series



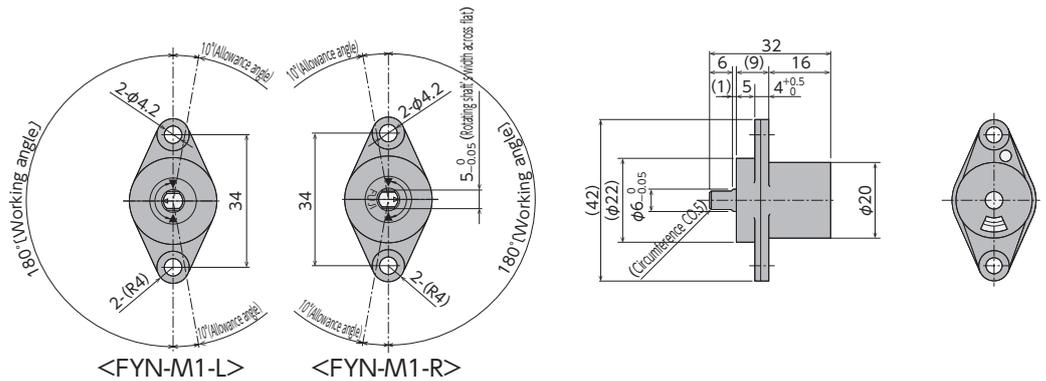
Specifications

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

Note) Measured at 23°C±2°C

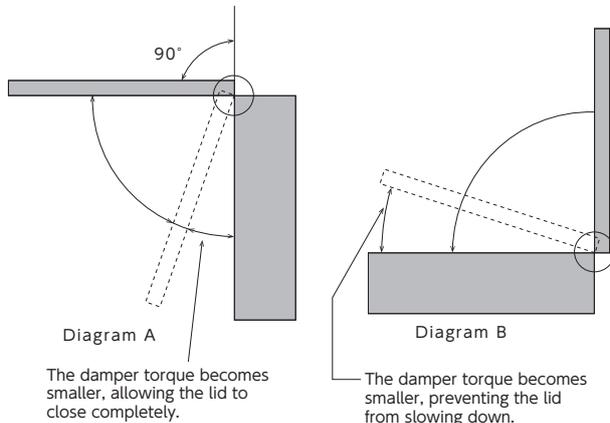
- * Max. angle 180°
- * Max. cycle rate 6cycle /min
- * Operating temperature -5~50°C
- * Weight 17±2g
- * Main body Polybutylene terephthalate (PBT)
- * Cap material Polybutylene terephthalate (PBT)

- * Rotating shaft material Zinc die-cast (ZDC)
- * Oil type Silicone oil
- * Cap colour R: Black L: Gray

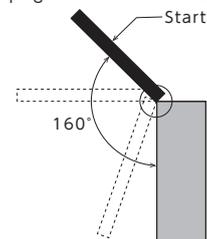
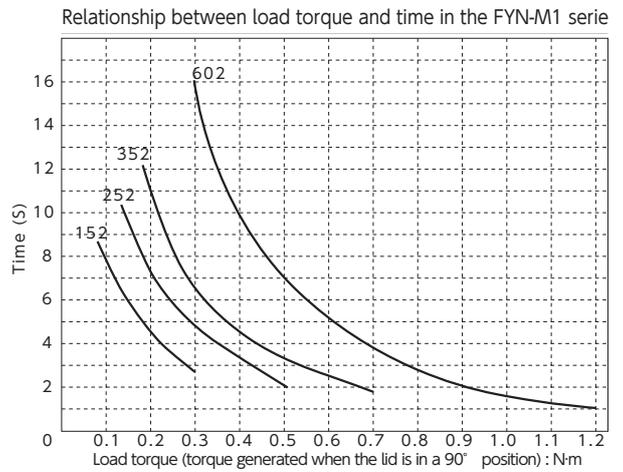


How to Use the Damper

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

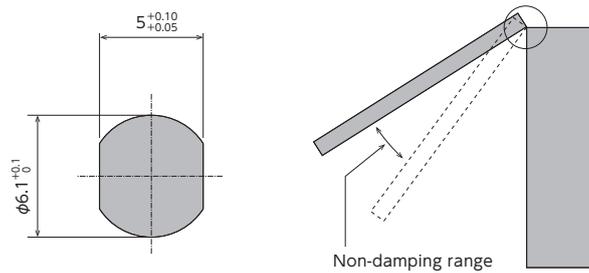


2. Below is a graph showing the relationship between the load torque and the time when a lid is closed from a 160° angle, as shown in the diagram.



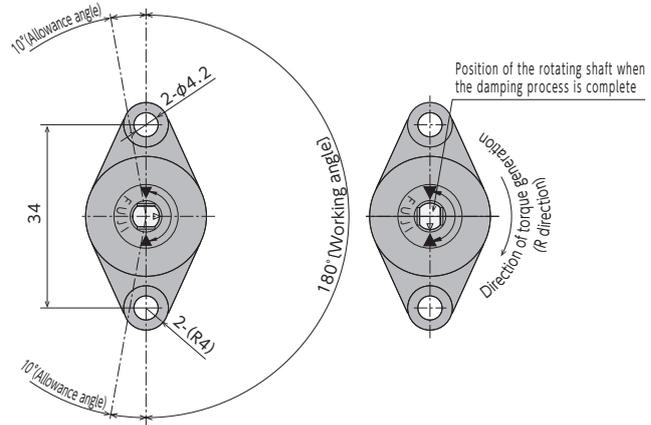
●Products specification might be changed without notice.

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



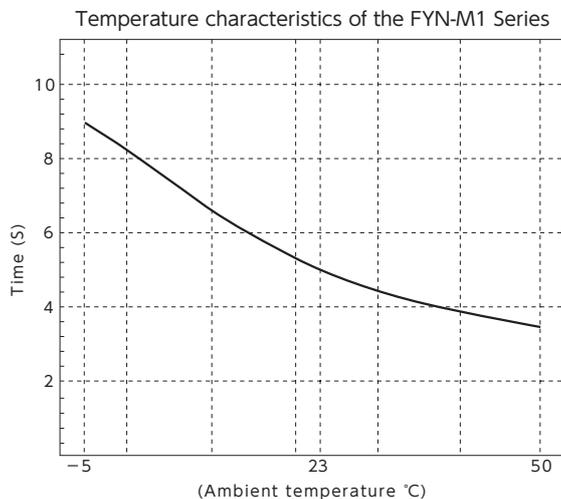
<Recommended dimensions for a rotating shaft opening>

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



<FYN-M1-R>

4. The time it takes for a lid with a damper to close 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.



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

Vane Damper

FYN-P1 Series

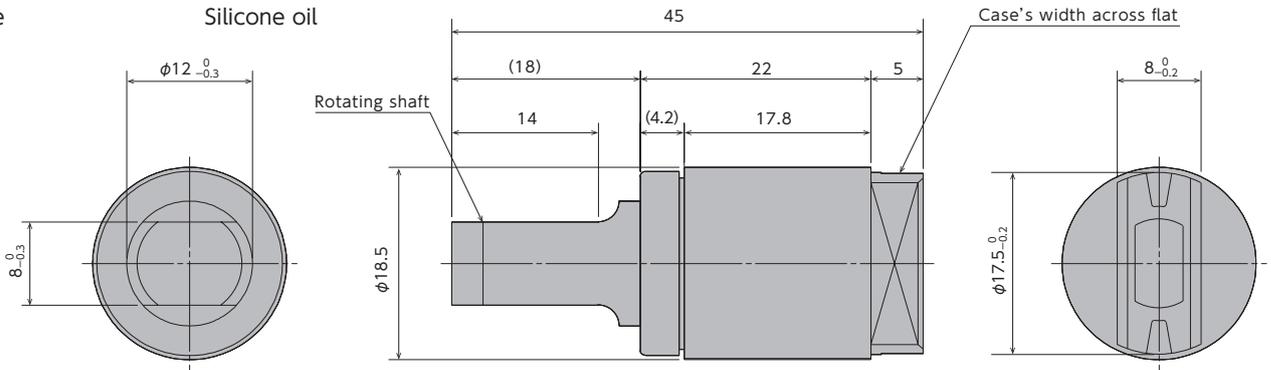


Specifications

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

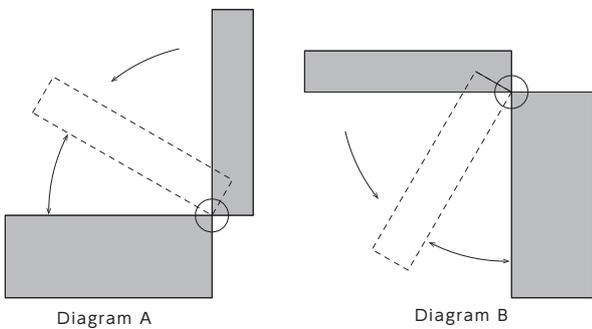
(Note) Measured at 23°C±2°C

- * Max. angle 115°
- * Operating temperature -5~50°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

- 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.

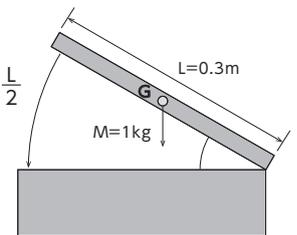


The damper torque becomes larger, preventing the lid from slowing down.

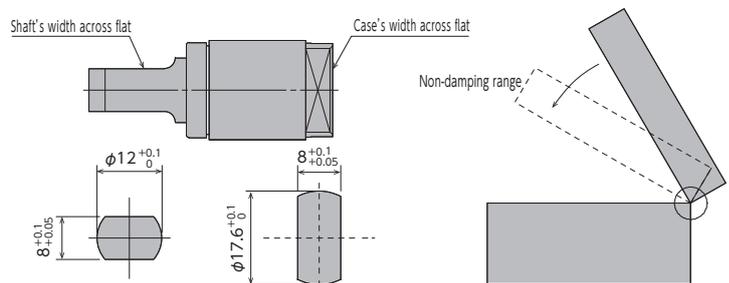
The damper torque becomes larger, preventing the lid from closing completely.

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

Example)
 Lid mass M: 1kg
 Lid dimensions L: 0.3m
 Gravity Center Position : Assumed as $\frac{L}{2}$
 Load torque : $T=1 \times 9.8 \times 0.3 \div 2$
 $=1.47\text{N}\cdot\text{m}$
 Based on the above calculation,
 FYN-P1*153 is selected.

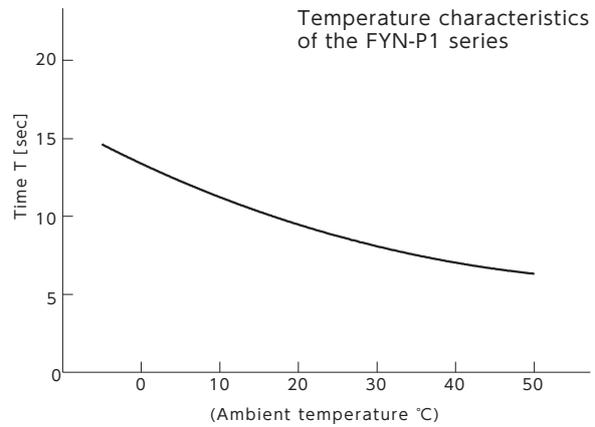


- When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.

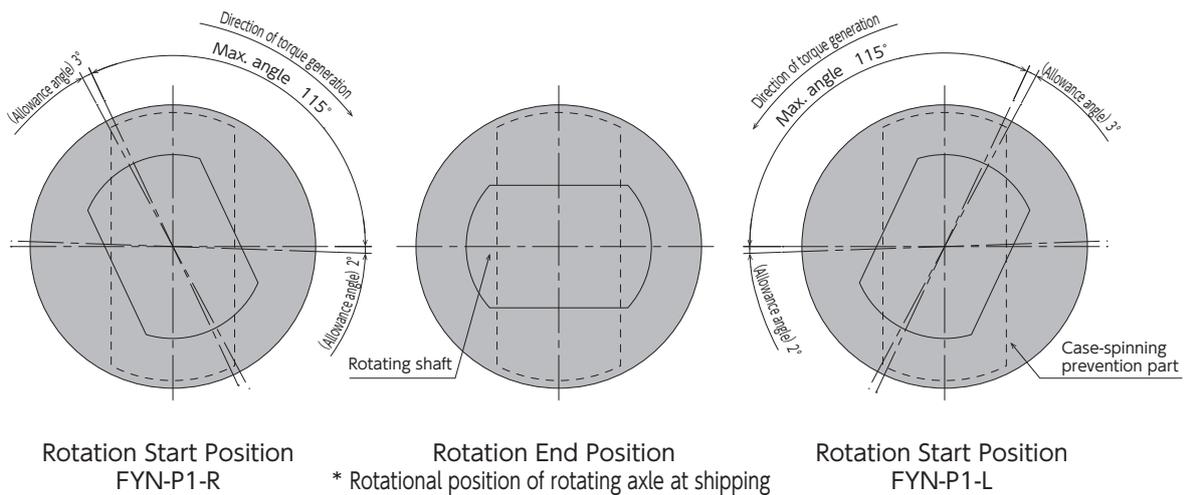


●Products specification might be changed without notice.

