# **Friction Damper**

FFD-30FS/FW/SS/SW

Fixed Type Adju

## Uni-Directional

Self-adjusting

**RoHS** Compliant

Products specification might be changed without notice.

# Model FFD-30FS-R102 FFD-30FS-R102 FFD-30FS-R102 FFD-30FS-R102 FFD-30FS-R102 FFD-30FS-R103 FFD-30FW-R133 FFD-30FW-R153 FFD-30FW-L203 FFD-30FW-L203 FFD-30FW-L233 FFD-30FW-R233 FFD-30FW-R303

## Specifications

Series

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 m	easured at a rotation sp	eed of 20rpm at 20 <sup>-</sup>	25℃		
* Max. rotation speed		30rpm	*Cap colour	R:Black L:Wh	ite
* Max. cycle rate		13cycle/min	* Weight	FFD-30FS	17 ± 2g
* Operating temperature		−10~60°C	FFD-30FW		$31 \pm 2g$
		(90%RH)		FFD-30SS	$16\pm 2g$
* Body and cap	o material PC	DM		FFD-30SW	$30\pm 2g$
+ 2:4332			<u>16[22]</u>	→ 	

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## How to Use the Damper

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- 1. The damper generates torque in both the clockwise and counter-clockwise directions. (A one-way clutch is built in inside the damper.)
- 2. Please make sure that the shaft attached to a damper has a bearing, as the damper itself is not fitted with one.

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

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

FFD-30SS-\*\*\*\*

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

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- 4. Please refer to the recommended dimensions below when creating a shaft for attachment to the damper. Using a shaft outside of the recommended dimensions may cause the shaft to slip out.
- 5. To insert a shaft into the damper, insert the shaft while spinning it in the opposite direction of the damper's direction of torque generation. (Do not force the shaft in from a regular direction. This may damage the built-in

# Hinge Damper

Fixed Type Adjustal

**Uni-Directional** 

Self-adjustin

FHD-A1 Series

Products specification might be changed without notice.



Specifications

	· · · · · · · · · · · · · · · · · · ·		
Model	Max. torque	Max. reverse torque	
FHD-A1-1-503	5N•m	0.6N•m or lower	
FHD-A1-2-503	(50 kgf•cm)	(6kgf•cm or lower)	
FHD-A1-1-104	10N•m	1N•m or lower	
FHD-A1-2-104	(100 kgf•cm)	(10kgf•cm or lower)	
* Max. angle	120°	* Main body material	Zinc die-cast (ZDC)
* Operating temperature $-5\sim50^{\circ}$ C			+ silver coating
* Weight 410g		* Hinge material	SUS304







## How to Use the Damper

1. There are two ways to attach the damper, as shown below. OAttached externally(FHD-A1-1\*\*\*)



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

## Damper Characteristics

1. Temperature characteristics

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



2. The working angle of the hinge is  $120^\circ\,$  .

Operating the hinge beyond this angle will cause damage to the hinge. Please ensure that an external stopper is in place.

# Friction Type Hinge Damper Fixed Type Adjustable type

**RoHS Compliant** 

## FHD-B1/B2 Series

Products specification might be changed without notice.



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



- L : Distance between the tip of retaining
- part and the centre of rotation
- $\theta$  : Retention angle from the retaining part's horizontal position
- $\alpha$  : Temperature coefficient of the max. temperature
- N: Number of dampers used



α

1.0

0.75

0.50

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

## 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.



# MRF Damper

## FMR-70S-403



## Characteristics

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

## **Basic Structure and Action**

## The basic structure of MRF damper is shown below.



## **Behavior**

The rotating shaft is supported with the bearings for providing the freedom of rotation in the main unit casing.

A coil is implemented in the main unit casing, and a rotor having the shape of a cup is mounted on the rotating shaft.

There is a gap between the internal surface of the main unit casing and the external surface of the rotor. The MR fluid is filled in this gap. When a current is supplied to the coil, a magnetic field line runs through the gap between the main unit casing and rotor, and a magnetic force flows in the MR fluid. When a magnetic force flows in the MR fluid, the iron power is linked like a chain and the friction force of iron powder generates a force to restrict the rotation between the main unit casing and rotor.

## What is the MR Fluid?

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



## MR Fluid

MR Fluid A magnet in the proximity

## Main Applications

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

Magnetic Substance

## Precautions for Use

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

2 Rotary Dampei

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Surface Treatment

Non-Electrolytic Nickel Plating Nitriding

## Products specification might be changed without notice.

## **Specifications**

	÷					
Туре		Coil (23°C)				
	Rated Torque N•m	Voltage V	Current A	Resistance Ω	Capacity W	Allowable slipping efficiency W
	4	DC24	0.13	192	3.12	10 **1
FIVIN-703-403	Maximum Operating Speed rpm	Mounting Posture	Direction of Rotation	Mass kg	Moment of Inertia kg•cm <sup>2</sup>	
	50	No ristriction	Both directions	0.83	1.16	

Main Unit Casing

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**Rotating Shaft** 

Cap

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

## Calculation

- Allowable slipping efficiency =  $2 \times \pi / 60 \times n \times Tc$
- n : Rotating Speed (rpm)
- Tc: Slipping Torque (N-m)





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Material

Metal (SUM)

Metal (SUM)

Polyacetal (POM)



Test Data



## Read these instructions before use

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

Warning Definition of "Warning" applies to situations in which death or serious injuries may occur to the user, etc. if the potential dangers of the products are not avoided. Warning The decision on the suitability of MRF damper shall be made by an engineer of the equipment or a person who determine the specification. •Because of the wide variety of conditions of use, the decision on the suitability of MRF damper shall be made by an engineer of the equipment or a person

## who determine the specification, after the performance verification and life test as necessity. Do not use the MRF damper outside the range of specification.

