



Pneumatic Rotary Actuators PRO - PRN

Catalogue : 2254UK-1-po





Rotary actuators are an efficient and easy way to generate torque from compressed air, in a very compact size. They are ideal for the compact applications in a wide range of industries such as, packaging, process, electronics etc.

Wide range

A full range of 9 sizes is available, the 8 largest sizes are single or double vane type (with double effective torque). For the PRN High Torque, a series of customized cushion units (CRN) are available for high energy applications.

Easy-to-use oscillating angles

Two oscillation reference points of 45° and 90° and three oscillating angles of 90° 180° and 270° are featured on the PRN ranges to match the most frequently uses. On the PRO range, the oscillation angle can be adjusted to the exact requirement.

Stable operation

The unique sealing design minimises leakages. It assures low speed oscillation and and stable, smooth operation even at low operating pressures and speeds.

Durability to high operating temperatures

Dry dehumidified air may supply the rotary actuators within operating temperature range of -5°C to 80°C (PRN range -5°C to +60°C).

Outstanding durability

A solid vane shaft and built-in damper are combined with a unique sealing desing to ensure outstanding durability. PRN50 and higher models are able to operate much greater loads with the incorporation of a Hydro-cushion.

Contents

General information 2

PRO Adjustable Oscillating Angle 4


PRN Miniature range 12

PRN High Torque range 20


CRN Hydro-cushion for PRN High Torque 25

Selecting a Rotary Actuator 28

Common instructions 30



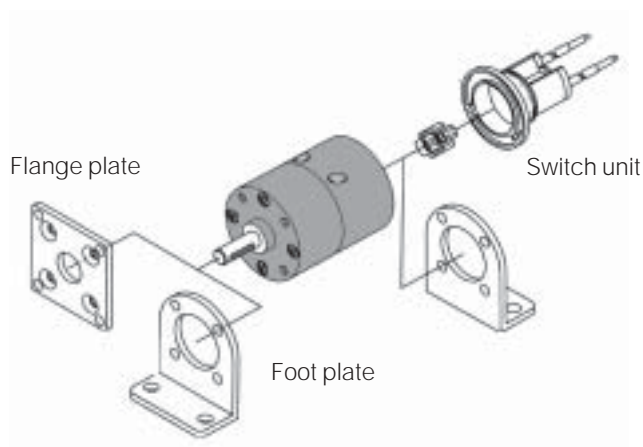
Important !
Before attempting any external or internal work on the actuator or any connected component, make sure the actuator is vented and disconnect the air supply in order to ensure insolation of the air supply.



Note !
Air quality is essential for maximum cylinder life (please refer to ISO 8573).

Note !
All technical data in this catalogue are typical data only.

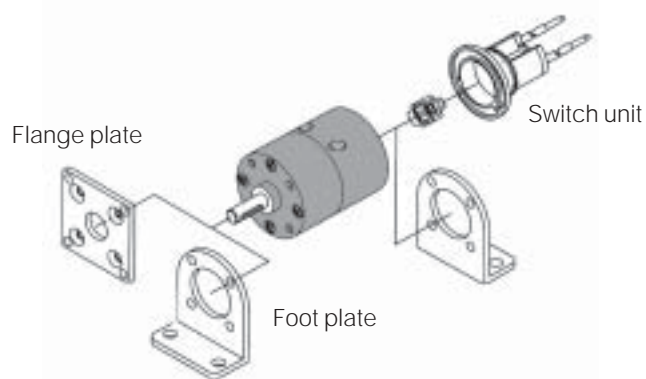
PRO Miniature Rotary Actuators (adjustable oscillating angle)



Vane	Model	Effective torque (N.m at 6 bar)
Single vane	PROA3S	0.38
	PROA10S	1.20
	PROA20S	2.10
	PRO30S	4.10
Double Vane	PROA3D	0.65
	PROA10D	2.54
	PROA20D	4.70
	PRO30D	9.50

Refer page 4

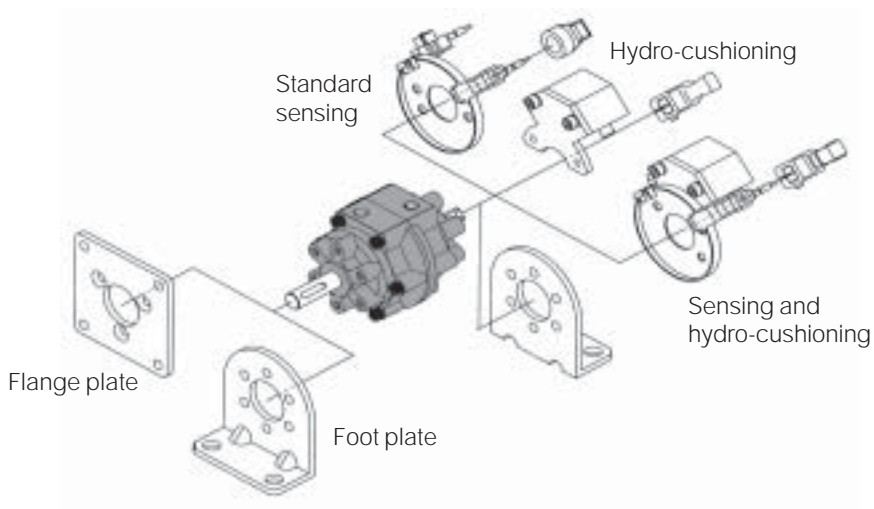
PRN Miniature Rotary Actuators (fixed oscillating angle)



Vane	Model	Effective torque (N.m at 6 bar)
Single vane	PRN1S	0.16
	PRNA3S	0.38
	PRNA10S	1.20
	PRNA20S	2.10
	PRN30S	4.10
Double Vane	PRNA3D	0.65
	PRNA10D	2.54
	PRNA20D	4.70
	PRN30D	9.50

Refer page 12

PRN High Torque (fixed oscillating angle)



Vane	Model	Effective torque (N.m at 6 bar)
Single vane	PRN50S	5.90
	PRN150S	18.00
	PRN300S	34.50
	PRN800S	123.00
Double Vane	PRN50D	12.80
	PRN150D	41.50
	PRN300D	83.00
	PRN800D	247.00

Refer page 20

PRO Miniature series - Adjustable oscillating angle - Order Codes

Standard models



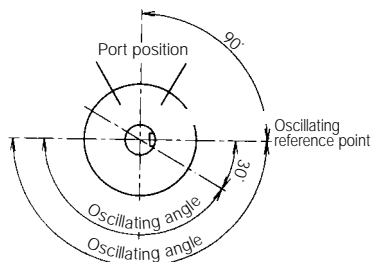
Order code	Torque at 6 bar	Oscillating angle
Single vane		
PROA3S-0-90	0,38	30 to 180°
PROA10S-0-90	1,20	30 to 180°
PROA20S-0-90	2,10	30 to 180°
PRO30SE-0-45	4,10	30 to 270°
Double vane		
PROA3D-0-45	0,65	30 to 90°
PROA10D-0-45	2,54	30 to 90°
PROA20D-0-45	4,70	30 to 90°
PRO30DE-0-45	9,50	30 to 90°

How to select a PRO rotary actuator ? Refer page 28

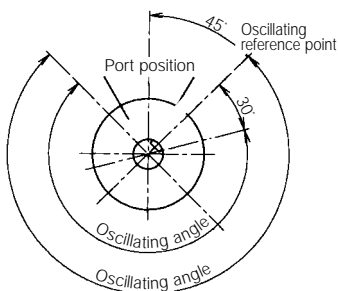
Note : Rotary actuators with variable oscillating angle are shipped with fixed reference point stopper. The angle setting stopper is attached but not fixed. This must be fixed securely before use.

Oscillation starting point and oscillation angle

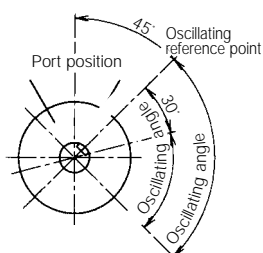
PROA3S, PROA10S, PROA20S
Oscillating reference point at 90°



PRO30S
Oscillating reference point at 45°



PROA3D, PROA10D, PROA20D, PRO30D
Oscillating reference point at 45°



Rotary Actuator mountings



For Rotary Actuator	Flange mounting	Foot mounting
PROA3S/D	PRN3-P	PRN3-L
PROA10S/D	PRN10-P	PRN10-L
PROA20S/D	PRN20-P	PRN20-L
PRO30S/D	PRN30-P	PRN30-L

The mountings are provided with set screws

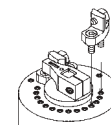
Switch units

Variable switch position, solid state NPN or PNP.
Refer to page 5 for technical data.



For Rotary Actuator	NPN	PNP
PROA3S/D	FR-3PRO	FP-3PRO
PROA10S/D	FR-10PRO	FP-10PRO
PROA20S/D	FR-20PRO	FP-20PRO
PRO30S/D	FR-30PRO	FP-30PRO

Protective cover and stopper unit



For Rotary Actuator	Protective cover	Stopper unit
PROA3S/D	PRO3-K	RO3-U
PROA10S/D	PRO10-K	RO10-U
PROA20S/D	PRO20-K	RO20-U
PRO30S/D	PRO30-K	RO30-U

Maintenance kits

The maintenance kit consists in the vane shaft, shoe seal and shaft O'rings

For Rotary Actuator		Double vane	
Single vane		Double vane	
PROA3S	PRNA3S-PS	PROA3D	PRNA3D-PS
PROA10S	PRNA10S-PS	PROA10D	PRNA10D-PS
PROA20S	PRNA20S-PS	PROA20D	PRNA20D-PS
PRO30S	PRN30S-PS	PRO30D	PRN30D-PS

PRO Miniature series - Adjustable oscillating angle - Technical data

Technical specification

PRO Rotary Actuators	Unit	PROA3S	PROA10S	PROA20S	PRO30S
Vane		Single vane			
Air condition		Filtered (5μ) lubricated or non-lubricated			
Oscillating angle	°	30 to 180	30 to 180	30 to 180	30 to 270
Oscillating reference point	°	90	90	90	45
Port size		M5	M5	M5	G1/8
Minimum operating pressure	bar	1,0	1,0	0,8	1,0
Operating pressure	bar	2 to 7	2 to 7	2 to 10	2 to 10
Operating temperature	°C	-5 to 80	-5 to 80	-5 to 80	-5 to 60
Maximum operating frequency	cycles/mn	150 (@180°)	150 (@180°)	120 (@180°)	90 (@270°)
Internal volume	cm3	4	12	21	43
Allowable radial load	N	40	50	300	400
Allowable thrust load	N	4	4	25	30
Allowable energy	mJ	1	2	3	7
Weight	kg	0,085	0,170	0,280	0,510

PRO Rotary Actuators	Unit	PROA3D	PROA10D	PROA20D	PRO30D
Vane		Double vane			
Air condition		Filtered (5μ) lubricated or non-lubricated			
Oscillating angle	°	30 to 90	30 to 90	30 to 90	30 to 90
Oscillating reference point	°	45	45	45	45
Port size		M5	M5	M5	G1/8
Minimum operating pressure	bar	0,7	0,7	0,6	0,8
Operating pressure	bar	2 to 7	2 to 7	2 to 10	2 to 10
Operating temperature	°C	-5 to 80	-5 to 80	-5 to 80	-5 to 60
Maximum operating frequency	cycles/mn	240 (@90°)	240 (@90°)	180 (@90°)	180 (@90°)
Internal volume	cm3	2,8	8,1	15	34
Allowable radial load	N	40	50	300	400
Allowable thrust load	N	4	4	25	30
Allowable energy	mJ	1	2	3	7
Weight	kg	0,087	0,180	0,290	0,530

Notes :

- İ The allowable energy differs from that of PRN series.
- İ Maximum operating frequency is given at 5 bar operating pressure (unloaded).
- İ Make sure to use the PRO rotary actuators within the allowable energy. Check if the required energy is lower than the allowable energy. If not, use end stoppers directly on the load.
- İ The PRO with keyways are provided with keys.