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



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



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

Vane Damper

FYN-N2 Series



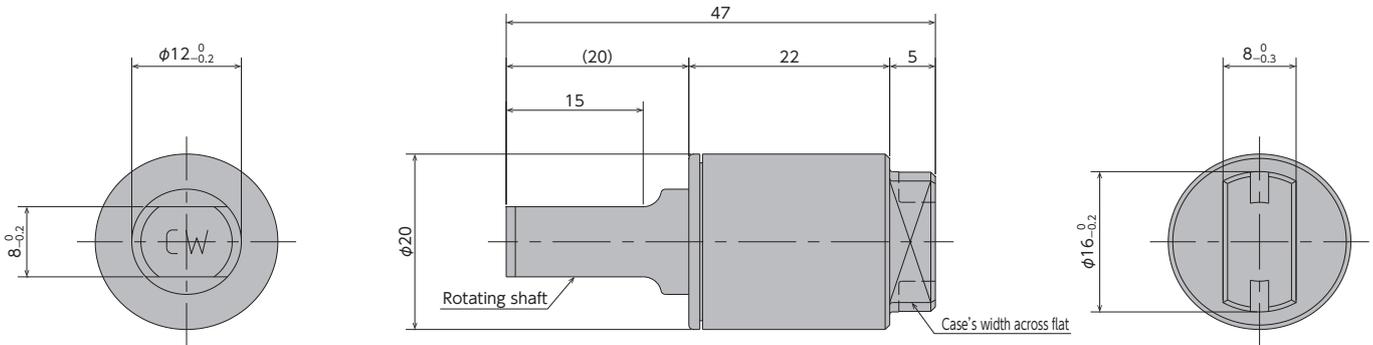
Specifications

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

Note) Measured at 23°C±2°C

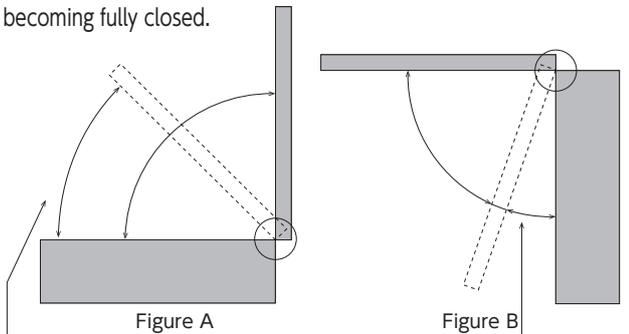
- * Max. angle 110°
- * Operating temperature -5~50°C
- * Weight 13 ± 1g
- * Body and cap material Polybutylene terephthalate (PBT)

- * Rotating shaft material Polyamide (PA)
- * Oil type Silicone oil



How to Use the Damper

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

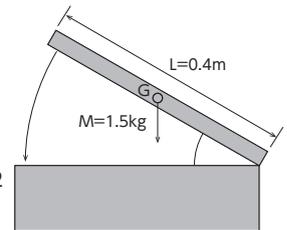


Stronger damper torque allows the lid to close gently until it is fully closed.

Stronger damper torque prevents the lid from being fully closed.

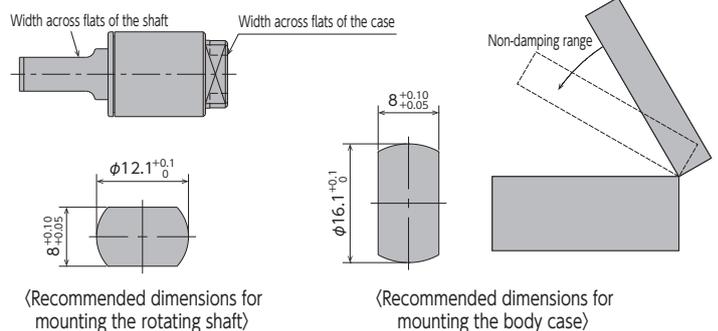
2. When using a damper with a lid shown in the diagram, determine the damper torque based on the following selection calculation.

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



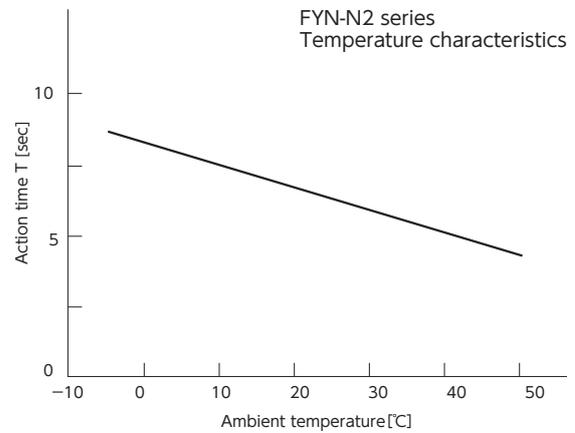
Based on the above calculation, select FYN-N2-*303.

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

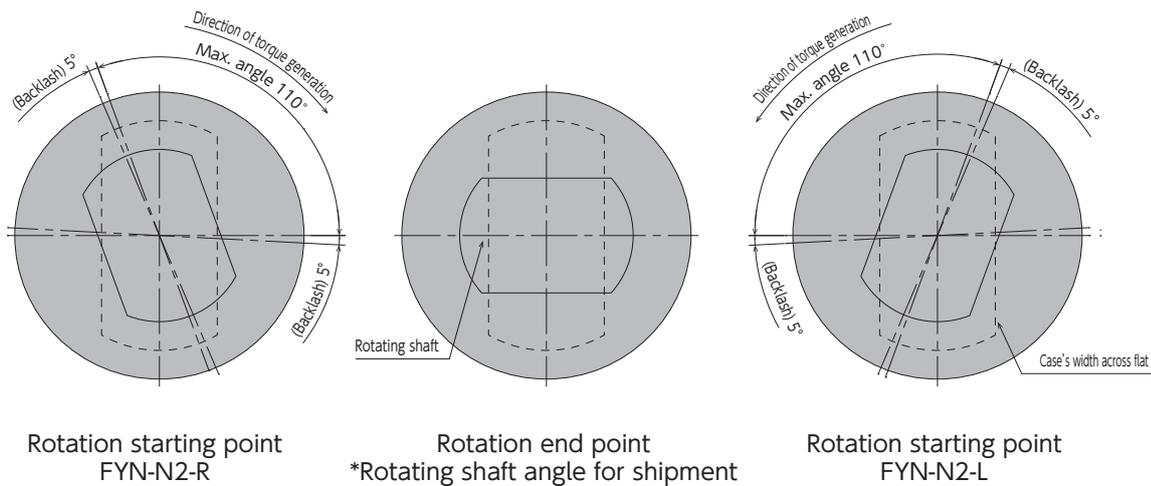


Products specification might be changed without notice.

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



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



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

Vane Damper

FYN-B1 Series

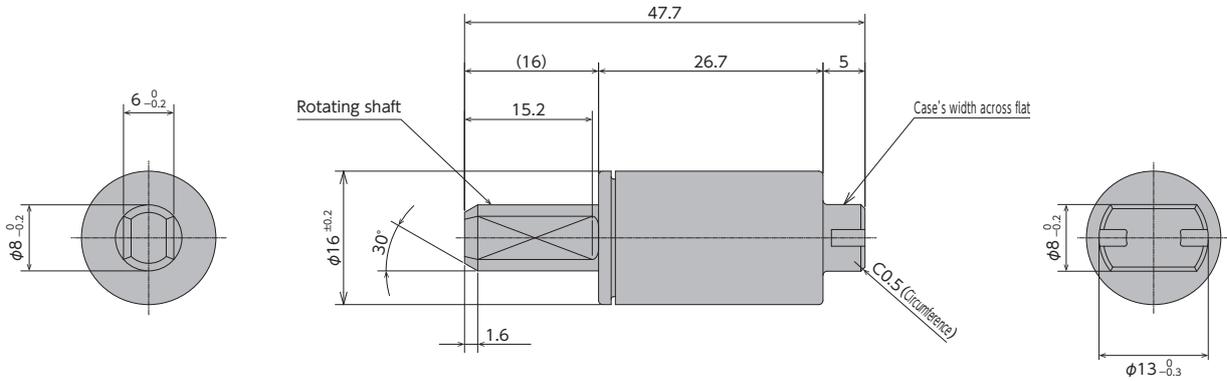


Specifications

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

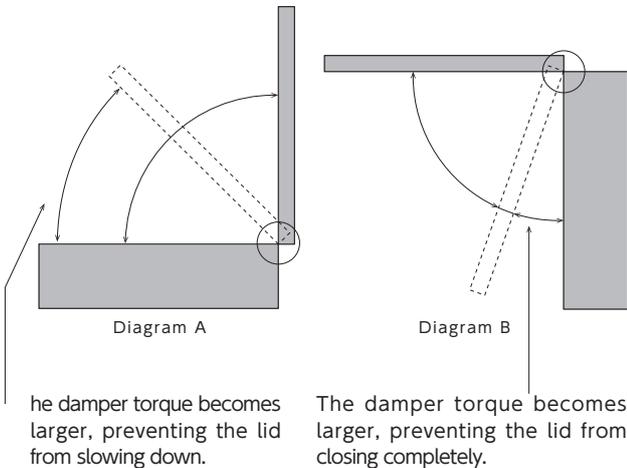
Note) Measured at 23°C±2°C

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



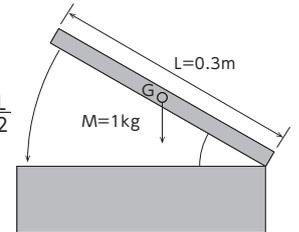
How to Use the Damper

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

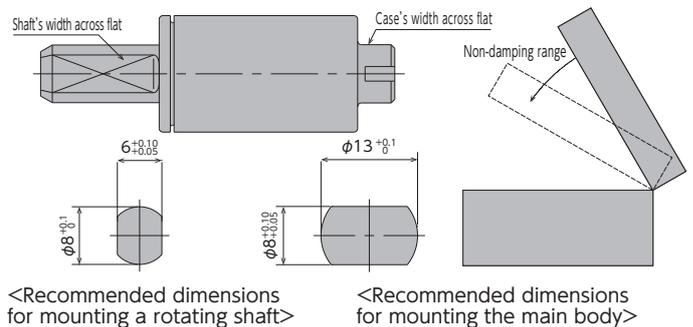


- When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

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

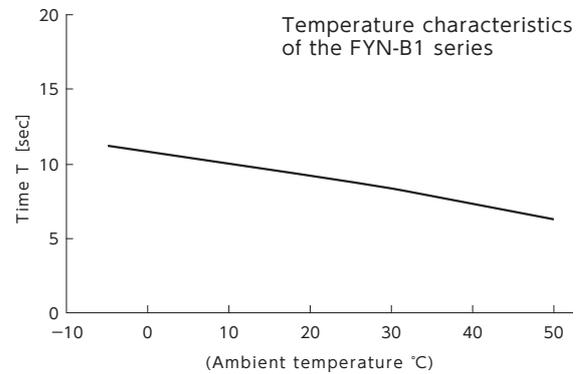


- When connecting the rotating shaft to other parts, please ensure a tight fit between them. Without a tight fit, the lid will not slow down properly when closing. The corresponding dimensions for fixing the rotating shaft and the main body are as follows.