•Do not use outside the range of specification for such like operating temperature range, rated voltage and current of the coil, the rated torque, the allowable slip rate, maximum rotational speed.

- There is a risk to receive injury or to make damage for MRF damper and/or peripheral devices.
- There is a risk of Electric shock, burns or fire.
  Due to oil leakage or deterioration of parts, there is a possibility that the durability of the product is significantly decreased.
- Refer to the product page of MRF damper for details.
- •When used, it generates heat by energization and or the slip friction of the coil. If the temperature of MRF damper surface is high, adjust the condition and make its surface under 70 °C and prevent the generation of heat.

## Implementation of Safety Measures for the Purposes Below.

- Implement the safety measures if used under the following conditions and environment, and consult our company for a judgment on the feasibility check beforehand. Also please take countermeasures against waterproofing, humid proofing as well as the designing of fail-safe, redundant and etc. for the The use in the environment other than those standard specifications clearly indicated in the catalog or owner's manual, outdoors, or place exposed to the direct sunlight.
- 2) Nuclear related devices, devices directly or indirectly related to the running of rail or ship, devices related to aviation or space, military devices, medical devices, devices contacting the potions and foods, combustion equipment, amusement devices that are related to the influence on human and properties, emergency shut off circuit, press machinery, the use for the devices or purposes to which especially the safety is required because of the expected serious influence on the human and properties. •Environment and the next safety exhibit can not be secured, please do not use the following devices that are required extremely high reliability and safety.
- 1) environment in which there is a possibility of ignition or explosion, or in water or a very high humid.
- 2) device in relate to the nuclear power, aviation, space, military, life supporting medical equipment, combustion etc.
- When you touch the MRF dampers, confirm the power supply of the coil and the peripheral devices are switched off and the temperature of MRF damper is cooled down. •There is a risk of Electric shock, burns or fire if to mount or dis-mount the MRF damper during the operation of peripheral device or powering the MRF damper.

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

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

## Do not throw into a fire

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

## Caution

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

## Do not operate without sufficient mounting strength

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

•Ensure sufficient mounting strength of load torque x safety factor

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

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

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

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

## Usage environment

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

## Do not discard oil more than is necessary

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

## Radial/Thrust load to the shaft

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

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

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

## Replacing time of MRF damper

- •Product reliable cycles are depended on the using circumstances and conditions; therefore, we cannot determine the life cycle however if there is phenomena such like below please consider that it is the time to replace to the new one.
  - 1. When the necessary torque is no longer performed even though given rated current.
- 2. When the torque started to be appeared without giving eclectic current.
- 3. When various torque started to be appeared under a same circumstance.
- 4. When abnormal noise, vibration or oil leakage are started to be appeared.
- In particular, high reliability and safeties is required, regardless the phenomenon such like above, we strongly recommend to replace to the new one periodically. Over-tightening of mounting screws

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

## Dispose

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

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



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

50rpm

## Specifications

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

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

## Gear Specifications

Model	G1	*G2
Туре	Standard spur gear	Shifted spur gear
Tooth profile	Invo	lute
Module	1.5	3.0
Pressure angle	2	0°
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 an

d counterclockwise to decrease it.

2 Rotary Damper

## Bi-Directional Uni-Directional Adjustable type Self-adjusting

**RoHS Compliant** 

## •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



## **Option Rack**



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

Fixed Type Adj

## FRT/FRN-C2 Series

Products specification might be changed without notice.



## Specifications

Model	Rated torque	Damping direction		
FRT-C2-201 (G1)	(20±6)×10 <sup>-3</sup> N•m 200±60 gf•cm	Both directions		
FRT-C2-301(G1)	(30±8)×10 <sup>-3</sup> N•m 300±80 gf•cm	Both directions		
FRN-C2-R301(G1)	(30±8)×10 <sup>-3</sup> N•m	Clockwise		
FRN-C2-L301(G1)	300±80 gf•cm	Counter-clockwise		
at 1) Pater determined at a verteting and of 20mm at 22%				

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

Note 2) Gear model number has G1 at the end

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

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

## Gear Specifications

Туре	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



FRT/FRN-D3 Series **RoHS** Compliant





Fixed Type

## **Specifications**

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

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

Туре	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
naen sinte esemelent	10.575

Note 1) Rated torque measured at a rotation speed of 20rpm at 2 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 tor que slightly differs from the rated torque.

3℃

## 2. Temperature characteristics



Fixed Type Ad

## 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

Note 1) Rated torque measured at a rotation speed of 20rpm at 23°C Note 2) Torque can be customized by changing the oil viscosity (see Cutomizable Torque Chart on page 178)

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

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

\* Max. rotational speed

\* Max. cycle rate

\* Operating temperature

- \* Weight
- \* Main body material
- \* Rotating shaft material
- \* Oil type

50rpm 10cycle /min 0~50°C FRT-K2:115.6g FRN-K2:93.2g Polycarbonate + glass fiber Metal (SUS) 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



Bi-Directional Uni-Directional

Fixed Type Adjustable type Self-adjusting

**RoHS** Compliant

## FRT/FRN-K2 Series

Products specification might be changed without notice.