Materials specification

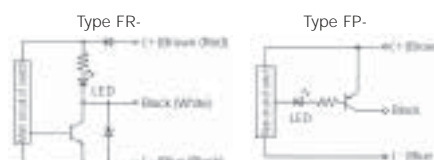
PRO	PROA3, PROA10, PROA20	PRO30
Body	Aluminium alloy	Aluminium alloy
Solid vane shaft	Steel + resin + Hydr. Nitrile	Steel + resin + Nitrile
Shoe	Resin	Resin
Shoe seal	Hydrogenated Nitrile	Nitrile
O-ring	Hydrogenated Nitrile	Nitrile
Screws, claw, stoppers, locknut	Steel	Steel

Effective torque (N.m)

		Operating pressure (bar)									
	Model n°	2	3	4	5	6	7	8	9	10	
Single vane	PROA3S	1,0	1,6	2,4	3,1	3,8	4,5	-	-	-	
	PROA10S	3,5	5,6	7,5	9,8	12,0	13,9	-	-	-	
	PROA20S	5,9	9,5	13,3	17,0	21,0	24,9	28,9	32,6	36,8	
	PRO30S	11,0	18,0	25,0	31,9	41,0	48,0	58,0	65,0	72,0	
Double vane	PROA3D	2,2	3,2	4,3	5,4	6,5	7,6	-	-	-	
	PROA10D	7,6	11,7	16,2	21,1	24,4	30,3	-	-	-	
	PROA20D	14,0	22,2	30,6	38,8	47,0	55,3	63,3	71,7	80,7	
	PRO30D	27,0	44,0	60,0	77,0	95,0	112,0	129,9	148,0	166,0	

Switch units specification

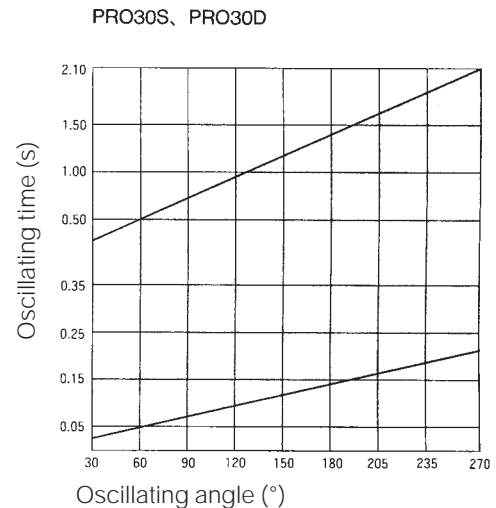
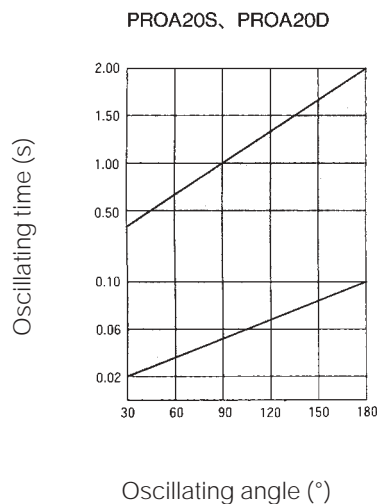
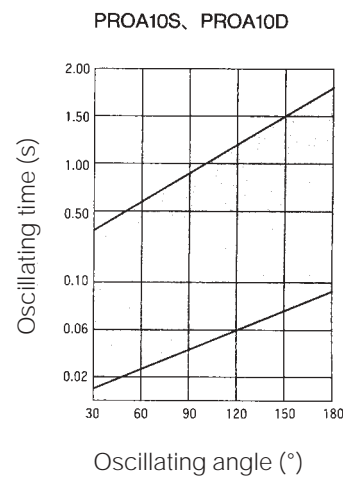
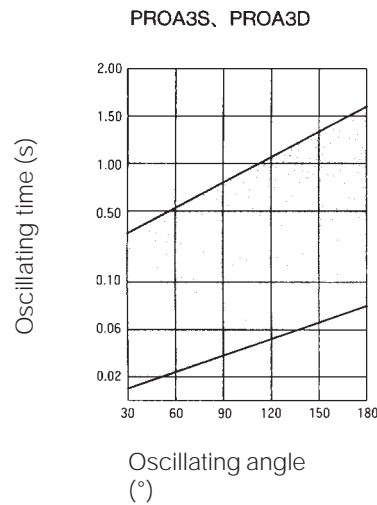
Switch unit type	FR-	FP-
Application	Relay, PLC, IC circuit	
Output method	NPN	PNP
Mounting	Switch position adjustable	
Operating voltage	DC5~30V	DC10~30V
Operating current	5 to 200mA	5 to 200mA
Indicating lamp	Lights up at ON	
Consumption	20mA@24V 10mA@12V 4mA at 5V	14mA@24V 7mA@12V
Max.leakage current	10μA	
Internal voltage drop	1,5V	
Average operating time	1ms	
Shock resistance	490m/s2	
Operating temperature	5 to 60°C	
Protection	IP67	
Lead wire	1m, 3 core, oil resistant	
Response range	23°±7°	
Hysteresis	Approx. 2°	



PRO Miniature series - Adjustable oscillating angle - Technical data (cont)

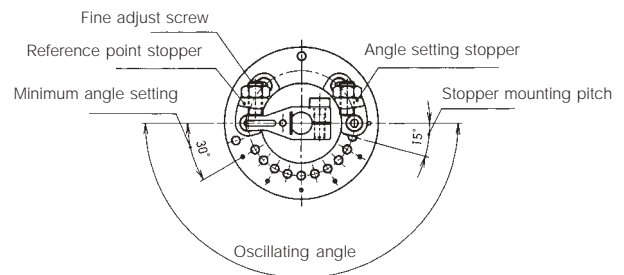
Oscillating time range

Note : The PRO rotary actuators must be operated within the range of the charts shown; otherwise, they exhibit a stick-slip motion.



Setting the oscillation angle

The rotary actuators are delivered with the reference point stopper fixed and the angle setting stopper non fixed. The angle setting stopper has to be set in position according to the angle required, it can be attached at intervals of 15°.



Oscillating angle setting and external stopper specifications

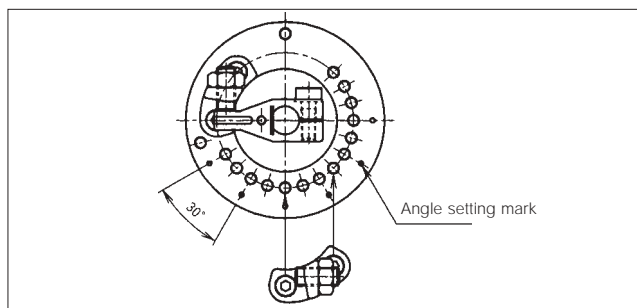
Model n°	PROA3S	PROA10S	PROA20S	PRO30S	PROA3D	PROA10D	PROA20D	PRO30D
Oscillation angle setting range	30 to 180°	30 to 180°	30 to 180°	30 to 270°	30 to 90°	30 to 90°	30 to 90°	30 to 90°
Oscillating reference point	90°	90°	90°	45°	45°	45°	45°	45°
Minimum angle setting	30°	30°	30°	30°	30°	30°	30°	30°
Maximum angle setting	180°	180°	180°	270°	90°	90°	90°	90°
Pitch for angle setting	15°	15°	15°	15°	15°	15°	15°	15°
Fine adjustment range								
Angle	-9° to +6°	-9° to +6°	-9° to +6°	-9° to +6°	-9° to +6°	-9° to +6°	-9° to +6°	-9° to +6°
Oscillating ref point	±3°	±3°	±3°	±3°	-1° to +3°	±3°	±3°	±3°
At max angle setting	-9° to +6°	-9° to +6°	-9° to +6°	-9° to +3°	-9° to +1°	-9° to +3°	-9° to +3°	-9° to +3°

PRO Miniature series - Adjustable oscillating angle

Setting the oscillation angle (cont.)

When the angle setting equals the stopper mounting pitch (15°)

1. Place the stopper into the tapped hole corresponding to the intended angle and fix it. When mounting the stopper, use the angle setting marks provided every 30°, near the tapped hole.



2. Then, rotate the fine adjust screws on the reference point stopper and the angle setting stopper until the correct angle is obtained. After completing the angle setting, the locknut must be tightened.

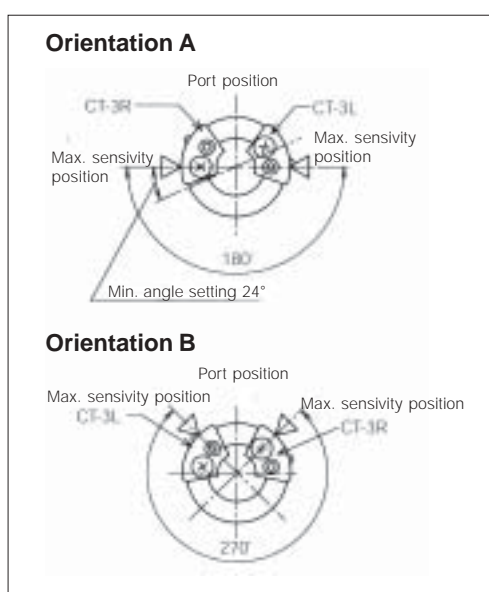
Angle fine adjustment range :

Refer to the table page 6.