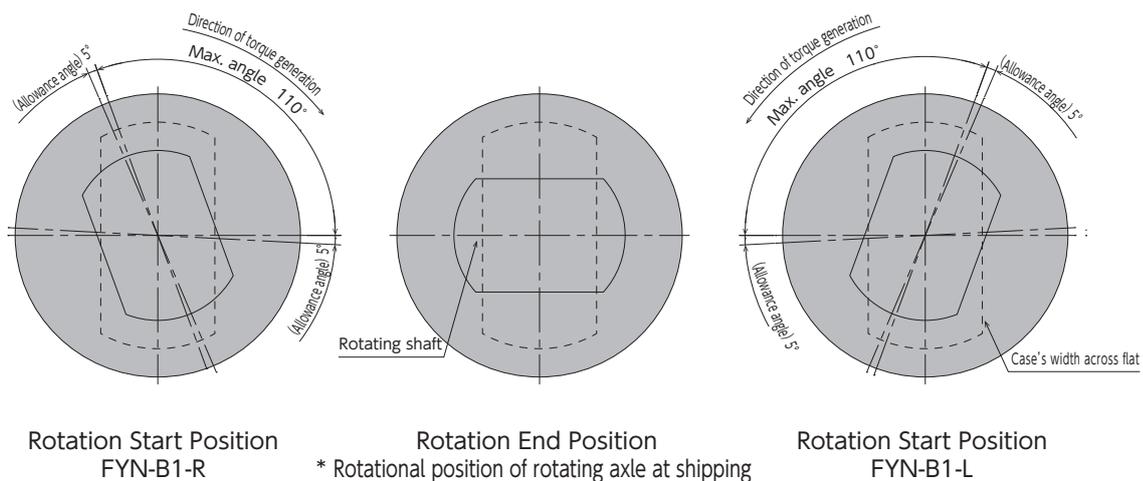


● Products specification might be changed without notice.

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



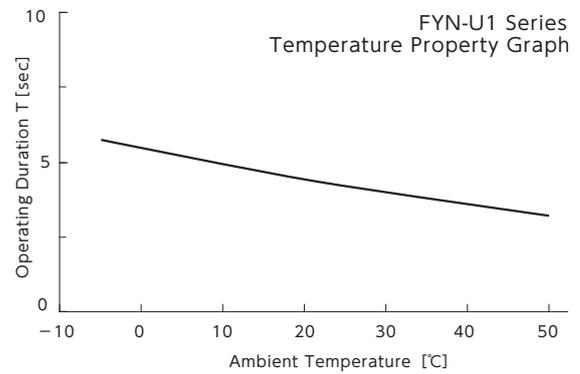
5. The damper's working angle is 110°, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place. The working angle is based on the width across flat for fixing, located towards the rear end of the main body. The position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



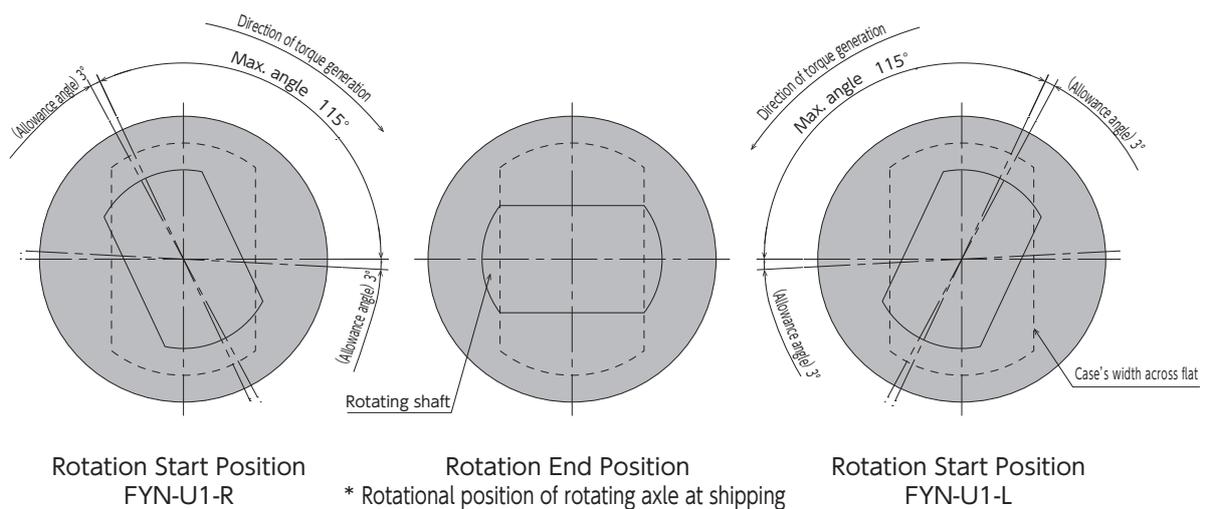
6. The direction in which torque is generated varies according to the model. Please select the appropriate model for your purpose.

●Products specification might be changed without notice.

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



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



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

Vane Damper

FYN-C1 Series

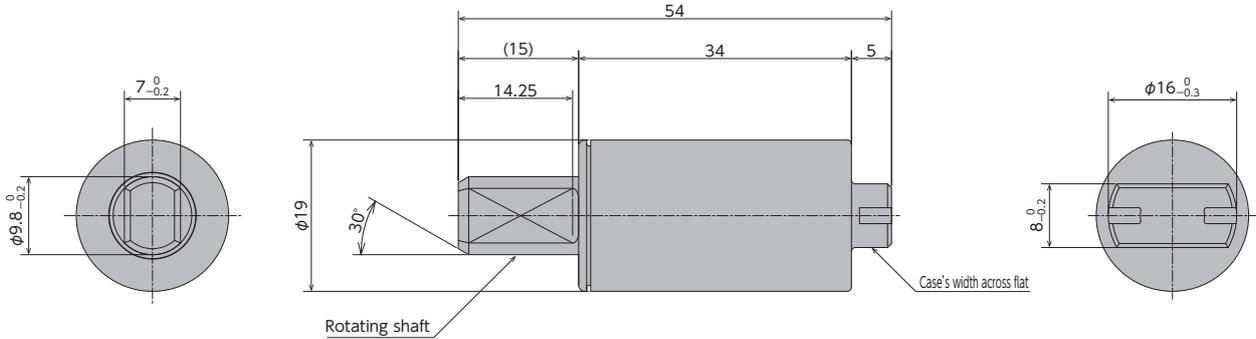


Specifications

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

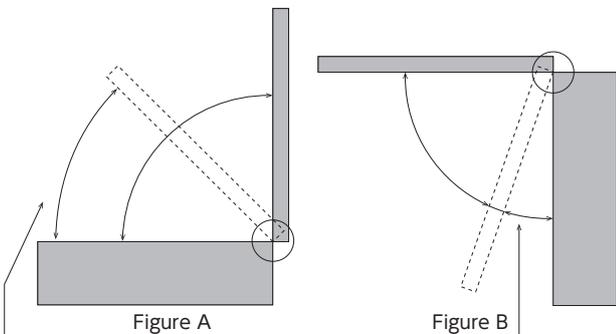
Note) Measured at 23°C±2°C

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



How to Use the Damper

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

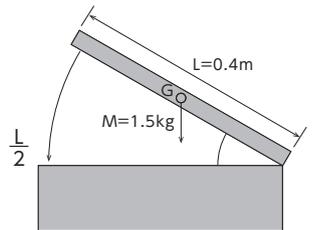


Stronger damper torque allows the lid to close gently until it is fully closed.

Stronger damper torque prevents the lid from being fully closed.

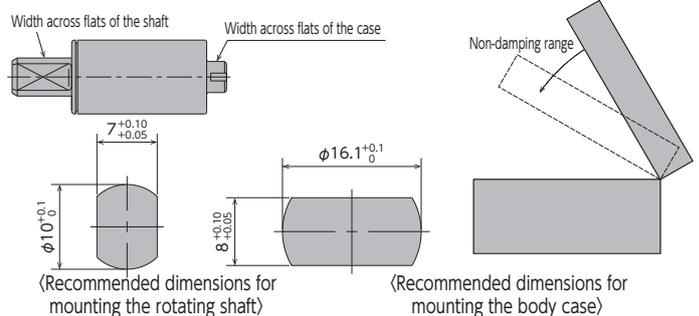
- When using a damper with a lid shown in the diagram, determine the damper torque based on the following selection calculation.

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



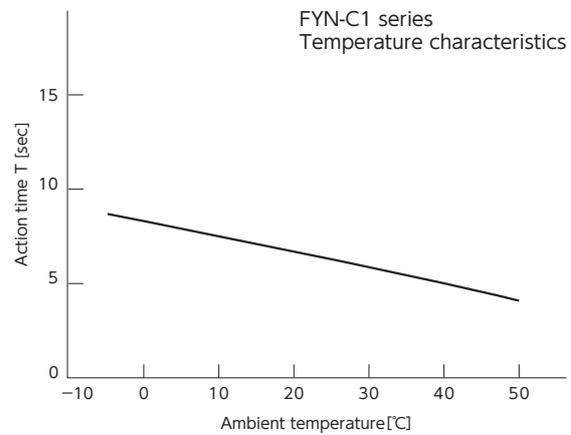
Based on the above calculation, select FYN-C1-*403.

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

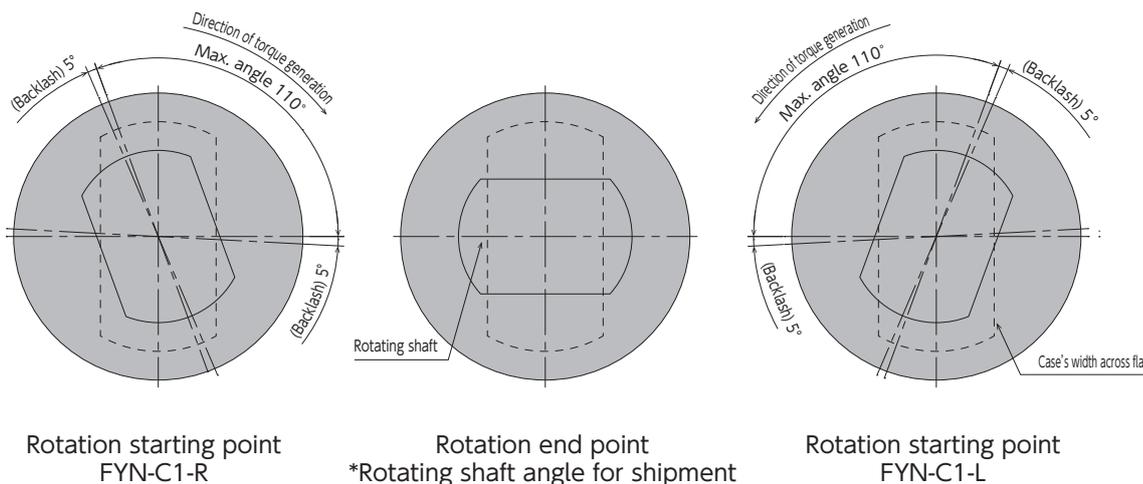


●Products specification might be changed without notice.

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



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



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

Vane Damper

FYN-D3 Series



Specifications

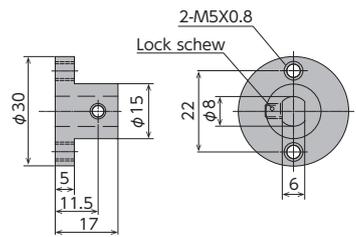
| Model | Max. torque | Reverse torque | Damping direction |
|-------------|--------------|----------------------|-------------------|
| FYN-D3-R503 | 5 N·m | 1 N·m or lower | Clockwise |
| FYN-D3-L503 | (50 kgf·cm) | (10 kgf·cm or lower) | Counter-clockwise |
| FYN-D3-R703 | 7 N·m | 1 N·m or lower |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

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

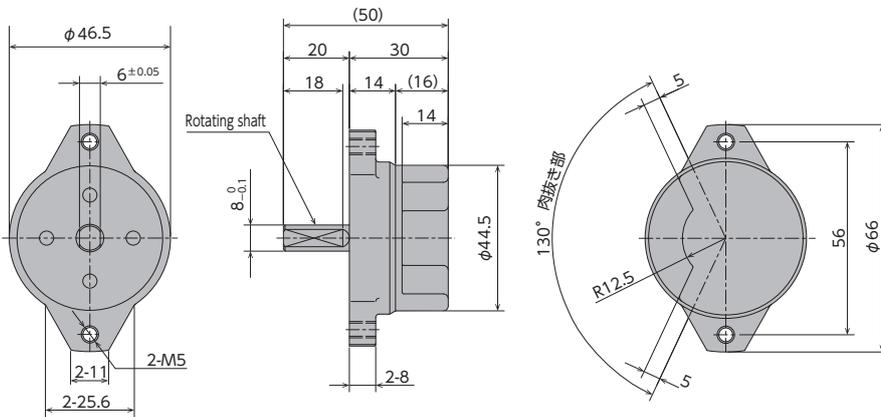
Optional Parts

Rotating shaft flange ROP-010H1

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

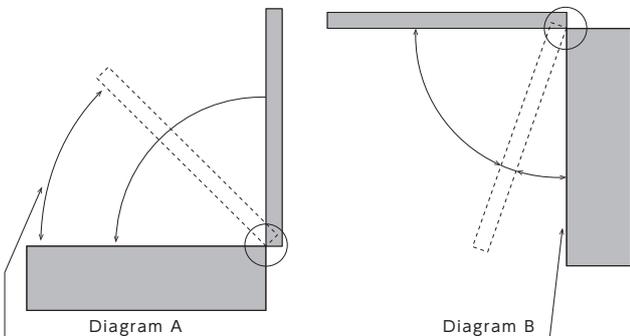


Rotating shaft flange ROP-010H1



How to Use the Damper

- 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.