## Specifications

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

Note 1) Rated torque measured at a rotation speed of 20rpm at 23°C Note 2) Torque can be customized by changing the oil viscosity (see 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 that generates one-way torque in the CW direction (R) or CCW direction (L) when the rotating axle is viewed from the top.

\* Max. rotational speed

\* Max. cycle rate

\* Operating temperature\* Weight

- \* Main body material
- \* Rotating shaft material
- \* Oil type

50rpm 10cycle /min 0~50°C FRT-K2 : 78.3g FRN-K2 : 56.6g Polycarbonate + glass fiber Metal (SUS) 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



FRT-W1

φ138 φ148

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

* Max.	rotation	speed
--------	----------	-------

- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Main body material
- \* Cap material
- \* Rotating (shaft) material \* Oil typel
- SUS420 Silicone oil

50rpm

6g

SUS304

A2017

1.5cycle /min -20 ~60℃

## **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



Products specification might be changed without notice.

## FRT-E2/E9 Series



<FRT-E2-% \*\* G1> (6)



## **Specifications**

Model	Rated torque
FRT-E2-100G1	(1±0.5)×10⁻³N•m
FRT-E9-100G2	10±5 gf∙cm
FRT-E2-200G1	(2±0.7)×10⁻³N•m
FRT-E9-200G2	20±7 gf•cm
FRT-E2-300G1	(3±0.8)×10⁻³N•m
FRT-E9-300G2	30±8 gf∙cm
FRT-E2-400G1	(4±1)×10⁻³N∙m
FRT-E9-400G2	40±10 gf∙cm

- \* Max. rotation speed
- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Body and cap material
- \* Rotating shaft material
- \* Gear material
- \* Oil type

- 50rpm 10cycle/min
- 0~50℃
  - FRT-E2 : with gear : 0.41g FRT-E9 : with gear : 0.38g Polycarbonate (PC) Polyacetal (POM) Polyacetal (POM)
- Silicone oil

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

## **Gear Specifications**

Note 2) Gear model number has G1 and G2 at the end

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

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

## **Damper Characteristics**

## 1. Speed characteristics

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

## 2. Temperature characteristics



Bi-Directional Fixed Type

Products specification might be changed without notice.

FRT-G2 Series

2.2

0 7





## **Specifications**

Model	Rated torque
FRT-G2-200(G*)	(2±0.7)×10 <sup>-3</sup> N•m 20±7 gf•cm
FRT-G2-300(G*)	(3±0.8)×10 <sup>-3</sup> N•m 30±8 gf•cm
FRT-G2-450(G*)	(4.5±1)×10 <sup>-3</sup> N•m 45±10 gf•cm
FRT-G2-600(G*)	(6±1.2)×10 <sup>-3</sup> N•m 60±12 gf•cm
FRT-G2-101(G*)	(10±2)×10 <sup>-3</sup> N•m 100±20 gf•cm

Note 1) Rated torque measured at a rotation speed of 20rpm at 23°C Note 2) Models with gear bears G1, G2, or

G3 at the end of their model numbers

Note 3) Torque can be customized by changing the oil viscosity (see Customizable Torque Chart on page 178) Note 4) The diagrams above are outline drawings of FRT-G2-\*\*\*\*

Please refer to the diagrams at the right for G2 and G3.

## **Gear Specifications**

(	1	1	
	G1	G2	G3
Туре	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 tor que 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.



- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Body and cap material
- \* Rotating shaft material
- \* Gear material
- \* Oil type

⟨FRT-G2-※※※G2⟩

## 0~50℃ 0.6g(with gear: G1:0.8g G2:1.0g G3:0.9g) Polycarbonate (PC) Polyacetal (POM) Polyacetal (POM) Silicone oil ⟨FRT-G2-※※※G3⟩

50rpm

10cycle/min



(6.5) p15 C0.3



Speed characteristics of the FRT-G2 series 1.5 101 (Measurement temperature: 23 Torque(cN•m) 50 600 450 300 200 0 20 10 3 5 30 40 50 (Rotation speed:rpm) Temperature characteristics of the FRT-G2 series 1.2 (Rotation speed : 20rpm) 1.0 Torque (cN•m) 101 0.8 0.6 600 0.4 450 300 0.2 200 0 0 10 20 30 40 50 (Ambient temperature℃)

Uni-Directiona

**RoHS Compliant** 

Products specification might be changed without notice.



## Specifications

**FRT-L1** Series

Model	Rated torque
FRT-L1-202	(200±40)×10 <sup>-3</sup> N•m 2,000±400 gf•cm
FRT-L1-302	(300±60)×10 <sup>-3</sup> N•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
- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Main body material
- \* Rotating shaft material
- \* Oil type
- 50rpm 10cycle /min 0~50°C 14.1g Polycarbonate (PC) Polyacetal (POM) 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



Bi-Directional Uni-Dire

FRT-N1 Series



Products specification might be changed without notice.