Switch mounting orientation

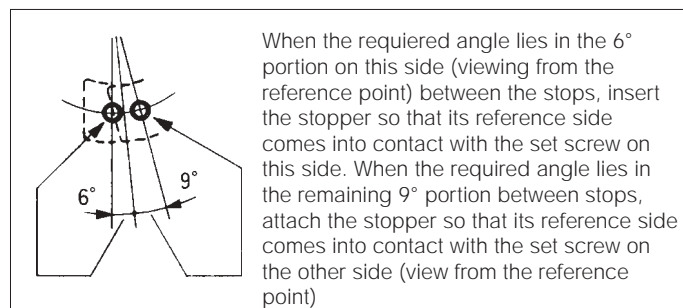
The 2 types of switches (-3L and -3R) included in the switch unit have to be oriented in accordance to the table and diagrams herebelow :

Oscillating angle	Orientation of switches
30° to 186°	A
187° to 270°	B

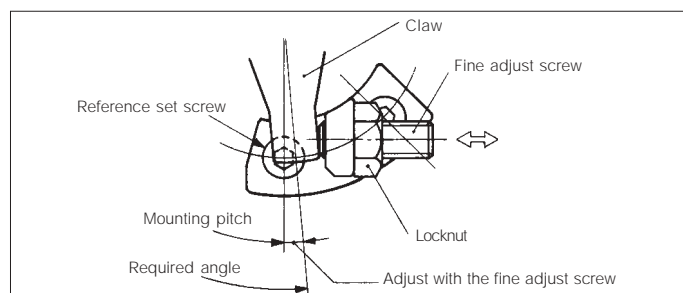


When the angle setting lies between two 15° stops

1. When the required angle lies between two 15° stops, fix the stopper into the tapped holes as shown in the diagram



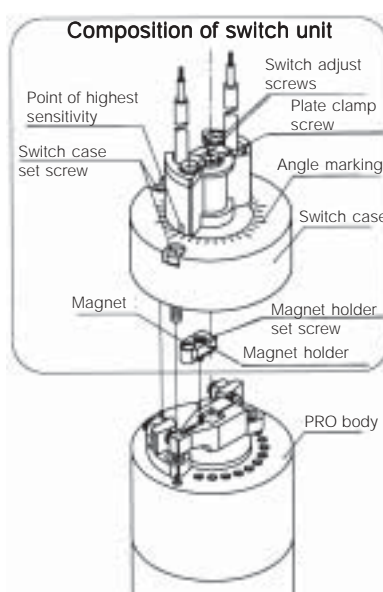
2. Then, rotate the fine adjust screw fitted to the stopper to obtain the required angle. After completing the angle setting, the locknut must be tightened.



Setting the switch position

Mount the switch unit on the body using the set of screws. For clamping torque, refer to the table below

Model	Clamping torque (N.m)
PROA3S/D	0,06 to 0,10
PROA10S/D	0,10 to 0,20
PROA20S/D and PRO30S/D	0,20 to 0,30



Adjusting the switch position

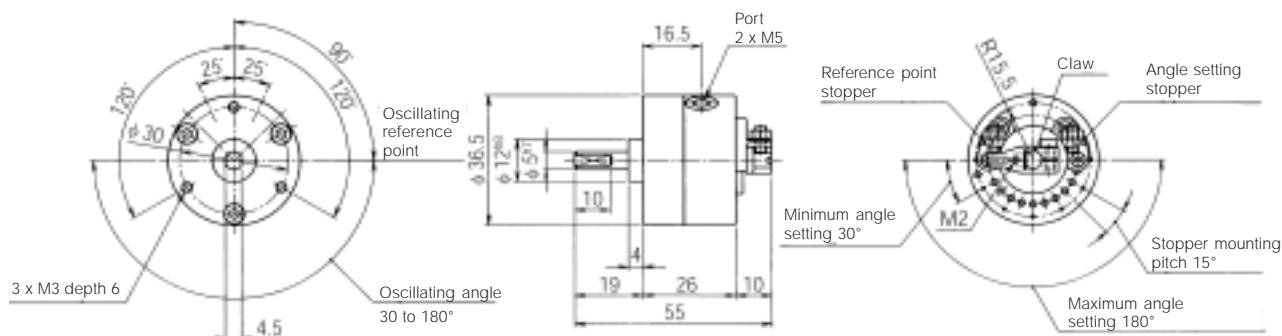
Loosen the switch adjust screws, make the point, at which the highest sensitivity is obtained, match with the angle marking equivalent to the actuator setting, and retighten the switch adjust screws (torque of 40 to 50N.cm. Since the angle markings are provided just for reference, make a final adjustment by checking if the LED is on.

Replacing the switch

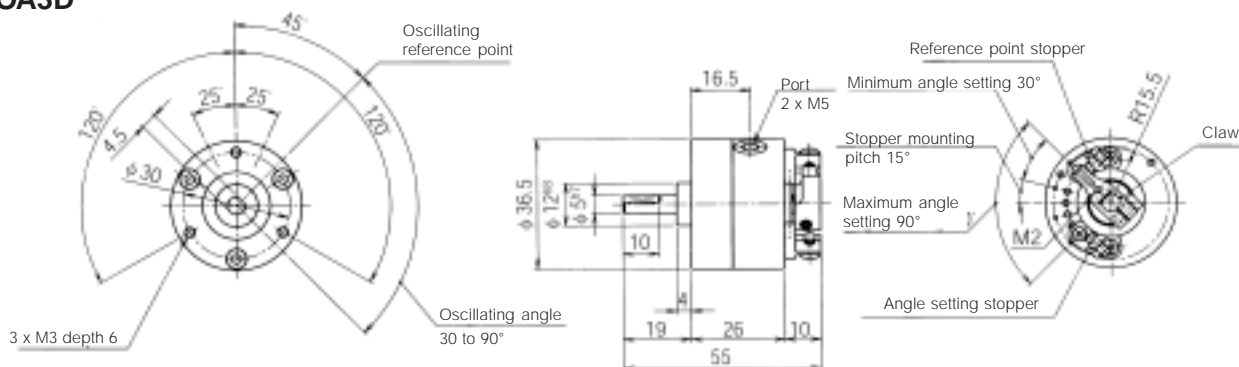
To remove the switch, remove the switch adjust screws and plate clamp screw. To mount a switch, reverse the procedure for removal. Adjust the switch position after completion of mounting.

PRO Miniature series - Adjustable oscillating angle - Dimensions (mm)

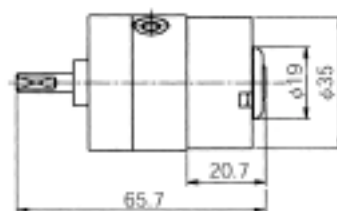
PROA3S



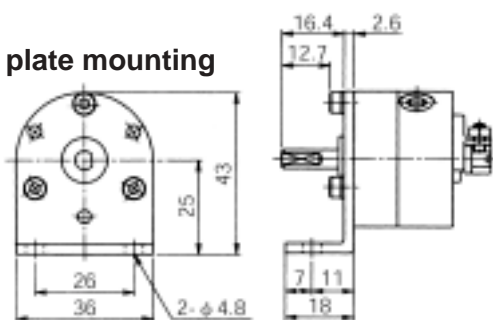
PROA3D



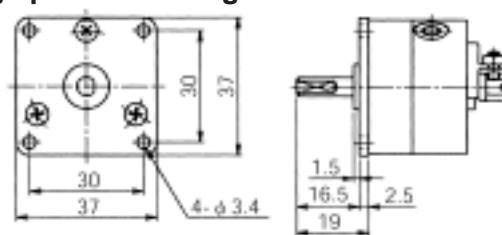
With protection cover



With foot plate mounting



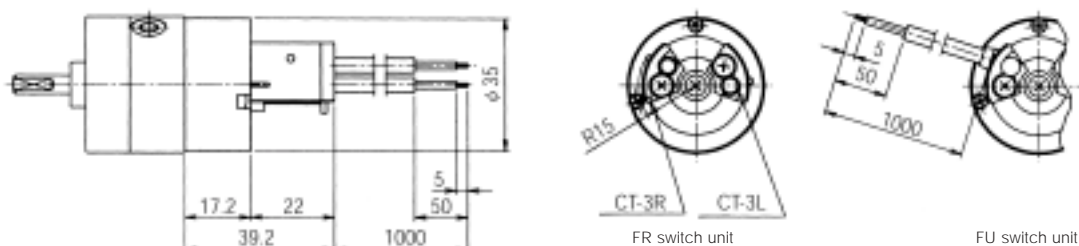
With flange plate mounting



Note : A foot plate can be fitted turned by steps of 60° from the original position

Note : A flange plate can be fitted turned by steps of 120° from the original position

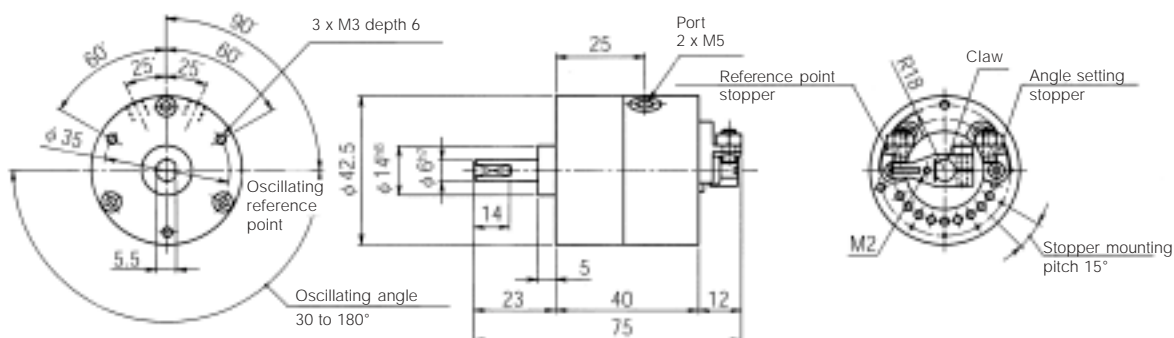
With switch unit (variable switch position)



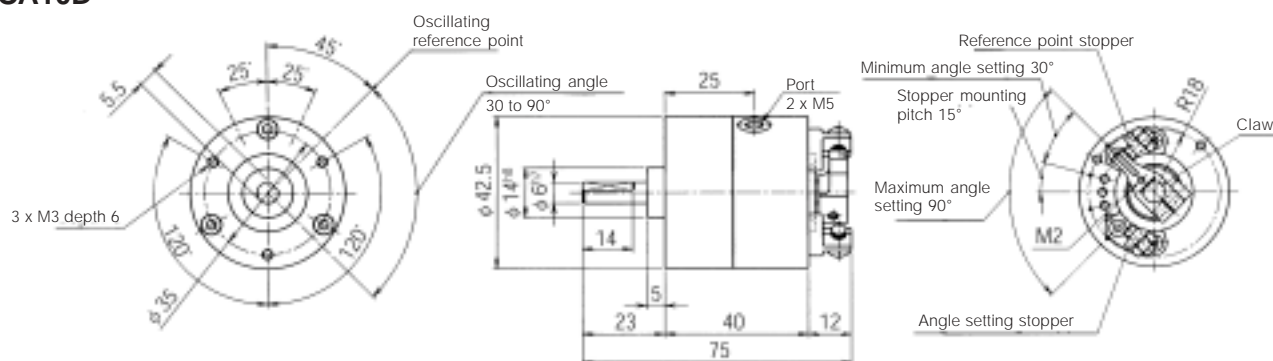
Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRO Miniature series - Adjustable oscillating angle - Dimensions (mm)