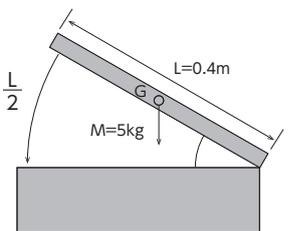
The damper torque becomes larger, preventing the lid from closing completely.

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

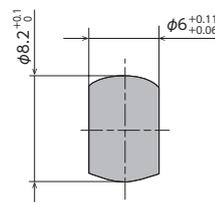
- When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

Example)
 Lid mass M : 5kg
 Lid dimensions L: 0.4m
 Gravity Center Position : Assumed as $\frac{L}{2}$
 Load torque : $T = 5 \times 9.8 \times 0.4 \div 2 = 9.8 \text{ N}\cdot\text{m}$

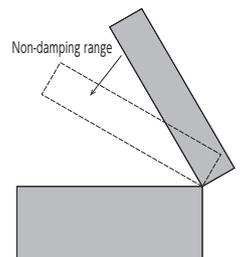
Based on the above calculation, FYN-D3-*104 is selected.



- 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.

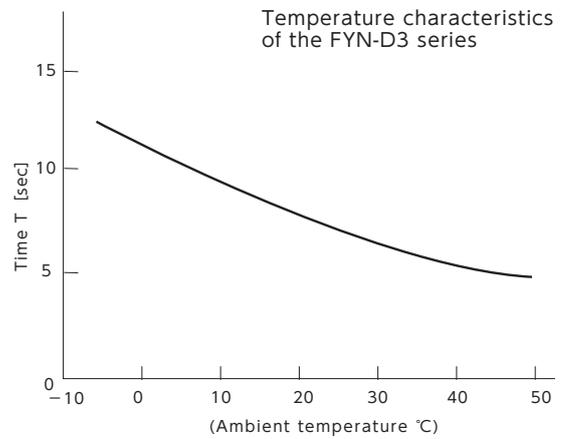


<Recommended dimensions for mounting a rotating shaft>

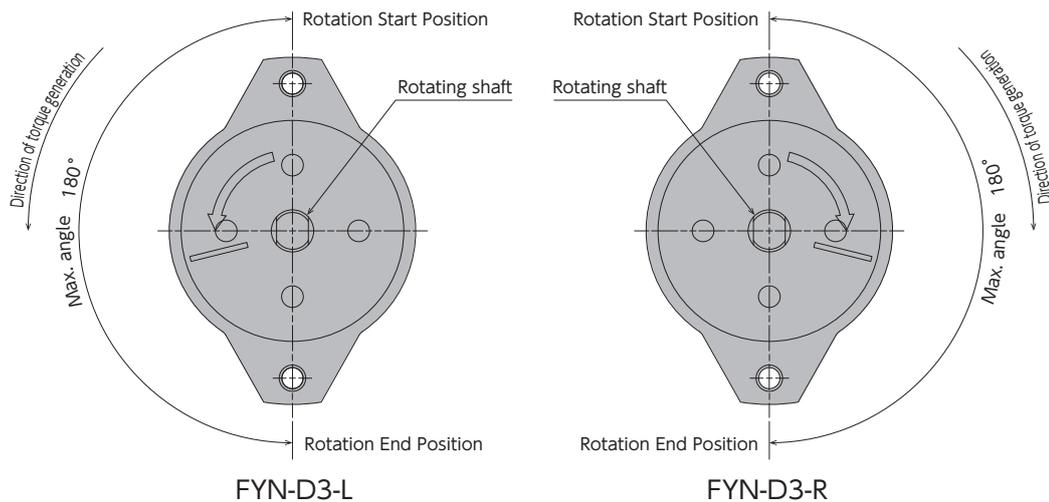


●Products specification might be changed without notice.

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



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



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

Vane Damper

FYT/FYN-D1(D2) Series



Specifications

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

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

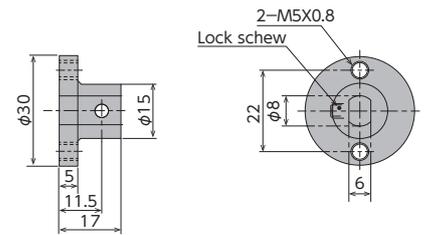
- * Max. angle 105°
- * Operating temperature -5~50°C
- * Weight D1 : 215±10g, D2 : 210±10g
- * Body and cap material Zinc die-cast (ZDC)

- * Rotating shaft material S25C
- * Oil type Silicone oil

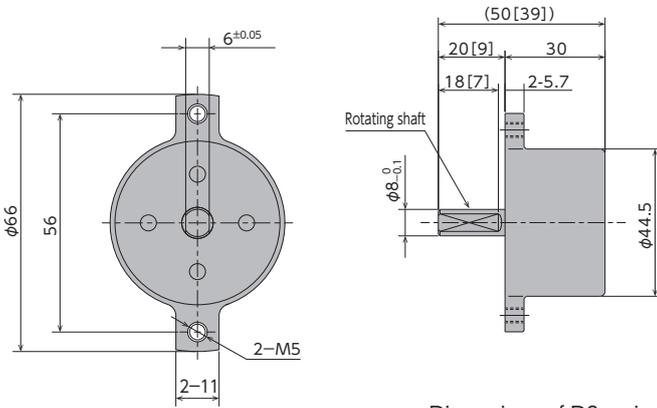
Optional Parts

Rotating shaft flange ROP-010H1

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



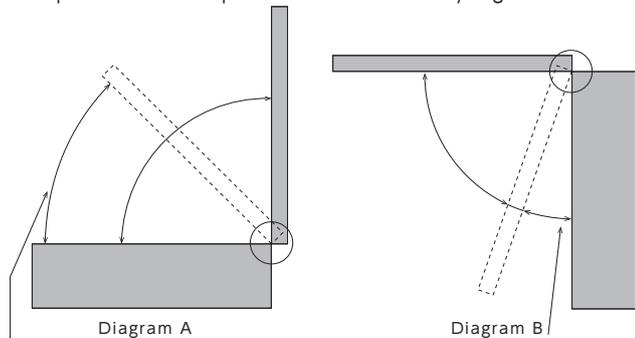
Rotating shaft flange ROP-010H1



Dimensions of D2 series are in []

How to Use the Damper

- The uni-directional FYN-D1 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly. Torque is generated in both clockwise and counterclockwise directions in the 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.



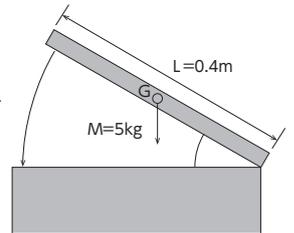
The damper torque becomes larger, preventing the lid from slowing down.

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.

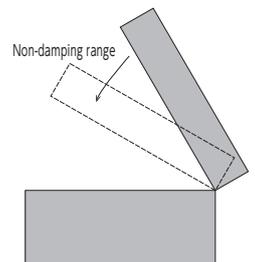
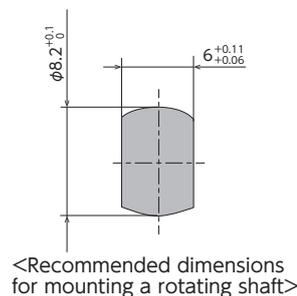
- When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque. Example)

Lid mass M : 5kg
Lid dimensions L : 0.4m
Gravity Center Position : Assumed as $\frac{L}{2}$
Load torque : $T = 5 \times 9.8 \times 0.4 \div 2 = 9.8 \text{ N}\cdot\text{m}$



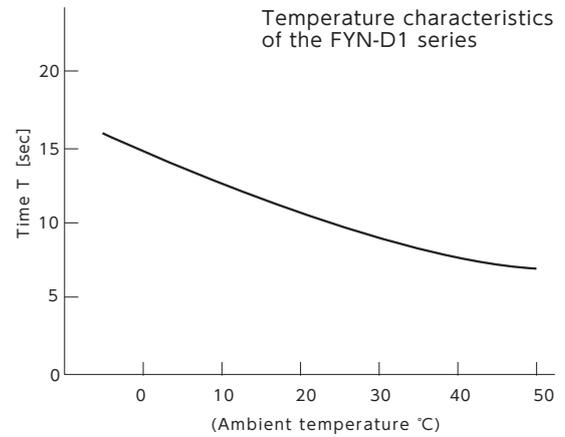
Based on the above calculation, FYN-D1-*104 is selected.

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

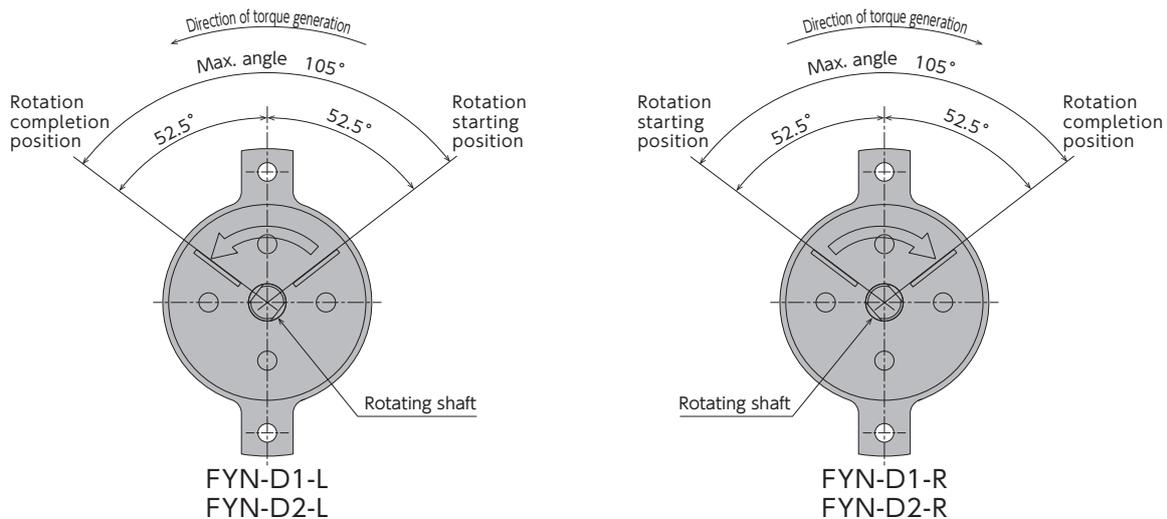


●Products specification might be changed without notice.

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



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

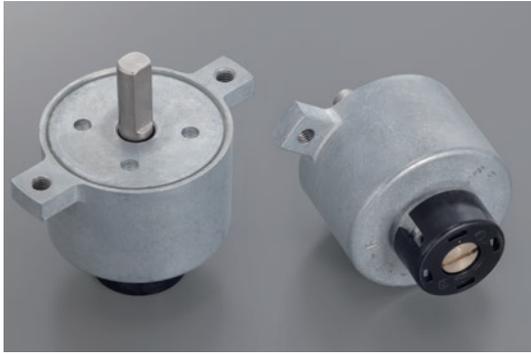


6. The FYN-D1 series is a fixed type; its torque is non-adjustable. However, a customized order for a torque between the range of 2 ~20N·m is possible by changing the oil viscosity.

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

Vane Damper

FYT/FYN-H1(H2) Series



Specifications

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

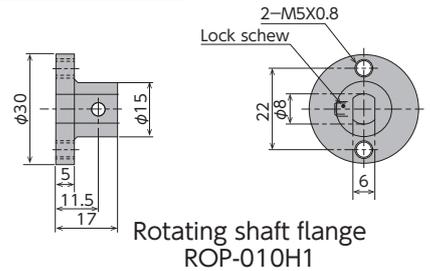
Note) Measured at 23° C ± 2° C
The FYT/N-H2 series has shorter shaft length.