## Specifications

Model	Rated torque
FRT-N1-102	(100±20)×10⁻³N⋅m 1,000±200 gf⋅cm
FRT-N1-182	(180±36)×10⁻³N•m 1,800±360 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
- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Main body material
- \* Cap material
- \* Rotating shaft material
- \* Oil type

50rpm
10cycle /min
റ∼50℃
8.2g
Polyacetal (POM)
Polyacetal (POM)
Polyacetal (POM)
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.



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RoHS Compliant

## FRT-S1 Series

Products specification might be changed without notice.





## Specifications

Model	Rated torque
FRT-S1-201	(20±6)×10⁻³N•m 200±60 gf•cm
FRT-S1-301	(30±8)×10⁻³N•m 300±80 gf•cm
Note 1) Rated torque measu	red at a rotational speed of 2

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
- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Main body material
- \* Rotating shaft material
- \* Oil type

50rpm 10cycle /min 0 ~50°C 3g Polyacetal (POM) Polyacetal (POM) 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.



Rotaty Dampe

**Bi-Directional** Fixed Type

**RoHS Compliant** 



# 11.8 3.1

*p*41

## **Specifications**

FRT-T1 Series

Model	Rated torque	Damping direction
FRT-T1-303	3±0.6N•m (30±6 kgf•cm)	Both directions

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

## \* Max. rotation speed

- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Main body material \* Cap material
- \* Rotor (shaft) material
- \* Oil typel

## 50rpm 10cycle /min 0~50℃ 74g Zinc die-cast (ZDC) Iron (SPFC) Polyacetal (POM) 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.



## How to Use the Damper

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 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.



## FYN-B1 Series



\*Max. angle \*Operating temperature \*Weight \*Body and cap material

110°  $-5 \sim 50^{\circ}$ C 9 $\pm$ 1g Polybutylene terephthalate (PBT)

## Specifications

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

Note) Measured at 23℃±2℃

\*Rotating shaft material F \*Oil type S

Polyphenylene Sulphide (PPS) Silicone oil

 $\ast \mathsf{R}$  type has Black shaft / L type has White shaft



## How to Use the Damper

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





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

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

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

Example) Lid mass M : 1 kg Lid dimensions L: 0.3m Gravity Center Position : Assumed as Load torque : T=1.5×0.4×9.8÷2 =2.94N•m Based on the above calculation,

FYN-B1-\*153 is selected.



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



<Recommended dimensions for mounting a rotating shaft>

<Recommended dimensions for mounting the main body>

**RoHS** Compliant





•Products specification might be changed without notice.

Fixed Type

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.

## 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

ø

- \* Operating temperature -5~50°C \* Weight
  - - 215±10g

180°

- \* Body and cap material Zinc die-cast (ZDC) \* Rotating shaft material S25C
- \* Oil type

**Optional Parts** 



Silicone oil

## How to Use the Damper

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





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

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

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

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

Lid mass M: 5kg

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

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



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





<Recommended dimensions for mounting a rotating shaft>

**RoHS** Compliant

# Temperature characteristics of the FYN-D3 series

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.

15

Time T [sec] 2

5

0 -10

0

10

20

(Ambient temperature °C)

30

40

50



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

## **FYN-M1** Series

- \* Max. angle
  - \* Max. cycle rate
    - \* Operating temperature
    - \* Weight
    - \* Main body

  - \* Cap material



180°

6cycle / min −5~50°C

17±2g

Polybutylene terephthalate (PBT)

Polybutylene terephthalate (PBT)

**Specifications** 

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

Note) Measured at 23°C±2°C

- \* Rotating shaft material
- \* Oil type
- \* Cap colour

across flat)

(Rotating

Zinc die-cast (ZDC) Silicone oil R: Black L: Gray

80° (Working angle 4 <FYN-M1-L> <FYN-M1-R>





**b**20

## How to Use the Damper

- 1. The FYN-M1 Series is designed to generate a large torque up to 90° in a closing lid, as shown in Diagram A, and the lid is able to close completely. However, when the lid is closed from a vertical position, as shown in Diagram B, the lid cannot be slowed down, as the torque becomes small just before the lid is completely closed.
- 2. Below is a graph showing the relationship between the load torque and the time when a lid is closed from a 160° angle, as shown in the diagram.

## Relationship between load torgue and time in the FYN-M1 serie





	_	

Bi-DirectionalUni-DirectionalFixed TypeAdjustable typeSelf-adjusting
RoHS Compliant
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.

5+0.10

 $\phi 6.1^{+0.1}$ 

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.



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

<Recommended dimensions for a rotating shaft opening>

Non-damping range



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

## FYN-N1 Series









\* Weight \* Body and cap material





**Specifications** 

Max. torque

1 N·m

(10 kgf.cm)

2 N•m

(20 kgf.cm)

3 N•m

(30 kgf.cm)

**Reverse torque** 

0.2 N·m or lower

(2 kgf·cm or lower)

0.4 N·m or lower

(4 kgf·cm or lower)

0.8 N·m or lower

(8 kgf·cm or lower)

Silicone oil

\* Rotating shaft material Polyphenylene Sulphide (PPS)

Damping direction

Clockwise

Counter-clockwise

Clockwise

Counter-clockwise

Clockwise

Counter-clockwise

Model

FYN-N1-R103

FYN-N1-L103

FYN-N1-R203

FYN-N1-L203

FYN-N1-R303

FYN-N1-L303

Note) Measured at 23°C±2°C

\* Oil type

## How to Use the Damper

1. FYN-N1 is designed to generate a large torque just before a lid closing from a vertical position, as shown in Diagram A, comes to a full closure. When a lid is closed from a horizontal position, as shown in Diagram B, a strong torque is generated just before the lid is fully closed, causing the lid to not close properly.