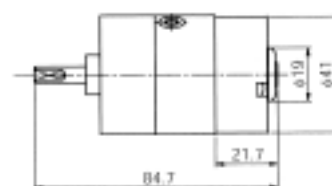
PROA10S



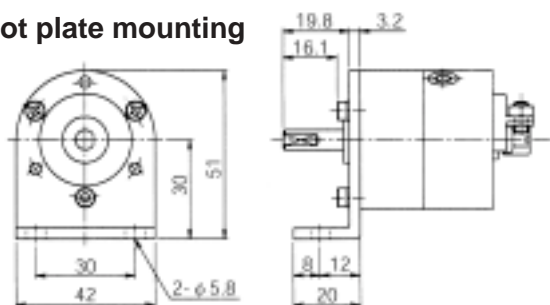
PROA10D



With protection cover

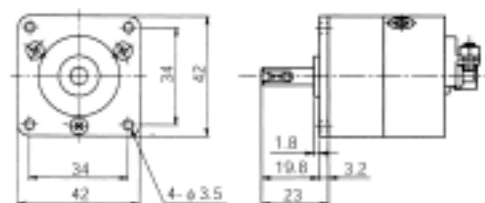


With foot plate mounting



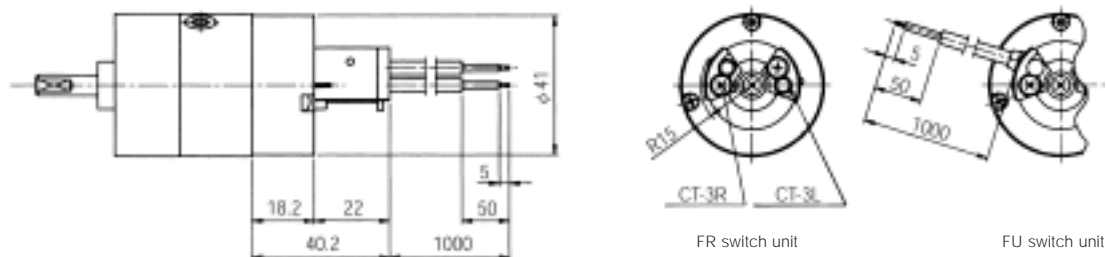
Note : A foot plate can be fitted turned by steps of 60° from the original position

With flange plate mounting



Note : A flange plate can be fitted turned by steps of 120° from the original position

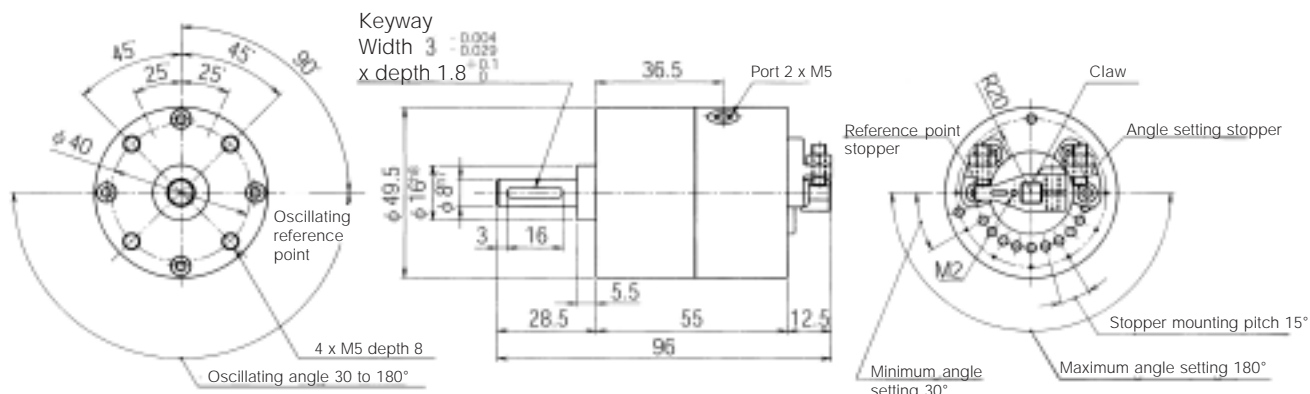
With switch unit (variable switch position)



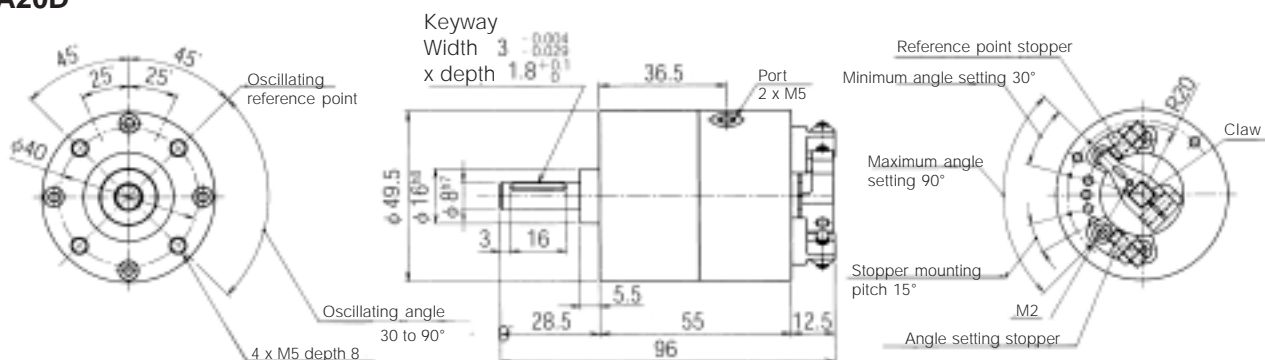
Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRO Miniature series - Adjustable oscillating angle - Dimensions (mm)

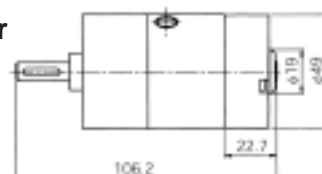
PROA20S



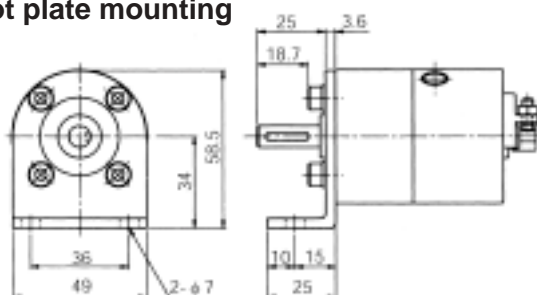
PROA20D



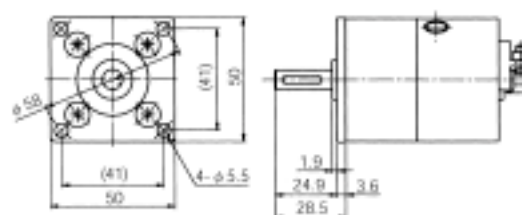
With protection cover



With foot plate mounting

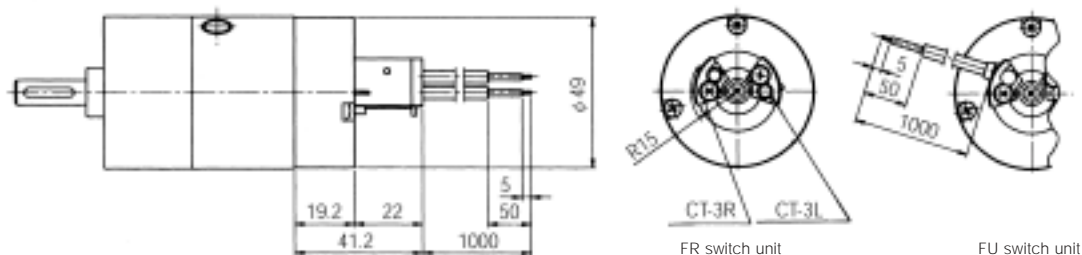


With flange plate mounting



Note : A foot plate can be fitted turned by steps of 90° from the original position

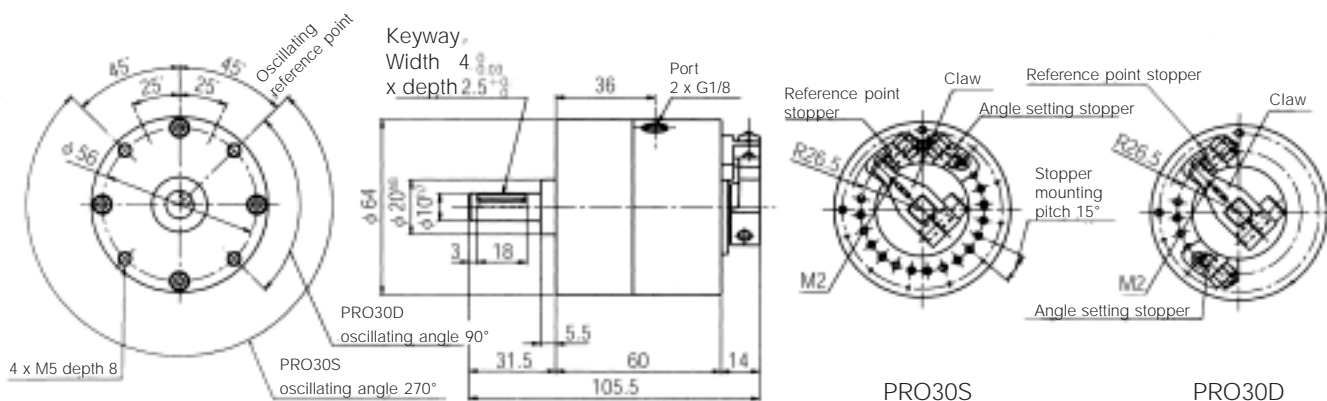
With switch unit (variable switch position)



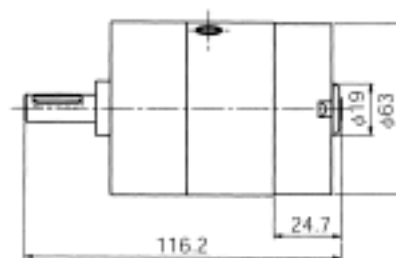
Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRO Miniature series - Adjustable oscillating angle - Dimensions (mm)