- * 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

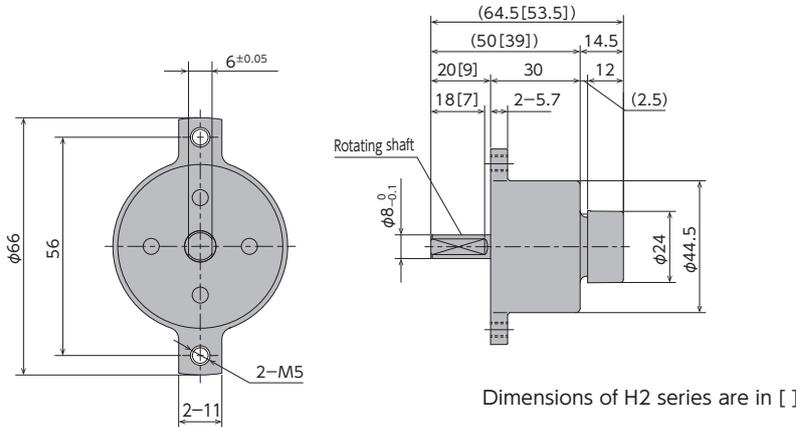
Optional Parts

Rotating shaft flange ROP-010H1

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



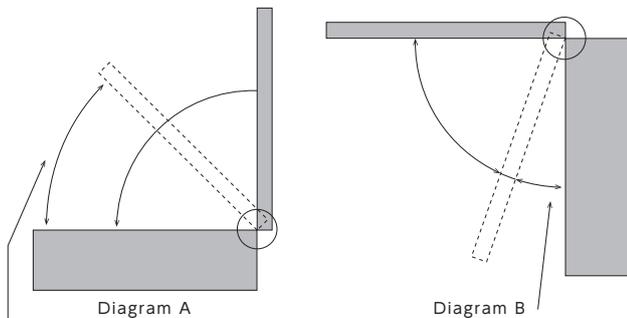
Rotating shaft flange ROP-010H1



Dimensions of H2 series are in []

How to Use the Damper

- The uni-directional FYN-H1 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly. Torque is generated in both clockwise and counterclockwise directions in the 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.



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

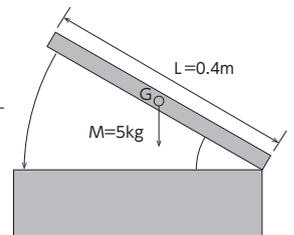
The damper torque becomes larger, preventing the lid from closing completely.

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

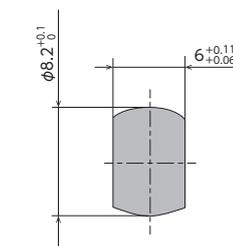
- When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque. Example)

Lid mass $M : 5\text{kg}$
 Lid dimensions $L : 0.4\text{m}$
 Gravity Center Position : Assumed as $\frac{L}{2}$
 Load torque : $T = 5 \times 9.8 \times 0.4 \div 2$
 $= 9.8\text{N}\cdot\text{m}$

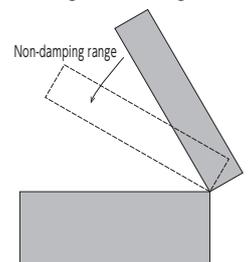
Based on the above calculation, FYT-H1*104 is selected.



- 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.

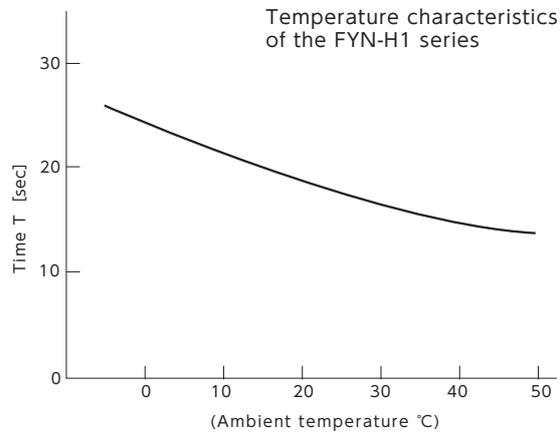


<Recommended dimensions for mounting a rotating shaft>

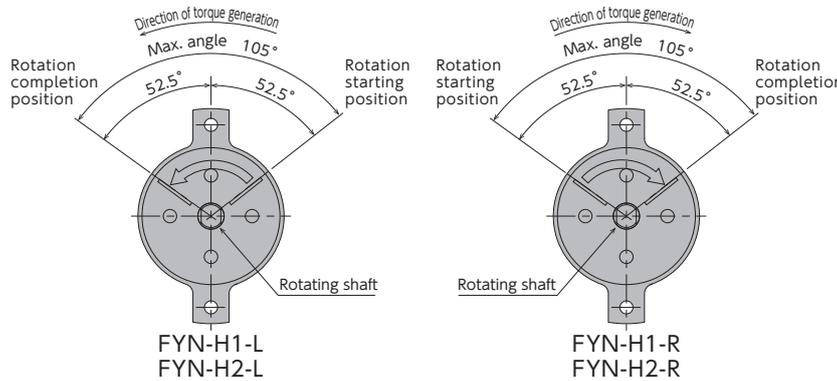


●Products specification might be changed without notice.

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

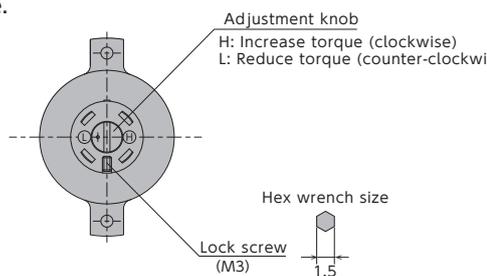


5. The damper's working angle is 110°, as shown below. Rotating the damper beyond this angle will cause damage to the damper. Please ensure that an external stopper is in place. The working angle is based on the width across flat for fixing, located towards the rear end of the main body. The position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



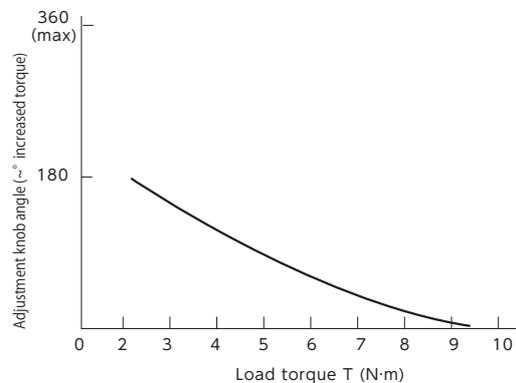
6. How to adjust the damper

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



<Range of torque adjustment>

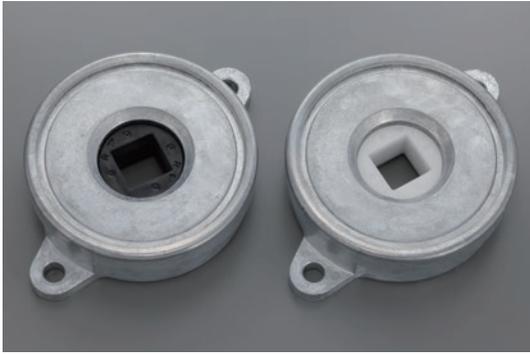
Please refer to the graph below for the relationship between torque and the adjustment knob.



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

Vane Damper

FYN-S1 Series

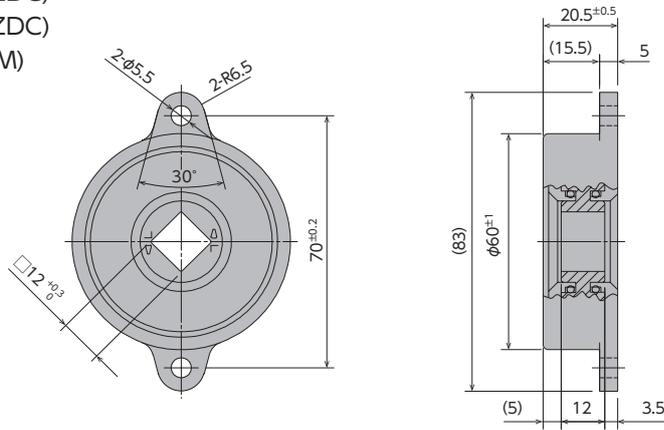


Specifications

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

Note) Measured at 23° C ± 2° C

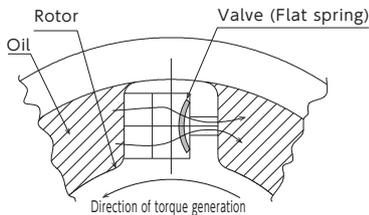
- * Max. angle 130°
- * Operating temperature -5~50°C
- * Weight 220±10g
- * Main body material Zinc die-cast (ZDC)
- * Cap material Zinc die-cast (ZDC)
- * Rotor material Polyacetal (POM)
- * Oil type Silicone oil



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 of torque is 5 ~ 10N·m. Please select your damper by referring to the motion-time graph below.

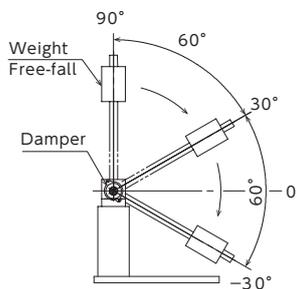
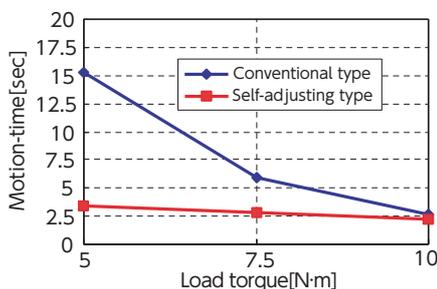


[Operating principles of the self-adjusting type]

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)

[Measurement conditions for the motion-time graph]

[Motion time graph]

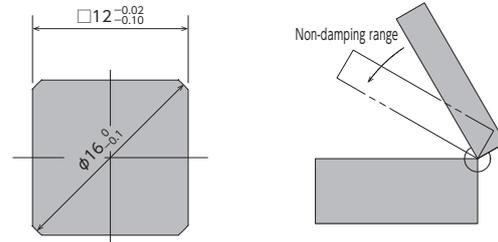


- Load torque T 5~10N·m
- Measured angle 30° ~ -30°
- Measurement temperature 23° C ± 2° C

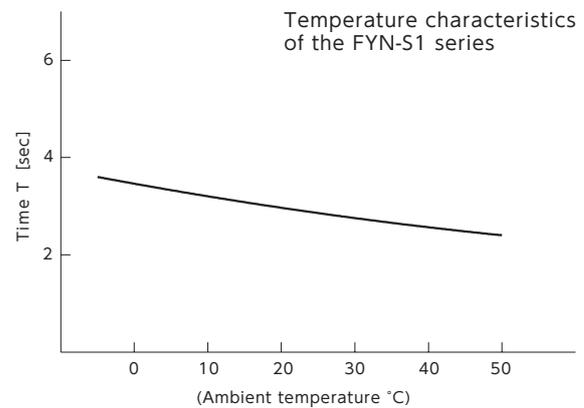
As the level of self-adjustment may vary depending on the range of the working angle of the actual work, please verify under actual working conditions before you select your damper.

●Products specification might be changed without notice.