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

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

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

Example) Lid mass M: 1.5kg Lid dimensions L: 0.4m Gravity Center Position : Assumed as  $\frac{L}{2}$ Load torque :  $T = 1.5 \times 9.8 \times 0.4 \div 2$ = 2.94N•m Based on the above calculation, FYN-N1-\*303 is selected.



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



<Recommended dimensions for mounting a rotating shaft>

<Recommended dimensions for mounting the main body>

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## **RoHS** Compliant

## Products specification might be changed without notice.

of the FYN-N1 series

Temperature characteristics

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.

## FYN-P1 Series



## Specifications

Note) Measured at 23°C±2°C

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

\* Max. angle

- \* Operating temperature
- \* Weight
- 10. 5±1g

115°

-5~50℃

- \* Body and cap material Polybutylene terephthalate (PBT)
- \* Rotating shaft material Polybutylene terephthalate (PBT)
- \* Oil type



Silicone oil		<	45			Case's w	idth across flat	
-0.3		(18)	<	22	5	/	8-0.2	
	Rotating shaft		(4.2)	17.8		\$17.5-02		
	•		<u> </u>			¥		

## How to Use the Damper

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





Diagram B

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

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

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

Lid mass M: 1kg Lid dimensions L: 0.3m Gravity Center Position : Assumed as  $\frac{L}{2}$ Load torque : T=1×9.8×0.3÷2

=1.47N•m Based on the above calculation, FYN-P1-\*153 is selected.



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



**Uni-Directional** 

**RoHS** Compliant

## 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.



Fixed Type

Products specification might be changed without notice.

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.

## FYN-S1 Series





## Specifications

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

Note) Measured at 23° C  $\pm$  2° C



## How to Use the Damper

1. Operating characteristics of self-adjusting oil pressure dam pers

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



## [Motion time graph]



[Operating principles of the self-adjusting type]

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

[Measurement conditions for the motion-time graph]



Load torque T 5~10N·m

- Measured angle  $30^{\circ}$  ~  $-30^{\circ}$
- Measurement temperature 23  $^\circ\,$  C  $\pm 2 ^\circ\,$  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.

**Uni-Directional** Self-adjusting

**RoHS Compliant** 

Products specification might be changed without notice.

Non-damping rang



 $\Box 12^{-0.02}_{-0.10}$ 

- 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.

2. When using the damper, please ensure that a shaft with

Direction of torque(L) Max. angle

30°

specified angular dimensions is inserted in the damper's shaft

## FYN-U1 Series





115° −5~50℃ 40±4g

\*Main body, rotating shaft materials Zinc die-cast (ZDC)



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

Note) Measured at 23°C±2°C

\* Cap material Polyphenylene Sulphide (PPS)\* Oil type Silicone oil



## How to Use the Damper

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





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

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

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

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



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



# Products specification might be changed without notice. FYN-U1 Series

Temperature Property Graph

Fixed Type

10

0

20

Ambient Temperature [℃]

30

40

50

Uni-Directional

- 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.

10

Operating Duration T [sec]

5

0



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

## FYN-X1/Y1/Z1 Series

## FYN-X1



## Specifications

Model	Max. torque	Reverse torque	Damping direction
FYN-X1-R114	11 N•m	2 N∙m or lower	Clockwise
FYN-X1-L114	(110 kgf•cm)	( 20 kgf•cm or lower)	Counter-clockwise

Note) Measured at 23° C  $\pm$  2° C

- \* Max. angle
- \* Operating temperature
- \* Weight
- \* Body, cap, and rotating shaft material
- \* Oil type

90° -5~50°C 271g Zinc die-cast (ZDC) Silicone oil

## FYN-Y1



## Specifications

Model	Max. torque	Reverse torque	Damping direction	
FYN-Y1-L254	25 N∙m (250 kgf•cm)	4.1 N·m or lower ( 41 kgf·cm or lower)	Counter-clockwise	
Note) Measured at 23° C ± 2° C				
* Max. angle		121.4°	121.4°	
* Operating temperature		−5~50°C	−5~50°C	
* Weight		215g	215g	
* Body, cap, and rotating shaft material		erial Zinc die-cast	(ZDC)	
* Oil type		Silicone oil	Silicone oil	

## FYN-Z1



## Specifications

Model	Max. torque	Rev	verse torque	Damping direction
FYN-Z1-R504	50 N∙m	2.6	N•m or lower	Clockwise
FYN-Z1-L504	(500 kgf•cm)	(26 kgf•cm or lower)		Counter-clockwise
Note) Measured at 23° C $\pm$ 2° C				
* Max. angle			57. 4°	
* Operating temperature			−5~50℃	
* Weight			490g	
* Body, cap, and rotating shaft material		erial	Zinc die-cast (ZDC)	
* Cap material			Iron (SPFC)	
* Oil type			Silicone oil	

## How to Use the Damper

Contact us from INQUIRY



## Products specification might be changed without notice.

Fixed Type Adjustable type Self-adjusting

Bi-Directional Uni-Directional

**RoHS** Compliant





17 12.7

5





**Specifications** 

## How to Use the Damper

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







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

The angle in which the damper torque becomes large can be customized by modifying the inside orifice. 2. When using a damper on a lid, such as the one shown in the diagram, use the following selection calculation to determine the damper torque. Example)

Lid mass M : 5kg Lid dimensions L : 0.4m Gravity Center Position : Assumed as  $\frac{L}{2}$ Load torque : T = 5×9.8×0.4÷2 = 9.8N•m Based on the above calculation,

FYN-D1-\*104 is selected.