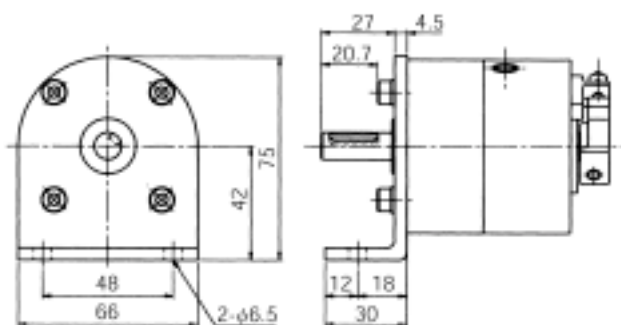
PROA30S & D



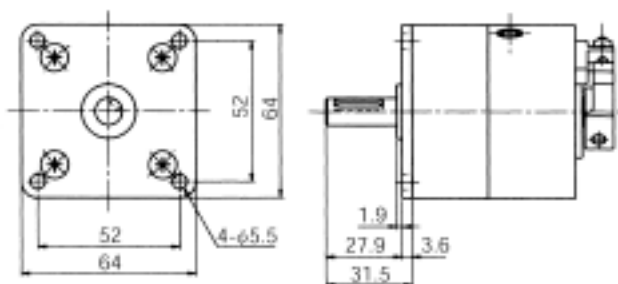
With protection cover



With foot plate mounting

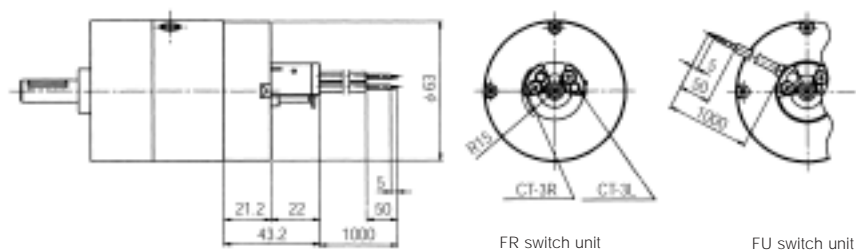


With flange plate mounting



Note : A foot plate can be fitted turned by steps of 60° from the original position

With switch unit (variable switch position)



Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRN Miniature series - Fixed oscillating angle - Order Codes

Standard models



Single vane	Torque at 6 bar (N.m)	Oscillating angle			Oscillating reference point	
		90°	180°	270°	45°	90°
PRN1S	0,16	PRN1S-90-90	PRN1S-180-90		X	
PRNA3S	0,38	PRNA3S-90-90	PRNA3S-180-90		X	
PRNA10S	1,20	PRNA10S-90-90	PRNA10S-180-90		X	
PRNA20S	2,10	PRNA20S-90-90	PRNA20S-180-90		X	
PRN30S	4,10	PRN30SE-90-45	PRN30SE-180-45	PRN30SE-270-45		X
Double vane						
PRNA3D	0,65	PRNA3D-90-45				X
PRNA10D	2,54	PRNA10D-90-45				X
PRNA20D	4,70	PRNA20D-90-45				X
PRN30D	9,50	PRN30DE-90-45				X

How to select a PRN rotary actuator ?
Refer page 28

Rotary Actuator mountings



Rotary Actuator	Flange mounting	Foot mounting
PRN1S	PRN1-P	PRN1-L
PRNA3S /D	PRN3-P	PRN3-L
PRNA10S /D	PRN10-P	PRN10-L
PRNA20S /D	PRN20-P	PRN20-L
PRN30S /D	PRN30-P	PRN30-L

The mountings are provided with set screws

Oscillation starting point and oscillation angle

PRNA3D, PRNA10D
PRNA20D, PRN30D

Oscillating reference point at 45°



PRN1S, PRNA3S, PRNA10S, PRNA20S

Oscillating reference point at 90°



Switch units

Variable switch position, solid state NPN or PNP.
Refer to page 13 for Technical information.



For Rotary Actuator	NPN	PNP
PRN1S	FR-1PRN	FP-1PRN
PRNA3S/D	FR-3PRN	FP-3PRN
PRNA10S/D	FR-10PRN	FP-10PRN
PRNA20S/D	FR-20PRN	FP-20PRN
PRN30S/D	FR-30PRN	FP-30PRN

Maintenance kits

The maintenance kit consists in the vane shaft, shoe seal and shaft O'rings

For Rotary Actuator

Single vane		Double vane	
PRN1S	PRN1S-PS	PRNA3D	PRNA3D-PS
PRNA3S	PRNA3S-PS	PRNA10D	PRNA10D-PS
PRNA10S	PRNA10S-PS	PRNA20D	PRNA20D-PS
PRNA20S	PRNA20S-PS	PRN30D	PRN30D-PS
PRN30S	PRN30S-PS		

PRN Miniature series - Technical data

Technical specification

PRN Rotary Actuators	Unit	PRN1S	PRNA3S	PRNA10S	PRNA20S	PRN30S
Vane		Single vane				
Air condition		Filtered (5μ) lubricated or non-lubricated				
Oscillating angle	°	90 / 180	90 / 180	90 / 180	90 / 180	90 / 180 / 270
Oscillating reference point	°	90	90	90	90	45
Port size		M5	M5	M5	M5	G1/8
Minimum operating pressure	bar	1.5	1,0	1,0	0,8	1,0
Operating pressure	bar	3 to 7	2 to 7	2 to 7	2 to 10	2 to 10
Operating temperature	°C	-5 to 60	-5 to 80	-5 to 80	-5 to 80	-5 to 60
Maximum operating frequency	cycles/mn	300 / 180	240 / 150	240 / 150	210 / 120	180 / 90 / 60
Internal volume	cm3	0,5/1	3,4/3,4	9,8/9,8	17/17	37/37/43
Allowable radial load	N	30	40	50	300	400
Allowable thrust load	N	3	4	4	25	30
Allowable energy	mJ	0.6	1.5	3	15	25
Weight	kg	0,035	0,070	0,140	0,250	0,470

PRN Rotary Actuators	Unit	PRNA3D	PRNA10D	PRNA20D	PRN30D
Vane		Double vane			
Air condition		Filtered (5μ) lubricated or non-lubricated			
Oscillating angle	°	90	90	90	90
Oscillating reference point	°	45	45	45	45
Port size		M5	M5	M5	G1/8
Minimum operating pressure	bar	0,7	0,7	0,6	0,8
Operating pressure	bar	2 to 7	2 to 7	2 to 10	2 to 10
Operating temperature	°C	-5 to 80	-5 to 80	-5 to 80	-5 to 60
Maximum operating frequency	cycles/mn	240	240	200	200
Internal volume	cm3	2,8	8,1	15,0	34,0
Allowable radial load	N	40	50	300	400
Allowable thrust load	N	4	4	25	30
Allowable energy	mJ	1,5	3	15	25
Weight	kg	0,072	0,140	0,260	0,480

Notes :

- Maximum operating frequency is given at 5 bar operating pressure (unloaded).
- Make sure to use the PRN rotary actuators within the allowable energy. Check if the required energy is lower than the allowable energy. If not, use end stoppers directly on the load.
- The PRN with keyways are provided with keys.

Materials specification

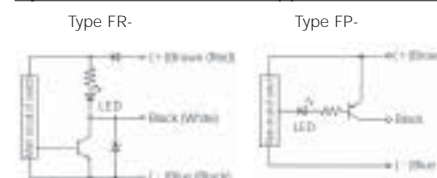
PRN	PRNA3, PRNA10, PRNA20	PRN1, PRN30
Body	Aluminium alloy	Aluminium alloy
Solid vane shaft	Steel + resin + Hydr. Nitrile	Steel + resin + Nitrile
Shoe	Resin	Resin
Shoe seal	Hydrogenated Nitrile	Nitrile
O-ring	Hydrogenated Nitrile	Nitrile
Screws, claw, stoppers, locknut	Steel	Steel

Effective torque (N.m)

		Operating pressure (bar)								
	Model n°	2	3	4	5	6	7	8	9	10
Single vane	PRN1S	-	0,8	1,0	1,29	1,56	1,85	-	-	-
	PRNA3S	1,0	1,6	2,4	3,1	3,8	4,5	-	-	-
	PRNA10S	3,5	5,6	7,5	9,8	12,0	1,39	-	-	-
	PRNA20S	5,9	9,5	13,3	17,0	21,0	24,9	28,9	32,6	36,8
	PRN30S	11,0	18,0	25,0	31,9	41,0	48,0	58,0	65,0	72,0
Double vane	PRNA3D	2,2	3,2	4,3	5,4	6,5	7,6	-	-	-
	PRNA10D	7,6	11,7	16,2	21,1	25,4	30,3	-	-	-
	PRNA20D	14,0	22,2	30,6	38,8	47,0	55,3	63,3	71,7	80,7
	PRN30D	27,0	44,0	60,0	77,0	95,0	112,0	129,9	148,0	166,0

Switch units specification

Switch unit type	FR-	FP-
Application	Relay, PLC, IC circuit	
Output method	NPN	PNP
Mounting	Switch position adjustable	
Operating voltage	DC5~30V	DC10~30V
Operating current	5 to 200mA	5 to 200mA
Indicating lamp	Lights up at ON	
Consumption	20mA@24V 10mA@12V 4mA at 5V	14mA@24V 7mA@12V
Max.leakage current	10μA	
Internal voltage drop	1,5V	
Average operating time	1ms	
Shock resistance	490m/s ²	
Operating temperature	5 to 60°C	
Protection	IP67	
Lead wire	1m, 3 core, oil resistant	
Response range	23°±7°	
Hysteresis	Approx. 2°	



PRN Miniature series - Technical data

Oscillating Time range

Model n°	Oscillation time range (s)		
	90°	180°	270°
PRN1S	0,03 - 0,60	0,06 - 1,20	-
PRNA3S	0,04 - 0,80	0,08 - 1,60	0,12 - 2,40
PRNA10S	0,045 - 0,90	0,09 - 1,80	0,135 - 2,70
PRNA20S	0,05 - 1,00	0,10 - 2,00	0,15 - 3,00
PRN30S	0,07 - 0,70	0,14 - 1,40	0,21 - 2,10
PRNA3D	0,04 - 0,80		
PRNA10D	0,045 - 0,90		
PRNA20D	0,05 - 1,00		
PRN30D	0,07 - 0,70		

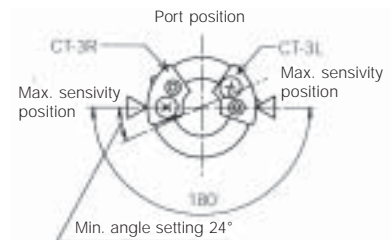
Note : Operate the PRN rotary actuators within the range of duration mentioned in the above charts. Otherwise, the rotary actuator may move in stick-slip motion.