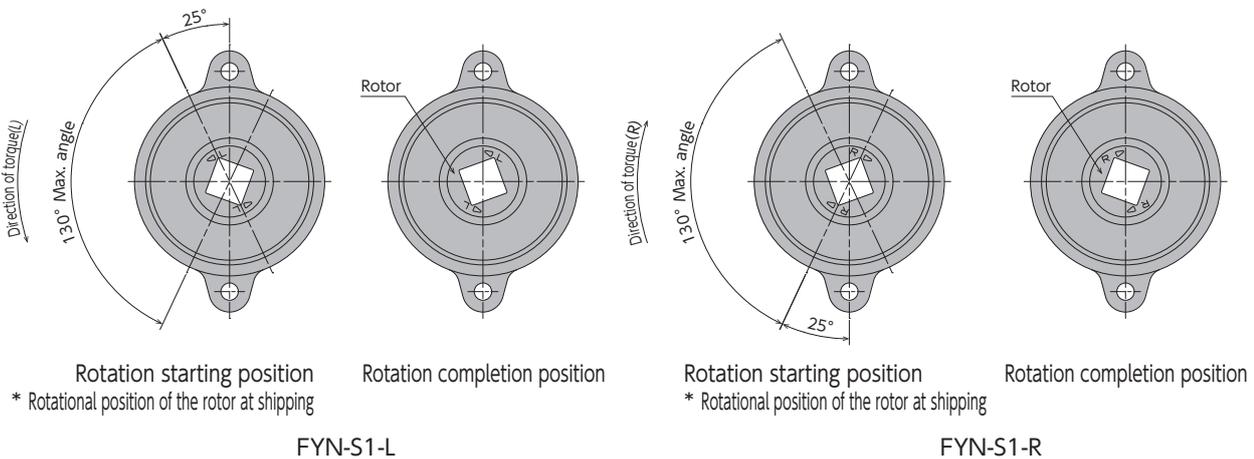
2. When using the damper, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. Also, please ensure a tight fit between the shaft and the damper shaft's opening. Without a tight fit, the non-damping range becomes larger in a closing motion, etc., and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



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



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



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

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

Vane Damper

FYN-X2 Series

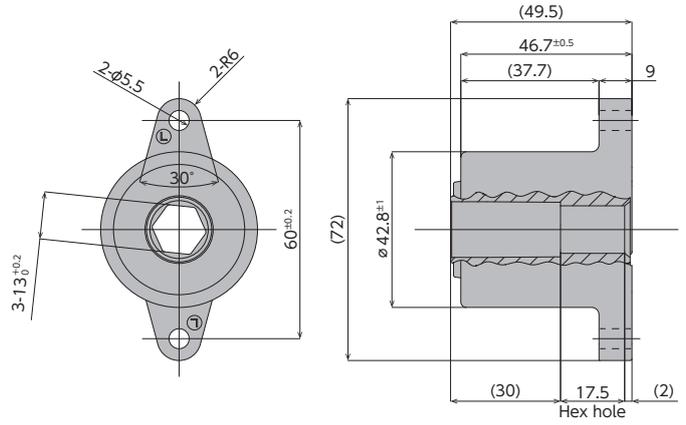
Specifications



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

Note) Measured at 23°C±2°C

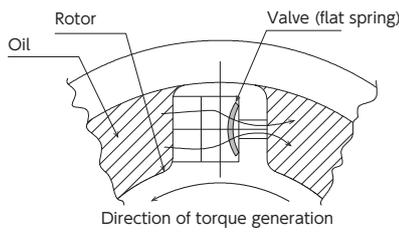
- *Max. angle 106°
- *Operating temperature -5~50°C
- *Weight 287±10g
- *Body material Zinc die-cast (ZDC)
- *Cap material Zinc die-cast (ZDC)
- *Rotor material Zinc die-cast (ZDC)
- *Oil type Silicone oil



How to Use the Damper

1. Operating characteristics of self-adjusting oscillating dampers

In a conventional oscillating damper, the damping strength (damping constant) does not change regardless of the load torque used. Therefore, the operating speed is slower when the load torque is small, and faster when the load torque is large. However, since the self-adjusting FYN-X2 series is designed to self-adjust the damping strength (damping constant) according to the applied load, its motion-time fluctuates less than that of conventional dampers when the load changes. The acceptable range of torque is 10 to 15N·m or 20 to 25N·m. Please select your damper by referring to the motion-time graph below.

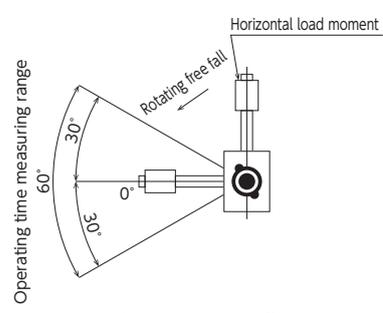
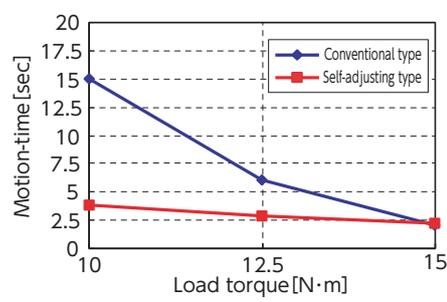
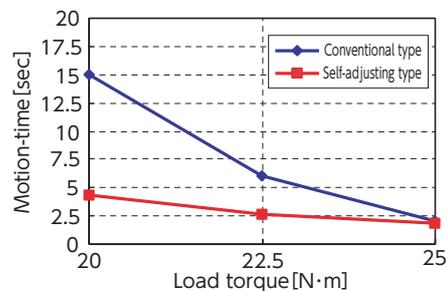


[Operating principles of the self-adjusting type]

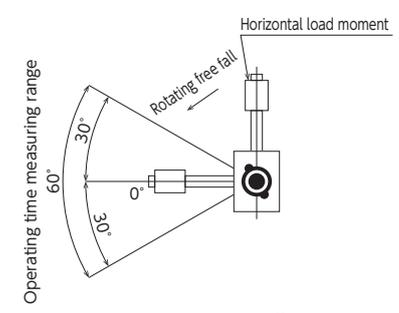
As shown in the diagram to the left, by changing the shape of the valve (flat spring), the amount of oil flow is altered, adjusting the damper's generated torque. (PAT.P)

[Measurement conditions for the motion-time graph]

[Motion time graph]



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

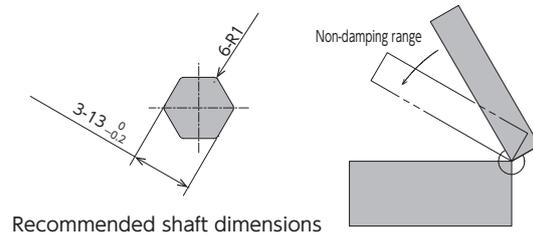


- FYN-X2 15N·m specification
- Measuring temperature : Room temperature (23±3°C)
 - Load torque : 10~15N·m
 - Measuring angle : +30°~-30°

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

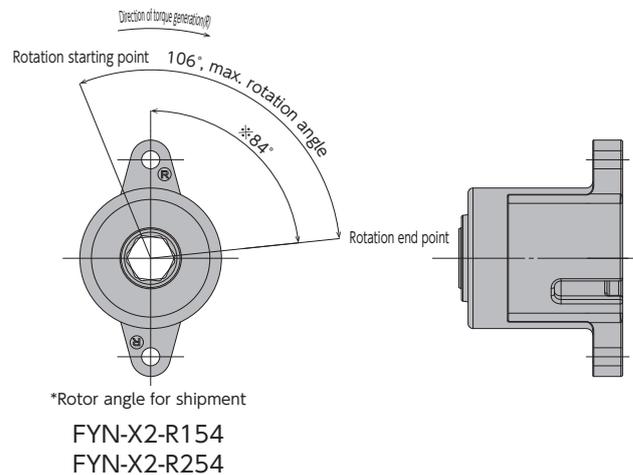
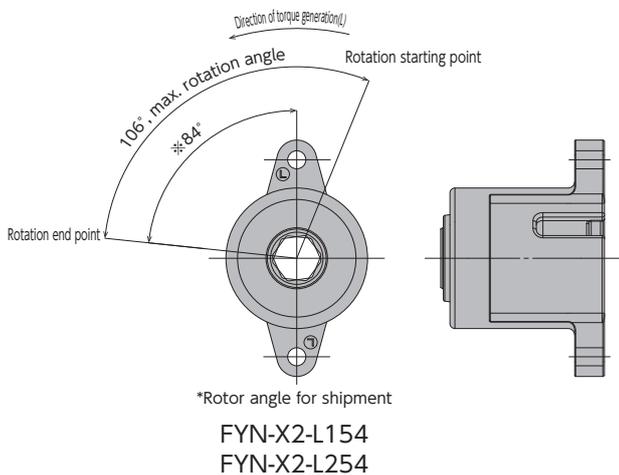
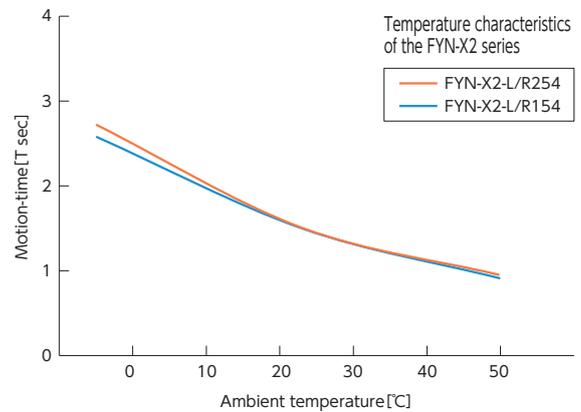
●Products specification might be changed without notice.

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



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

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



5. Because the FYN-X2 series is a self-adjusting type, the torque cannot be adjusted manually. However, by altering the viscosity of the oil, its damper characteristics can be modified.

* Please contact us, as this is a custom order,

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

Vane Damper

FYN-Z2 Series

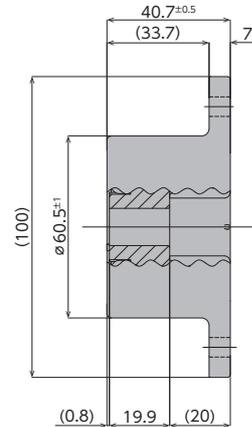
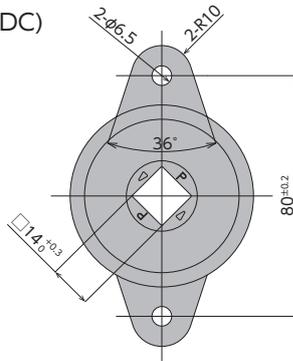
Specifications



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

Note) Measured at 23°C±2°C

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



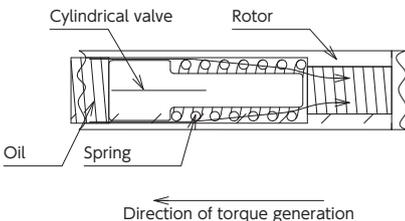
How to Use the Damper

1. Operating characteristics of self-adjusting oscillating dampers

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

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

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



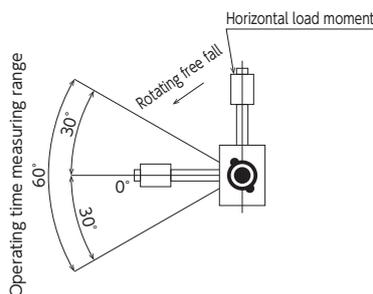
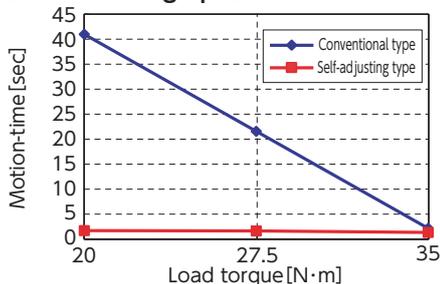
[Operating principles of the self-adjusting type]

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

[Measurement conditions for the motion-time graph]

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

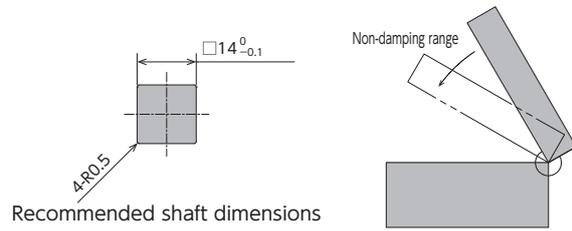
[Motion time graph]



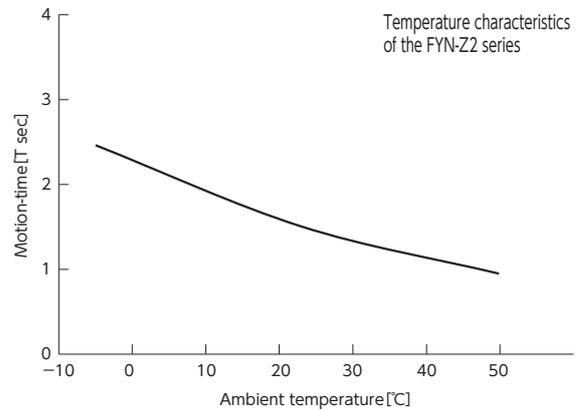
As the level of self-adjustment may vary depending on the range of the working angle of the actual work, please verify under actual working conditions before you select your damper.

●Products specification might be changed without notice.

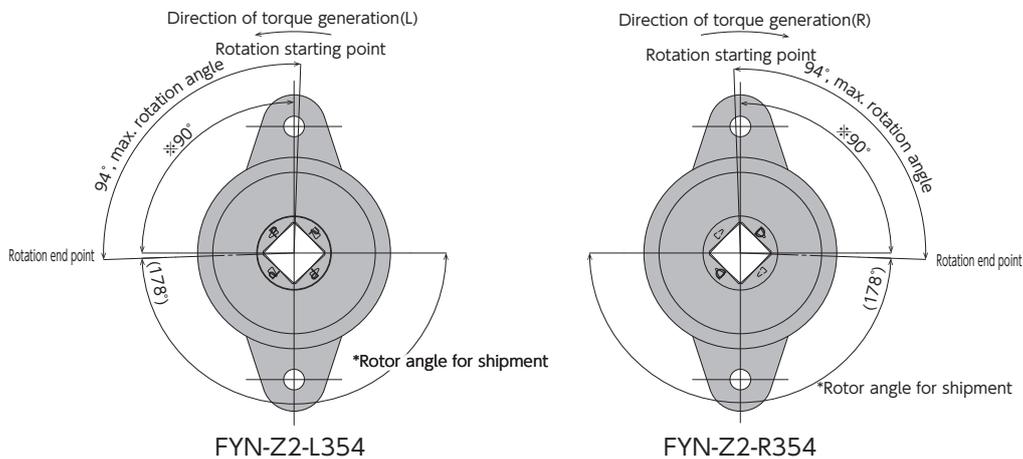
2. When using the damper, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. Also, please ensure a tight fit between the shaft and the damper shaft's opening. Without a tight fit, the play becomes larger in a closing motion, etc., and the lid may not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



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



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



5. Because the FYN-Z2 series is a self-adjusting type, the torque cannot be adjusted manually. However, by altering the viscosity of the oil, its damper characteristics can be modified.