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







**RoHS Compliant** 

## 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  $\sim$ 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.



Products specification might be changed without notice.

Fixed Type



(64.5[53.5])

30

2-5.7

14.5

12

(2.5)

φ24

Dimensions of H2 series are in []

**b**44.

(50[39])

20[9]

18[7]

Rotating shaft

φ8-

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







## How to Use the Damper

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2-11

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

2-M5

6±0.05



¢66 56



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

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

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

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

Lid mass M: 5kg

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

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



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





<Recommended dimensions for mounting a rotating shaft>

Bi-Directional Uni-Directional

**RoHS Compliant** 

Adjustable type

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.



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

## <Range of torque adjustment>

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



## FYT/FYN-LA3 Series



- \* Max. angle
- \* Operating temperature 0~50℃
- \* Weight
- 1.75kg Zinc die-cast (ZDC)
- \* Body and cap material
- \* Rotating shaft material \* Oil type

80<sup>±1</sup>

Alloy steel Silicone oil

210°

**Specifications** 

Model	Max. torque	Damping constant	Damping direction
FYT-LA3	40N•m (400kgfscm)	10~60N•m/(rad/sec)	Both directions
FYN-LA3-R			Clockwise
FYN-LA3-L	(400Kgr*Ciii)		Counter-clockwise

Note) Measured at 23°C±2°C



## How to Use the Damper

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



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



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).



Bi-Directional Uni-Directional

**RoHS Compliant** 

Adjustable type

Products specification might be changed without notice.

Non-damping rang

## 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



- Formula (N·m/(rad/sec)) =  $\frac{FL^2t}{A}$
- 2. Delayed absorption in rotation Formula (N·m/(rad/sec)) =  $\frac{T}{\omega}$
- 3. Impact absorption in linear motion

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

1. Delayed absorption in linear motion 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)

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

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)

FDT-47A/FDN-47A Series

Bi-Directional Uni-Directional

Fixed Type A

**RoHS Compliant** 

Products specification might be changed without notice.

## Specifications

10.3<sup>±0.5</sup>

¢42.8

1.6

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	Clockwise direction
FDN-47A-L502	(5±1.5 kgf•cm)	Counter-clockwise direction
FDN-47A-R103	1±0.2 N∙m	Clockwise direction
FDN-47A-L103	(10±2 kgf•cm)	Counter-clockwise direction
FDN-47A-R163	1.6±0.3 N∙m	Clockwise direction
FDN-47A-L163	(16±3 kgf•cm)	Counter-clockwise direction
FDN-47A-R203	2±0.3 N∙m	Clockwise direction
FDN-47A-L203	(20±3 kgf•cm)	Counter-clockwise direction

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





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

to the right for the recommended shaft dimensions for a damper.



6. Please contact us when a continuous rotation is planned.

## 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



\* Max. rotation speed
\* Max. cycle rate
\* Operating temperature

- \* Weight
- \* Main body material
- \* Rotating (shaft) material Nylon (with glass)
- \* Oil typel
- -10~50°C FDT- 47A : 50g FDN- 47A : 55g Iron (SPFC) Nylon (with glas Silicone oil

50rpm 12cycle /min



## \_\_\_\_\_¥ <FDT-47A-%%%>

## How to Use the Damper

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

creating a shaft for
FDN-47A. Not using
the recommended
shaft dimensions may
cause the shaft to
slip out.

t tor		
	Shaft's external dimensions	φ 6 <sub>-0.03</sub>
ising	Surface hardness	HRC55 or higher
ded	Quenching depth	0.5mm or highe
may	Surface roughness	1.0Z or lower
ft to	Chamfer end	$\rightarrow$
	(Damper insertion side)	<u>C0.2~C0.3</u> (orR0.2~R0.3)

## **Damper Characteristics**

## 1. Speed characteristics

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



Robity Dampe

FDT-57A/FDN-57A Series

**RoHS** Compliant

· · · · · · · · · · · · · · · · · · ·	(6)
	0

\* Max. rotation speed

- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Main body material
- \* Rotating (shaft) material
- \* Oil typel



## Specifications

Model	Rated torque	Damping direction
FDT-57A-303	3±0.4 №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	Clockwise direction
FDN-57A-L303	(30±4 kgf•cm)	Counter-clockwise direction
FDN-57A-R403	4±0.5 N•m	Clockwise direction
FDN-57A-L403	(40±5 kgf•cm)	Counter-clockwise direction
FDN-57A-R553	5.5±0.6 N•m	Clockwise direction
FDN-57A-L553	(55±6 kgf•cm)	Counter-clockwise direction

2-R5.5

Fixed Type

Products specification might be changed without notice.