Switch mounting orientation

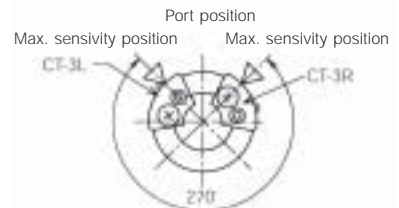
The 2 types of switches (-3L and -3R) included in the switch unit have to be oriented in accordance to the table herebelow :

Oscillating angle	Orientation of switches
30° and 180°	A
270°	B

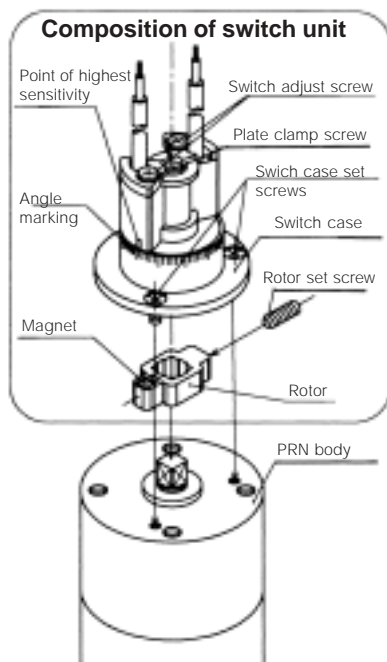
Orientation A



Orientation B



Setting the switch unit



Mount the switch unit on the body using the set of screws. For clamping torque, refer to the table below :

Model	Clamping torque (N.m)
PRN1S	0,20 to 0,30
PRNA3S/D	0,20 to 0,30
PRNA10S/D	0,20 to 0,30
PRNA20S/D	0,20 to 0,30
PRN30S/D	0,20 to 0,30

Adjusting the switch position

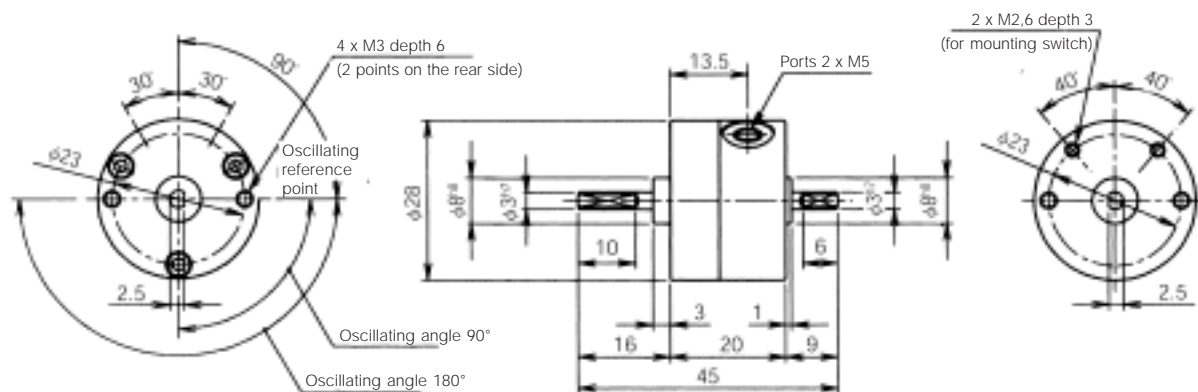
Loosen the switch adjust screws, make the point, at which the highest sensitivity is obtained, match with the angle marking equivalent to the actuator setting, and retighten the switch adjust screws at a clamping torque of 40 to 50 N.cm. Since the angle markings are provided just for reference, make a final adjustment by checking if the LED is on.

Replacing the switch

To remove the switch, remove the switch adjust screws and plate clamp screw. To mount a switch, reverse the procedure for removal. Adjust the switch position after completion of mounting.

PRN Miniature series - Dimensions (mm)

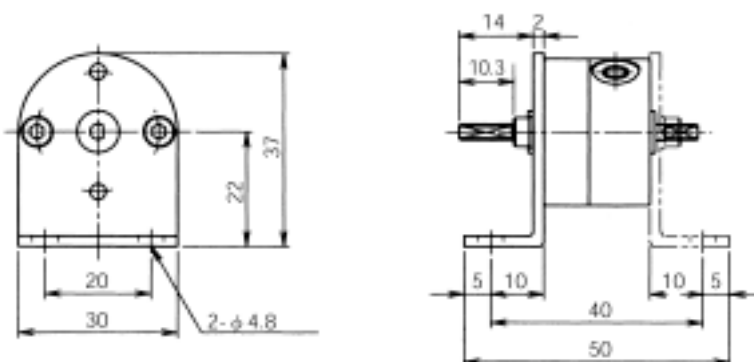
PRN1S



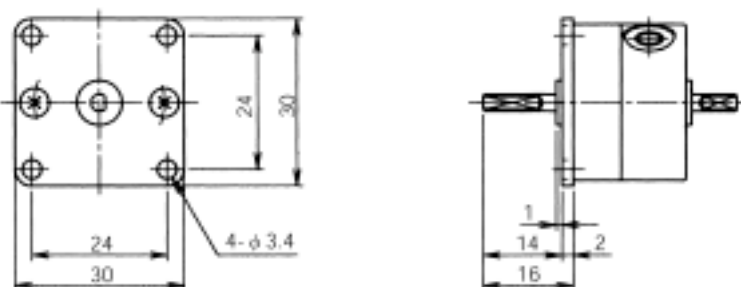
With foot plate mounting

Note :

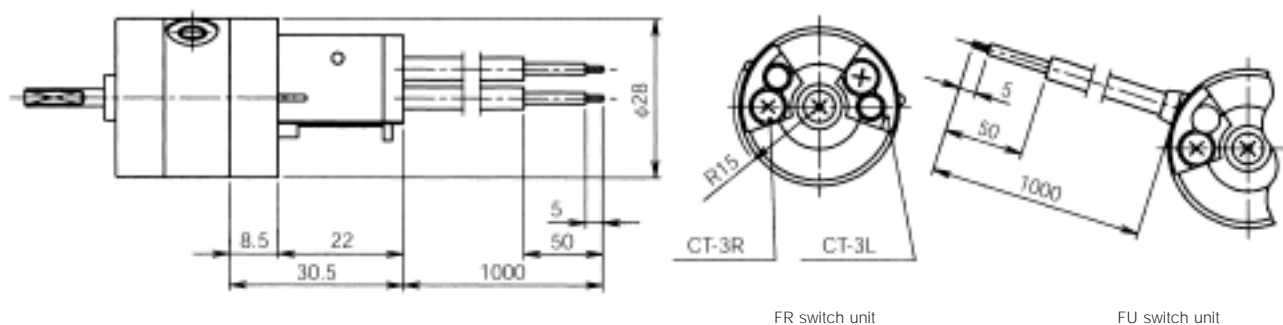
A foot plate can be fitted turned by steps of 90° from the original position.
Short shaft side : Example with 2 pcs.



With flange plate mounting



With switch unit (variable switch position)



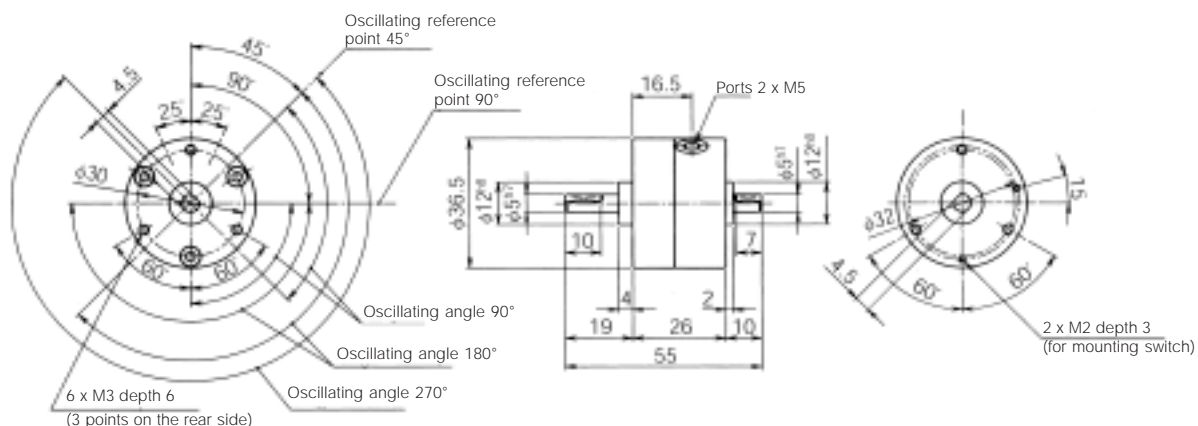
FR switch unit

FU switch unit

Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRN Miniature series - Dimensions (mm)

PRNA3S/D

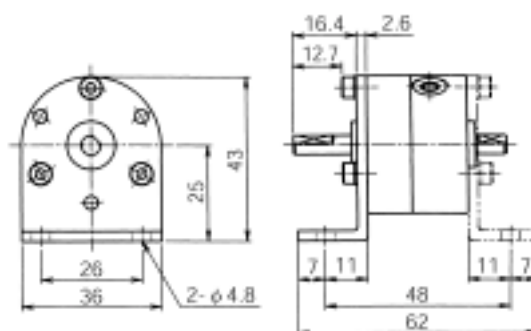


With foot plate mounting

Note :

A foot plate can be fitted turned by steps of 90° from the original position.

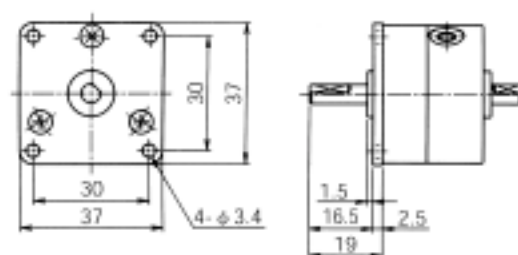
Short shaft side : Example with 2 pcs.