* Please contact us, as this is a custom order,

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

Vane Damper

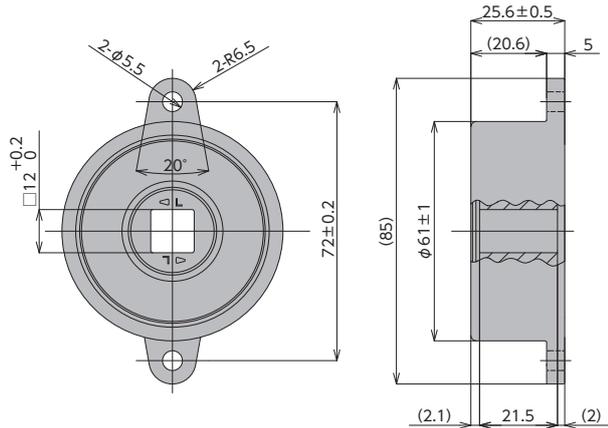
FYN-A2 Series

Specifications

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



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



How to Use the Damper

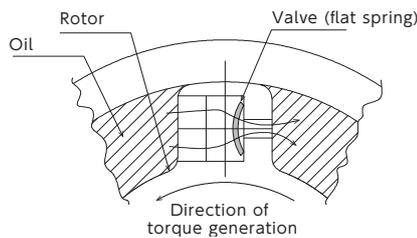
1. Operating characteristics of self-adjusting oscillating dampers

in a conventional oscillating damper, the damping strength (damping constant) does not change regardless of the load torque used.

Therefore, the operating speed is slower when the load torque is small, and faster when the load torque is large.

However, since the self-adjusting FYN-A2 series is designed to self-adjustable the damping strength (damping constant) according to the applied load, its motion-time fluctuates less than that of conventional dampers when the load changes.

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



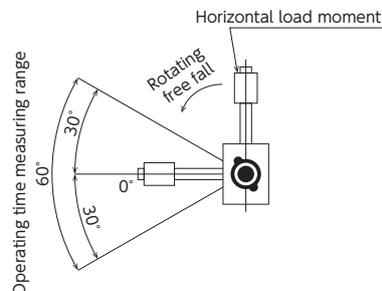
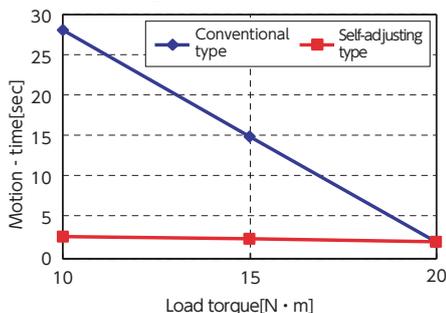
[Operating principles of the self-adjusting type]

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

[Measurement conditions for the motion-time graph]

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

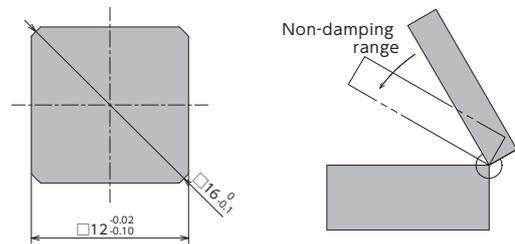
[Motion time graph]



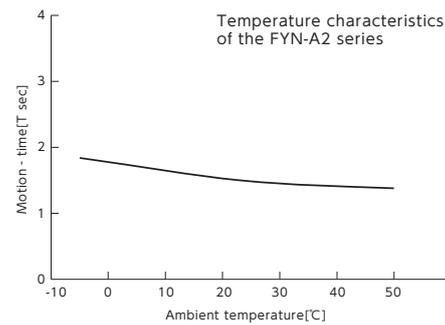
As the level of self-adjustment may vary depending on the range of the working angle of the actual work, please verify under actual working conditions before you select your damper.

●Products specification might be changed without notice.

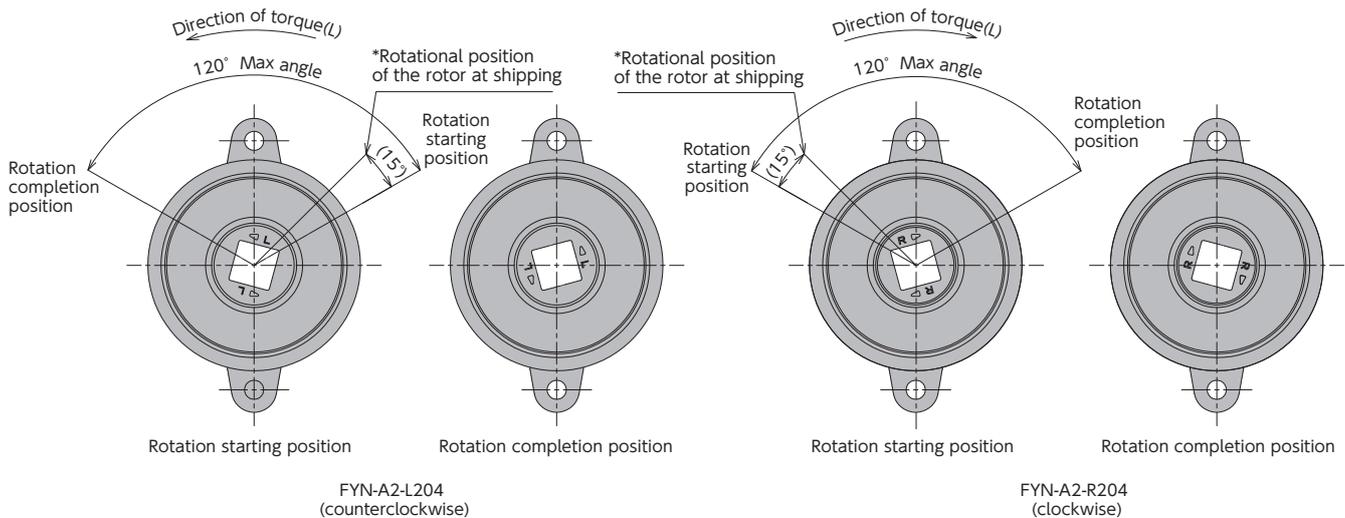
2. When using the damper, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. Also, please ensure a tight fit between the shaft and the damper shaft's opening. Without a tight fit, the play becomes larger in a closing motion, etc., and the lid may not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



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



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

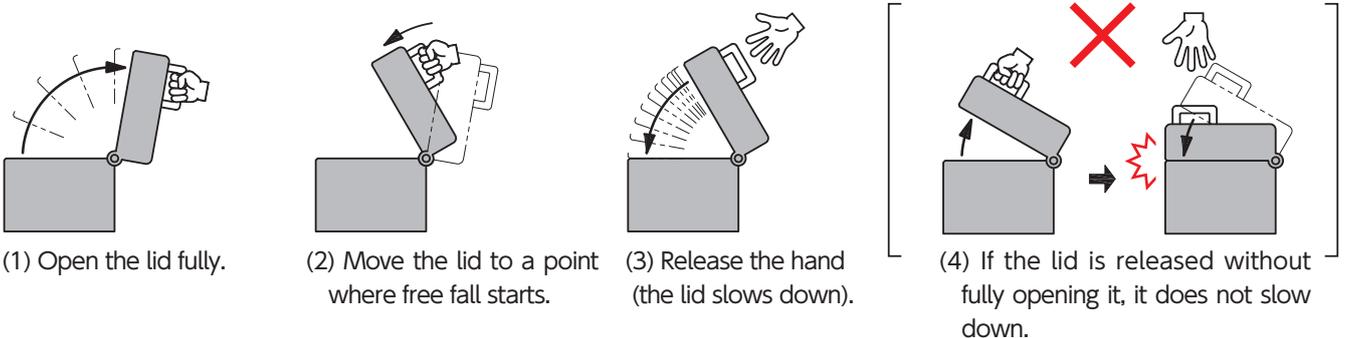


5. Because the FYN-A2 series is a self-adjusting type, the torque cannot be adjusted manually. However, by altering the viscosity of the oil, its damper characteristics can be modified. (Please contact us, as this is a custom order.) 6. The direction in which torque is generated varies according to the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

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

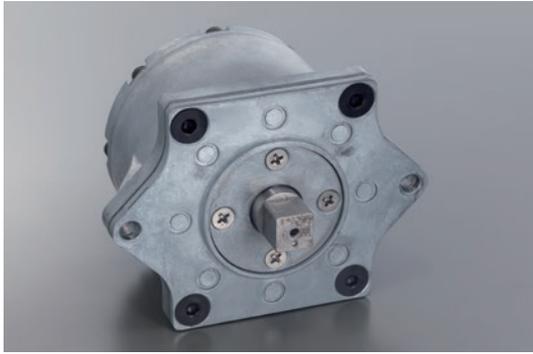
Precautions for Use

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



Vane Damper

FYT/FYN-LA3 Series

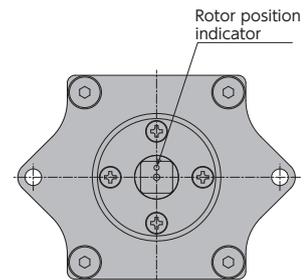
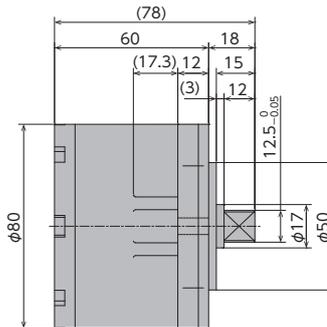
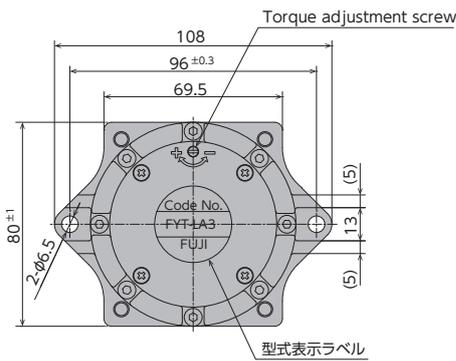


Specifications

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

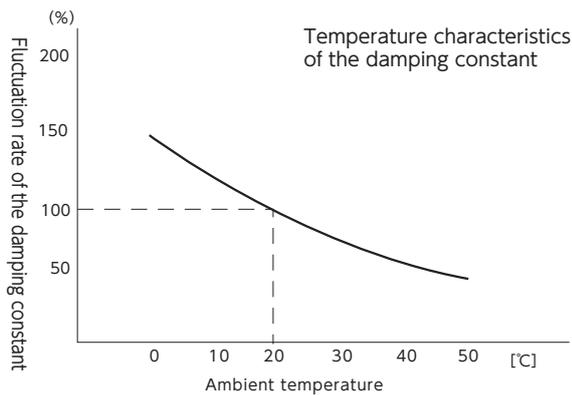
Note) Measured at 23°C±2°C

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



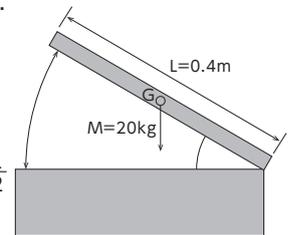
How to Use the Damper

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.

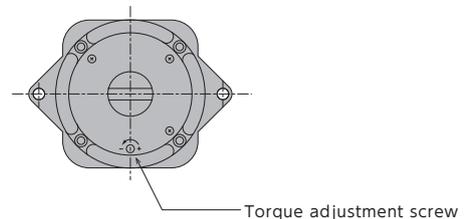


2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque.