23℃±3℃

φ10 <sup>0</sup><sub>-0.03</sub>)

diameter:

haft

ø10 (Suitable

φ52.4

p57

3.8 ±0.

1.6

Note) Rated torque is measured at a rotation speed of 20rpm at

torque generating direction

68

(62

.1.6



## How to Use the Damper

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

creating a shaft for FDN-57A. Not using the recommended shaft dimensions may cause the shaft to slip out.

Shaft's external dimensions	$\varphi$ 10 $_{-0.03}^{0}$
Surface hardness	HRC55 or higher
Quenching depth	0.5mm or higher
Surface roughness	1.0Z or lower
Chamfer end	$\rightarrow$
(Damper insertion side)	<u>C0.2~C0.3</u> (orP0.2~P0.3)

# 4. To insert a shaft into FDN-57A, insert the shaft while spinning it in the idling direction of the one-way clutch. (Do not force the s from the regular direction. This may damage the oneway clutch.) haft in

<FDN-57A-R/L\*\*\*\*>

5. When using FDT-57A, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. A wobbling shaft and damper shaft may not allow the

lid to slow down properly when closing.
Please see the diagrams to the right for the recommended shaft dimensions for a damper.
Please contact us when a continuous

Nordamigrange Nordam

Damper Characteristics

## ①1. Speed characteristics

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



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

rotation is planned.



Bi-Directional Uni-Directional

FDT-63A/FDN-63A Series

Fixed Type

**RoHS** Compliant

Products specification might be changed without notice.

## **Specifications**

11.3<sup>±0.5</sup>

1.6

Model	Rated torque	Damping direction
	4±0.5 N∙m	Both directions
FD1-03A-403	(40±5 kgf•cm)	Both directions
	5.3±0.6 N∙m	Both directions
FD1-03A-333	(53±6 kgf•cm)	Both directions
FDT-63A-703	6.7±0.7 N∙m	Both directions
FDT-63B-703	(67±7 kgf•cm)	Both directions
FDN-63A-R453	4.5±0.5 N∙m	Clockwise direction
FDN-63A-L453	(45±5 kgf•cm)	Counter-clockwise direction
FDN-63A-R603	6±0.6 N∙m	Clockwise direction
FDN-63A-L603	(60±6 kgf•cm)	Counter-clockwise direction
FDN-63A-R903	8.5±0.8 N•m	Clockwise direction
FDN-63A-L903	(85±8 kgf•cm)	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



## <FDN-63A-R/L\*\*\*>

from the regular direction. This may damage the one-way clutch.)

- 5. When using FDT-63A, please ensure that a shaft with specified angular dimensions is inserted in the damper's shaft opening. A wobbling shaft and  $\Box 12.5_{-0.10}^{-0.02}$
- 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

7. Please contact us when a continuous

for usage with spiral springs

rotation is planned.

characteristics

(Recommended dimensions for the corresponding shaft>

Non-damping rang

(FDT-63B-703)





\* Max. rotation speed \* Max. cycle rate \* Operating temperature \* Weight

12cycle /min -10~50℃ \* Main body material Iron (SPFC)

50rpm

- \* Rotating (shaft) material
- \* Oil typel

FDT-63A : 92g FDN-63A: 115g Nylon (with glass) Silicone oil



## <FDT-63A-% \*\* >> How to Use the Damper

- 1. Dampers may generate torque in both directions, clockwise, or counter-clockwise.
- 2. Please make sure that a shaft attached to a damper has a bearing, as the damper itself is not fitted with one.
- 3. Please refer to the recommended dimensions below when creating a shaft for FDN-63A. Not using the recommended shaft dimensions may cause the shaft to slip out.

4. To insert a shaft into FDN-63A, insert the shaft while spinning i in the idling direction of the one-way clutch. (Do not force the shaft ir

1		
	Shaft's external dimensions	φ 10 <sub>-0.03</sub>
-	Surface hardness	HRC55 or higher
t	Quenching depth	0.5mm or higher
ו	Surface roughness	1.0Z or lower
	Chamfer end	-
ı	(Damper insertion side)	<u>C0.2~C0.3</u> (orR0.2~R0.3)

## **Damper Characteristics**

## 1. Speed characteristics

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





140

Rotary Dampe

FDT-70A/FDN-70A Series

Bi-Directional Uni-Directional Fixed Type

•Products specification might be changed without notice.

**RoHS Compliant** 

# from the regular direction. This may damage the one-way clutch.) 5. When using FDT-70A, please ensure that a shaft with specified angular



0 -30-20-100 10 2030405060 (Ambient temperature °C)

\* Max. rotation speed

- \* Max. cycle rate
- \* Operating temperature
- \* Weight
- \* Main body material
- \* Rotating (shaft) material
- \* Oil typel
- FDT-70A: 112g FDN-70A: 136g Iron (SPFC) Nylon (with glass) Silicone oil

12cycle /min

-10~50℃

50rpm

## **Specifications**

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

Not 70F



# 11.3<sup>±0.5</sup> 1.6

D1-70A-303	0.7 ±0.0 N-111	Dath directions	
DT-70B-903	(87±8 kgf•cm)	Both directions	
DN-70A-R114	11±1.1 N•m	Clockwise direction	
DN-70A-L114	(110±11 kgf•cm)	Counter-clockwise direc	
e) Rated torque is measu has a slotted rotating sh	red at a rotation speed of 20rpm at 23°C±3°C aft 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.
- 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 ir

	Shaft's external dimensions	Φ10 <sub>-0.03</sub>
-	Surface hardness	HRC55 or higher
t	Quenching depth	0.5mm or highe
۱	Surface roughness	1.0Z or lower
	Chamfer end	$ \rightarrow $
۱	(Damper insertion side)	<u>C0.2~C0.3</u> (orR0.2~R0.3)

## Damper Characteristics

## 1. Speed characteristics

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



## 2. Temperature characteristics

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



for the corresponding shaft>



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.