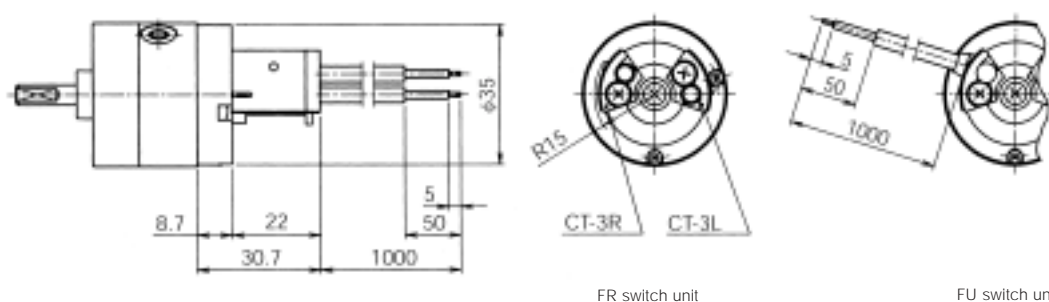
With flange plate mounting

Note :

A flange plate can be fitted turned by steps of 120° from the original position



With switch unit (variable switch position)



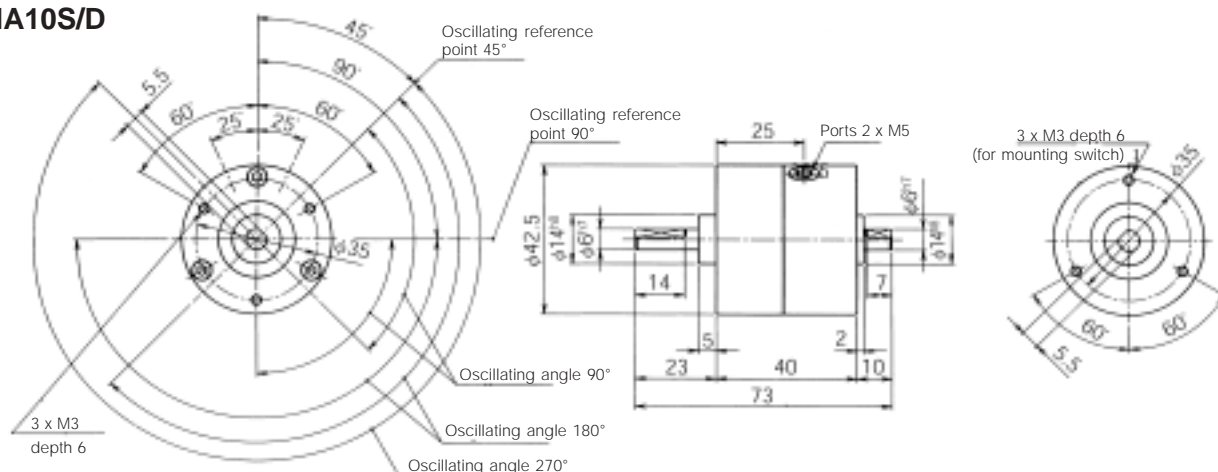
FR switch unit

FU switch unit

Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRN Miniature series - Dimensions (mm)

PRNA10S/D

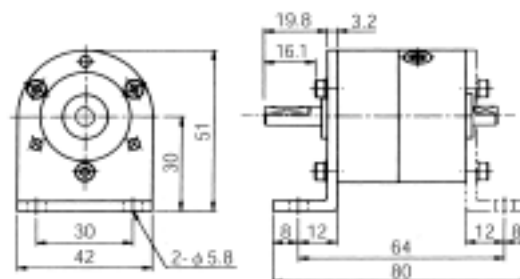


With foot plate mounting

Note :

A foot plate can be fitted turned by steps of 60° from the original position.

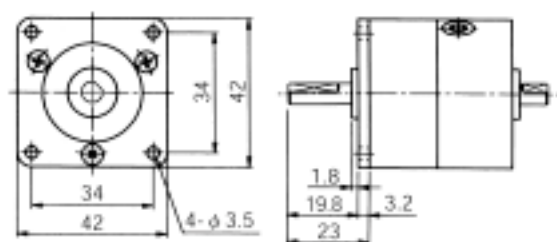
Short shaft side : Example with 2 pcs.



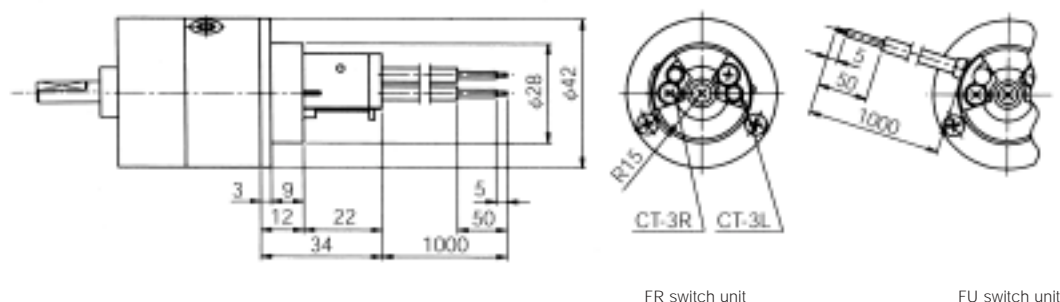
With flange plate mounting

Note :

A flange plate can be fitted turned by steps of 120° from the original position



With switch unit (variable switch position)



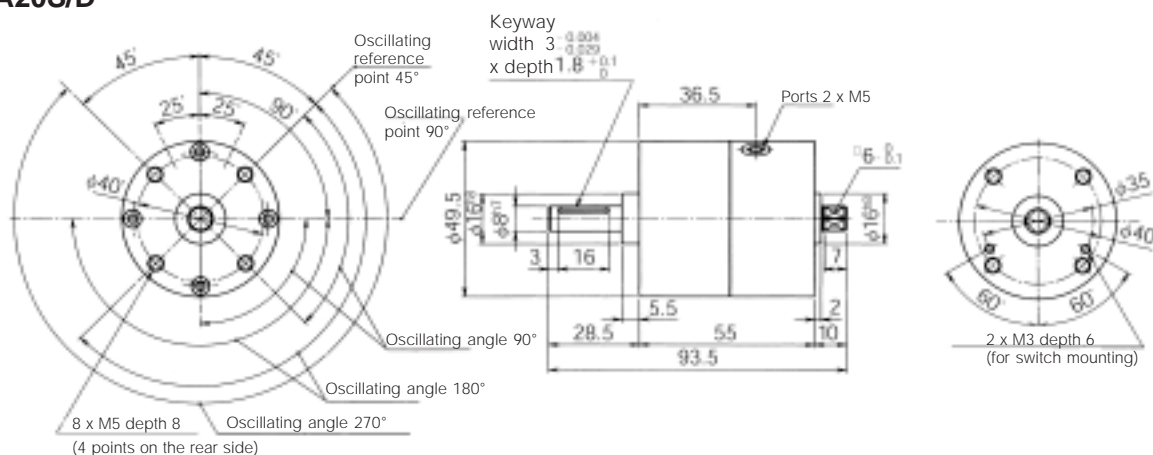
FR switch unit

FU switch unit

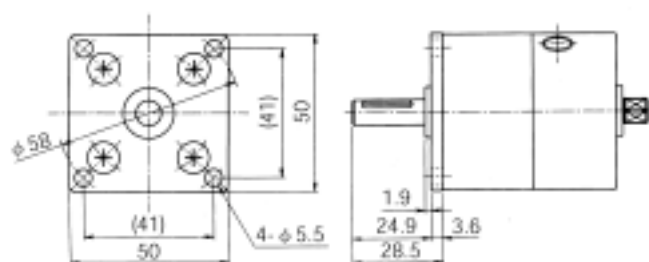
Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRN Miniature series - Dimensions (mm)

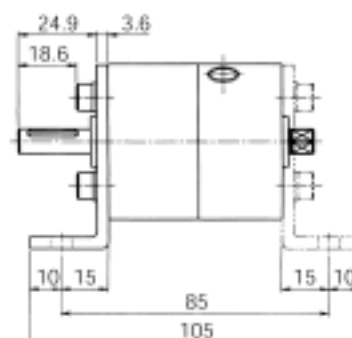
PRNA20S/D



With flange plate mounting



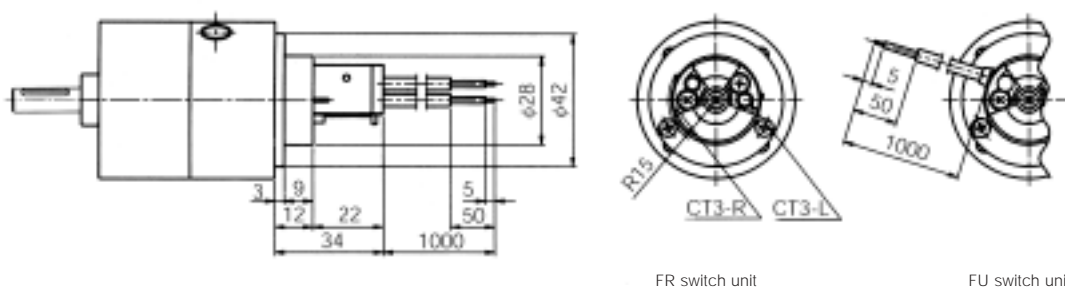
With foot plate mounting



Note :

A foot plate can be fitted turned by steps of 90° from the original position.
Short shaft side : Example with 2 pcs.

With switch unit (variable switch position)



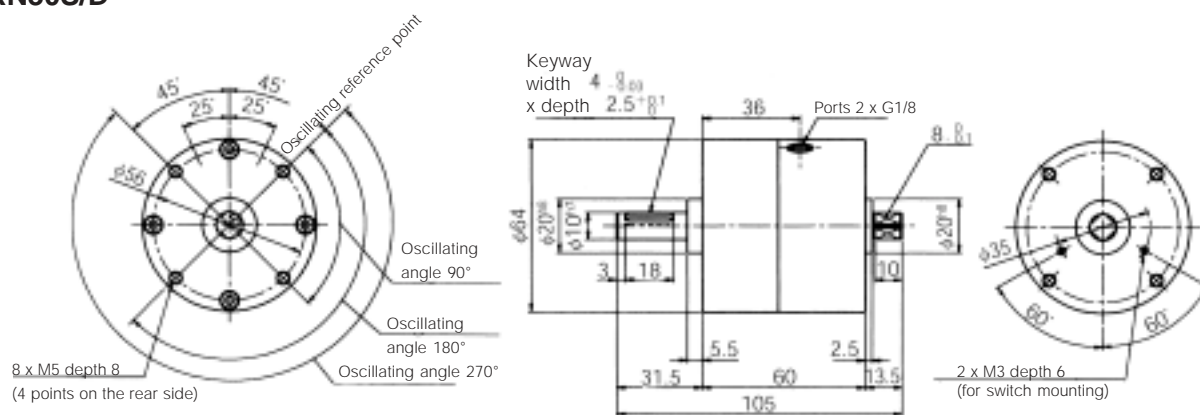
FR switch unit

FU switch unit

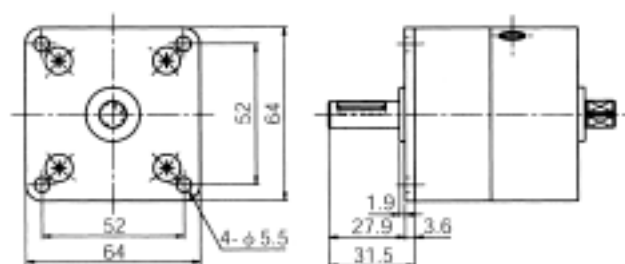
Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRN Miniature series - Dimensions (mm)