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



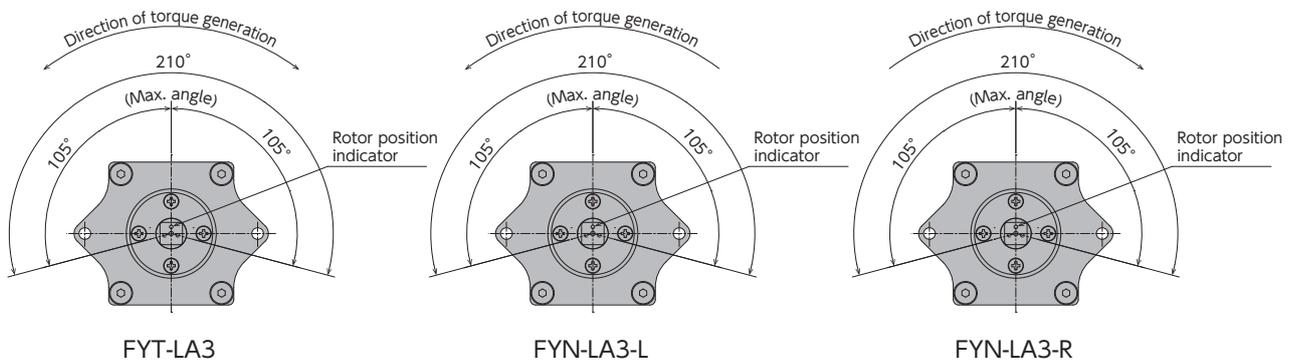
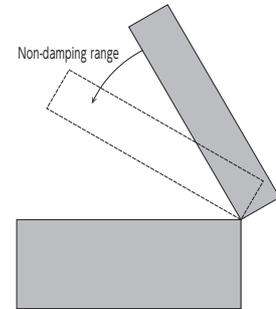
3. FYT, FYN-LA3 series are torque-adjustable types. Turn the damping adjustment screw located on the back of the main body by inserting a slotted screwdriver. The damping constant increases when turned to the + direction (right). The damping constant decreases when turned to the - direction (left).



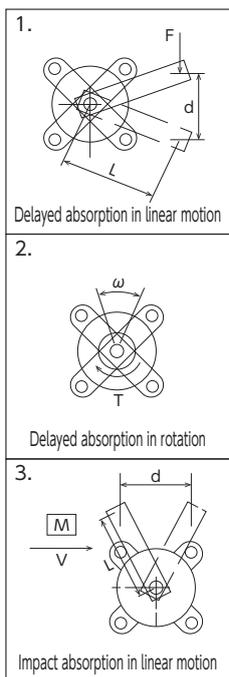
●Products specification might be changed without notice.

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

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

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

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

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

3. Impact absorption in linear motion

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

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)

Friction Type Hinge Damper

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

FHD-B1/B2 Series

RoHS Compliant

●Products specification might be changed without notice.

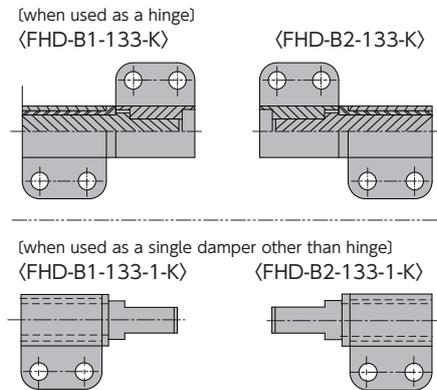
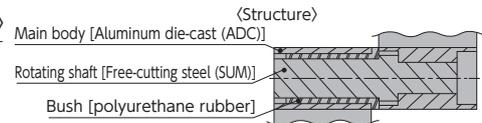
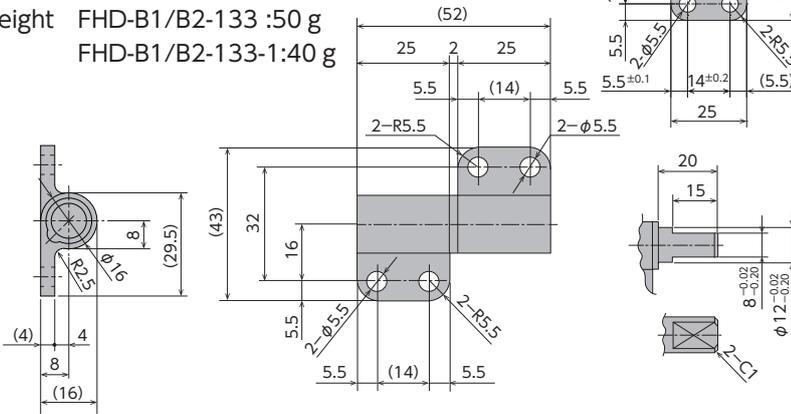


Specifications

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

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

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



How to Use the Damper

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

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

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

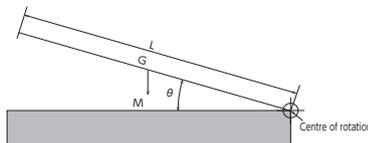
M : Mass of the retaining part

L : Distance between the tip of retaining part and the centre of rotation

θ : Retention angle from the retaining part's horizontal position

α : Temperature coefficient of the max. temperature

N : Number of dampers used

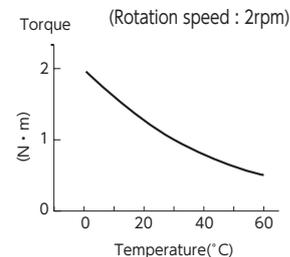


- This damper is only for horizontal application. Please do not use this damper for vertical application.

Damper Characteristics

1. Temperature characteristics

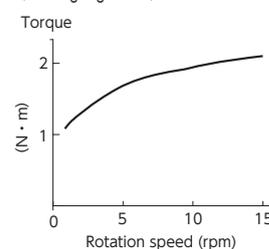
Damper characteristics vary according to the ambient temperature. In general, the damper characteristics become weaker as the temperature increases, and become stronger as the temperature decreases. This is because the temperature of the shaft bush inside the damper varies according to the temperature.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



2. Speed characteristics

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

(Measurement temperature : 25°C±2°C)
(Working angle : 90°)



Friction Damper

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

FFD-25FS/FW/SS/SW Series

RoHS Compliant

●Products specification might be changed without notice.

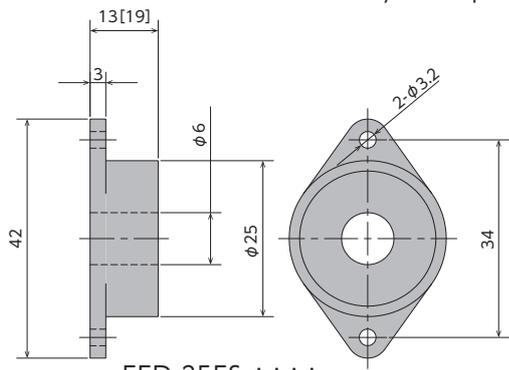


Specifications

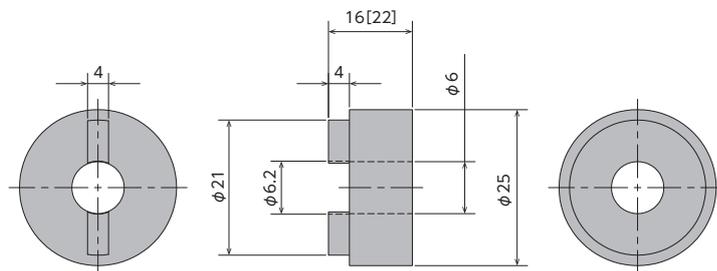
| Model | Max. torque | Max. reverse torque | Model | Max. torque | Max. reverse torque |
|---------------|-----------------|---------------------|---------------|-----------------|---------------------|
| FFD-25FS-R102 | 0.1±0.01 (N·m) | Clockwise | FFD-25SS-R102 | 0.1±0.01 (N·m) | Clockwise |
| FFD-25FS-L102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

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

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



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



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

How to Use the Damper

- 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.

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

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

Friction Damper

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

FFD-28FS/FW/SS/SW Series

RoHS Compliant

●Products specification might be changed without notice.

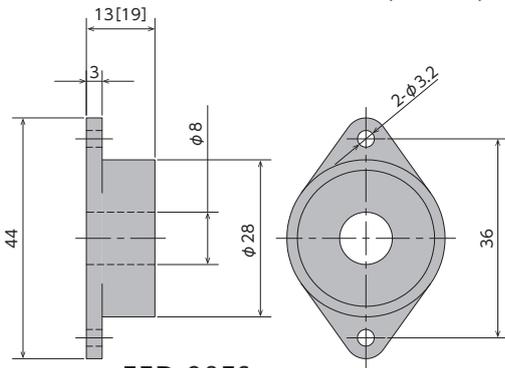


Specifications

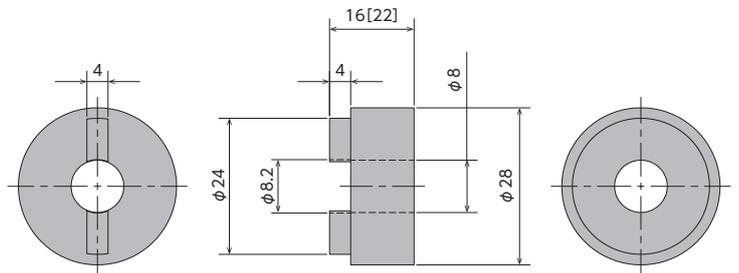
| Model | Max. torque | Max. reverse torque | Model | Max. torque | Max. reverse torque |
|---------------|-----------------|---------------------|---------------|-----------------|---------------------|
| FFD-28FS-R102 | 0.1±0.01 (N·m) | Clockwise | FFD-28SS-R102 | 0.1±0.01 (N·m) | Clockwise |
| FFD-28FS-L102 | (1±0.1 kgf·cm) | Counter-clockwise | FFD-28SS-L102 | (1±0.1 kgf·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±0.5 kgf·cm) | Counter-clockwise | FFD-28SS-L502 | (5±0.5 kgf·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±1 kgf·cm) | Counter-clockwise | FFD-28SS-L103 | (10±1 kgf·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±1 kgf·cm) | Counter-clockwise | FFD-28SW-L103 | (10±1 kgf·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±1.5 kgf·cm) | Counter-clockwise | FFD-28SW-L153 | (15±1.5 kgf·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±2 kgf·cm) | Counter-clockwise | FFD-28SW-L203 | (20±2 kgf·cm) | Counter-clockwise |

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

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



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



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

How to Use the Damper

- 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.

| | |
|--|--------------------------------|
| Shaft's external dimensions | 8-φ _{0.03} |
| Surface hardness | HRC55 or higher |
| Quenching depth | 0.5mm or higher |
| Surface roughness | 1.0Z or lower |
| Chamfer end (Damper insertion side) | C0.2~C0.3 (orR0.2~R0.3) |

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

Friction Damper

Fixed Type

Bi-Directional

Uni-Directional

Adjustable type

Self-adjusting

FFD-30FS/FW/SS/SW Series

RoHS Compliant

●Products specification might be changed without notice.



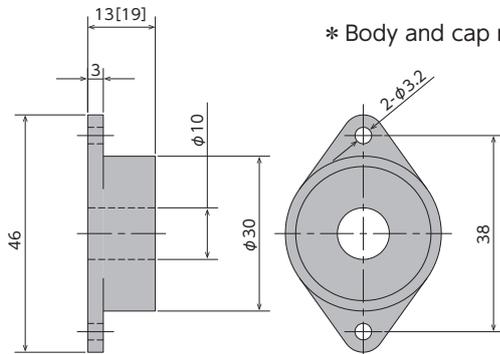
Specifications

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

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

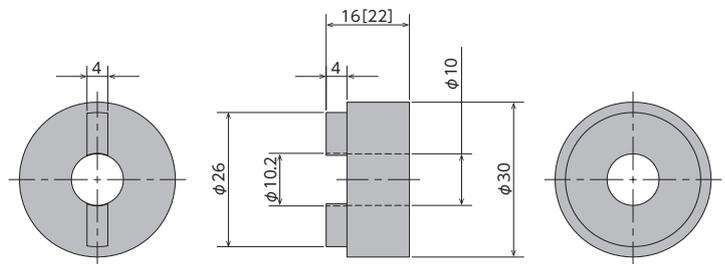
- * Max. rotation speed 30rpm
- * Max. cycle rate 13cycle/min
- * Operating temperature - 10 ~ 60°C (90%RH)
- * Body and cap material POM

- * Cap colour R:Black L:White
- * Weight FFD-30FS 17 ± 2g
- FFD-30FW 31 ± 2g
- FFD-30SS 16 ± 2g
- FFD-30SW 30 ± 2g



FFD-30FS-****

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



FFD-30SS-****

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

How to Use the Damper

- 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 oneway clutch.)

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