# **Friction Damper**

FFD-25FS/FW/SS/SW

Fixed Type Adju

Uni-Directional

Self-adjusting

**RoHS** Compliant

Products specification might be changed without notice.

## Specifications

Series

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) (5±0.5 kgf•cm)	Clockwise
FFD-25FS-L502	(5±0.5 kgf•cm)	Counter-clockwise	FFD-25SS-L502		Counter-clockwise
FFD-25FS-R103	1±0.1(N•m)	Clockwise	FFD-25SS-R103	1±0.1[N•m] (10±1 kgf•cm)	Clockwise
FFD-25FS-L103	(10±1 kgf•cm)	Counter-clockwise	FFD-25SS-L103		Counter-clockwise
FFD-25FW-R103	1±0.1 [N•m]	Clockwise	FFD-25SW-R103	1±0.1 (N•m) (10±1 kgf•cm)	Clockwise
FFD-25FW-L103	(10±1 kgf•cm)	Counter-clockwise	FFD-25SW-L103		Counter-clockwise
FFD-25FW-R153	1.5±0.15 (N•m)	Clockwise	FFD-25SW-R153	1.5±0.15 (N•m) (15±1.5 kgf•cm)	Clockwise
FFD-25FW-L153	(15±1.5 kgf•cm)	Counter-clockwise	FFD-25SW-L153		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 <sup></sup> 25 <sup>o</sup> C					
*Max. rotation speed 30rpm			*Cap colour	R:Black L:Wh	nite
*Max. cycle rate 1		13cycle/min	*Weight	FFD-25FS	13±2g
*Operating temperature $-10\sim60^{\circ}$ C				FFD-25FW	24±2g
		(90%RH)		FFD-25SS	12±2g
*Body and cap material POM FFD-25SW 23±2g				23±2g	



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





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

## How to Use the Damper

- 1. The damper generates torque in both the clockwise and counter-clockwise directions. (A one-way clutch is built in inside the damper.)
- 2. Please make sure that the shaft attached to a damper has a bearing, as the damper itself is not fitted with one.

Shaft's external dimensions	$\varphi 6_{-0.03}^{0}$
Surface hardness	HRC55 or higher
Quenching depth	0.5mm or higher
Surface roughness	1.0Z or lower
Chamfer end (Damper insertion side)	<u>C0.2~C0.3</u> (orR0.2~R0.3)

- 3. It can be used as a free-stop for a load that is smaller than the rated torque.
- 4. Please refer to the recommended dimensions below when creating a shaft for attachment to the damper. Using a shaft outside of the recommended dimensions may cause the shaft to slip out.
- 5. To insert a shaft into the damper, insert the shaft while spinning it in the opposite direction of the damper's direction of torque generation. (Do not force the shaft in from a regular direction. This may damage the built-in oneway clutch.)

# Friction Damper

FFD-28FS/FW/SS/SW

Products specification might be changed without notice.

**RoHS** Compliant

Soft Absorber

Series

Specifications

FFD-28FS-R102	0.1±0.01 [N·m]	Classica			
		CIOCKWISE	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-clockw
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-clockw
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-clockw
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-clockw
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-clockw
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-clockw
*) Rated torque is m	easured at a rotation sp	eed of 20rpm at 20 <sup>~</sup>	25℃		
* Max. rotatior	n speed	30rpm	*Cap colour	R:Black L:W	'hite
* Max. cycle ra	te	13cycle/min	* Weight	FFD-28FS	$14 \pm 2g$
* Operating temperature		−10~60°C		FFD-28FV	V 27±2g
		(90%RH)		FFD-28SS	$14 \pm 2g$
*Body and cap material POM				FFD-28SV	V $25 \pm 2q$



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





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

## How to Use the Damper

13[19]

- 1. The damper generates torque in both the clockwise and counter-clockwise directions. (A one-way clutch is built in inside the damper.)
- 2. Please make sure that the shaft attached to a damper has a bearing, as the damper itself is not fitted with one.

Shaft's external dimensions	$\varphi 8_{-0.03}$
Surface hardness	HRC55 or higher
Quenching depth	0. 5mm or higher
Surface roughness	1.0Z or lower
Chamfer end (Damper insertion side)	<u>C0.2~C0.3</u> (orR0.2~R0.3)

- 3. It can be used as a free-stop for a load that is smaller than the rated torque.
- 4. Please refer to the recommended dimensions below when creating a shaft for attachment to the damper. Using a shaft outside of the recommended dimensions may cause the shaft to slip out.
- 5. To insert a shaft into the damper, insert the shaft while spinning it in the opposite direction of the damper's direction of torque generation. (Do not force the shaft in from a regular direction. This may damage the built-in oneway clutch.)