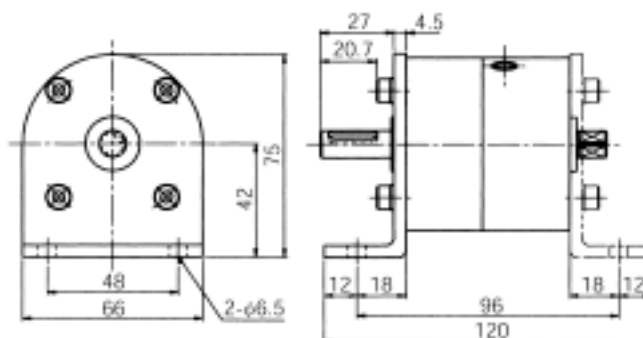
PRN30S/D



With flange plate mounting



With foot plate mounting

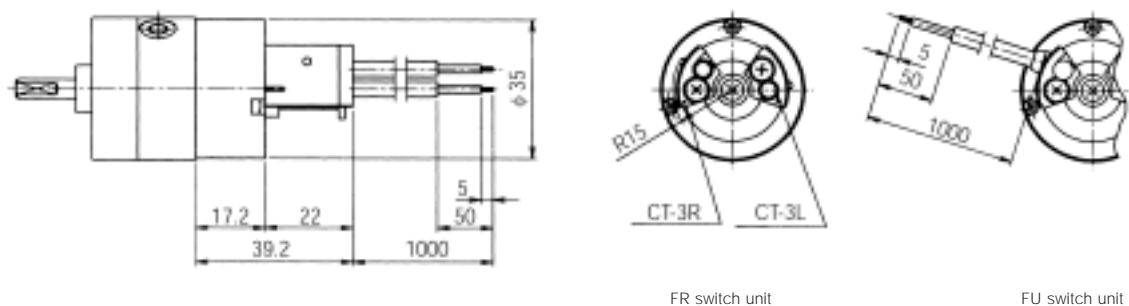


Note :

A foot plate can be fitted turned by steps of 90° from the original position.

Short shaft side : Example with 2 pcs.

With switch unit (variable switch position)



FR switch unit

FU switch unit

Note : For switch unit-mounting hardware combinations, refer to the required dimensions in each fig.

PRN High Torque range - Fixed oscillating angle - Order Codes

Standard models

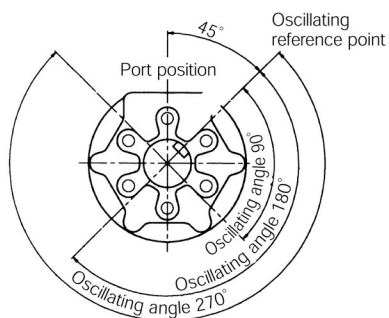


Model	Torque at 6 bar	Oscillating angle		
Single vane (reference point 45°)	(N.m)	90°	180°	270°
PRN050SE	5,90	PRN50SE-90-45	PRN50SE-180-45	PRN50SE-270-45
PRN150SE	18,00	PRN150SE-90-45	PRN150SE-180-45	PRN150SE-270-45
PRN300SE	34,50	PRN300SE-90-45	PRN300SE-180-45	PRN300SE-270-45
PRN800SE	123,00	PRN800SE-90-45	PRN800SE-180-45	PRN800SE-270-45
Double vane (reference point 45°)				
PRN050DE	12,80	PRN50DE-90-45		
PRN150DE	41,50	PRN150DE-90-45		
PRN300DE	83,00	PRN300DE-90-45		
PRN800DE	247,00	PRN800DE-90-45		

How to select a PRN rotary actuator ?
Refer page 28

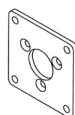
Oscillation starting point and oscillation angle

PRN50, PRN150, PRN300, PRN800
Oscillating reference point at 45°



Rotary Actuator mountings

The mountings are provided with set screws



Rotary actuator	Flange mounting	Foot mounting
PRN050SE/DE	PRN50-P	PRN50-L
PRN150SE /DE	PRN150-P	PRN150-L
PRN300SE/ DE	-	PRN300-L
PRN800SE/DE	-	PRN800-L

Switch unit



Variable switch position, reed type or solid state type (NPN or PNP).
Refer to page 22.

Hydro-cushion



Hydraulic cushion to use when the inertial energy exceeds that allowable by the actuator.
Refer to page 25.

Maintenance kits

The maintenance kit consists in the vane shaft, shoe seal and shaft O'rings

For Rotary Actuator			
Single vane		Double vane	
PRN050SE	PRN50S-PS	PRN50DE	PRN50D-PS
PRN150SE	PRN150S-PS	PRN150DE	PRN150D-PS
PRN300SE	PRN300S-PS	PRN300DE	PRN300D-PS
PRN800SE	PRN800S-PS	PRN800DE	PRN800D-PS

PRN High Torque range - Technical data

Technical specification

PRN High Torque	Unit	PRN50S			PRN150S			PRN300S		
Vane		Single vane			Single vane			Single vane		
Air condition		Filtered (5µ) lubricated or non-lubricated								
Oscillating angle	°	90°	180°	270°	90°	180°	270°	90°	180°	270°
Oscillating reference point	°	45°	45°	45°	45°	45°	45°	45°	45°	45°
Port size		G1/8	G1/8	G1/8	G1/4	G1/4	G1/4	G3/8	G3/8	G3/8
Minimum operating pressure	bar	1,0	1,0	1,0	0,8	0,8	0,8	0,8	0,8	0,8
Operating pressure	bar	2 to 10			2 to 10			2 to 10		
Operating temperature	°C	5 to 60			5 to 60			5 to 60		
Maximum operating frequency	cycles/mn	180	90	60	120	80	50	90	60	40
Internal volume	cm3	51	51	61	146	146	179	244	283	352
Allowable radial load	N	588			1 176			1 960		
Alloowable thrust load	N	44,1			88,2			147,0		
Allowable energy	mJ	49,0			225,4			1 078,0		
Weight	kg	0,820	0,790	0,730	2,000	1,900	1,700	3,700	3,700	3,700

PRN High Torque	Unit	PRN800S			PRN50D	PRN150D	PRN300D	PRN800D
Vane		Single vane			Double vane	Double vane	Double vane	Double vane
Air condition		Filtered (5µ) lubricated or non-lubricated						
Oscillating angle	°	90°	180°	270°	90°	90°	90°	90°
Oscillating reference point	°	45°	45°	45°	45°	45°	45°	45°
Port size		G1/2	G1/2	G1/2	G1/8	G1/4	G3/8	G1/2
Minimum operating pressure	bar	0,5	0,5	0,5	0,8	0,6	0,6	0,5
Operating pressure	bar	2 to 10			2 to 10	2 to 10	2 to 10	2 to 10
Operating temperature	°C	5 to 60			5 to 60	5 to 60	5 to 60	5 to 60
Maximum operating frequency	cycles/mn	65	45	30	180	120	90	65
Internal volume	cm3	754	869	1 036	42	127	244	754
Allowable radial load	N	4 900			588	1 176	1 960	4 900
Allowable thrust load	N	490,0			44,1	88,2	147,0	490,0
Allowable energy	mJ	3 920,0			49,0	225,4	1 078,0	3 920,0
Weight	kg	12,700	12,200	11,200	0,820	2,000	4,300	12,700

Notes :

- İ Maximum operating frequency is given at 5 bar operating pressure (unloaded).
- İ Make sure to use the PRN rotary actuators within the allowable energy. Check if the required energy is lower than the allowable energy. If not, use a CRN hydro-check (refer to page 25) or end stoppers directly on the load.
- İ The PRN with keyways are provided with keys.

Materials specification

PRN	PRN050, PRN150	PRN300	PRN800
Body	Aluminium die casting alloy	Aluminium alloy	Aluminium alloy
Solid vane shaft	Structural steel alloy + Nitrile	Structural steel alloy + Nitrile	Structural steel alloy + Nitrile
Shoe	Zinc die casting alloy	Zinc die casting alloy	Zinc die casting alloy
Shoe seal	Nitrile	Nitrile	Nitrile
Damper	Uréthane	Uréthane	Uréthane
Bearing	-	-	Steel bearing
O-ring	Nitrile	Nitrile	Nitrile
Cover plate	-	-	Structural carbon steel
Screws, claw, stoppers, locknut	Steel	Steel	Steel

Effective torque (N.m)

		Operating pressure (bar)								
	Model n°	2	3	4	5	6	7	8	9	10
Single vane	PRN50S	1,25	2,59	3,69	4,79	5,90	7,00	8,29	9,50	10,60
	PRN150S	5,50	8,50	11,50	15,00	18,00	21,00	24,00	27,30	30,50
	PRN300S	10,50	16,50	22,50	28,50	34,50	40,50	46,00	51,80	57,50
	PRN800S	37,80	59,10	81,00	102,00	123,00	144,00	166,00	186,00	205,00
Double vane	PRN50D	3,30	5,79	8,29	10,40	12,80	15,10	17,60	20,10	22,50
	PRN150D	12,50	19,00	27,00	35,00	41,50	48,00	55,00	62,00	69,00
	PRN300D	25,50	39,00	54,00	68,00	83,00	97,00	110,00	124,00	137,00
	PRN800D	77,40	120,00	161,00	206,00	247,00	288,00	332,00	371,00	411,00

Oscillating time range (s)

		Oscillating angle		
		90°	180°	270°
PRN50S		0.08~0.8	0.1~1.6	0.24~2.4
PRN150S		0.12~1.2	0.24~2.4	0.36~3.6
PRN300S		0.16~1.6	0.32~3.2	0.48~4.8
PRN800S		0.22~2.2	0.44~4.4	0.66~6.6

PRN High Torque range - Sensing

Order Codes



The switch unit consists in a 3-part mounting hardware combined with either a reed type or a solid state type sensors.

The 3 parts hardware are to be ordered separately :

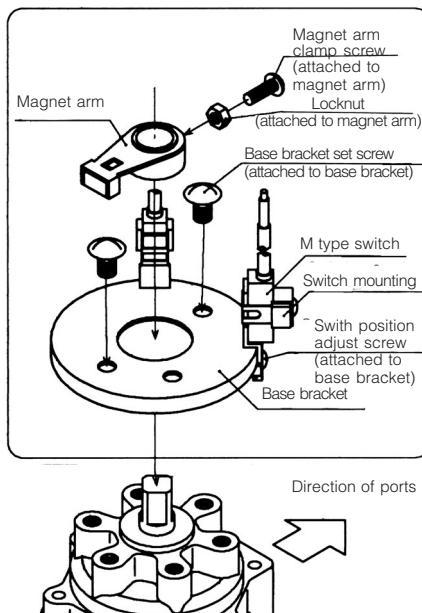
- Base bracket
- Magnet arm
- Switch mounting (except for PRN800)

Switch units used with hydro-cushion, refer to page 25.

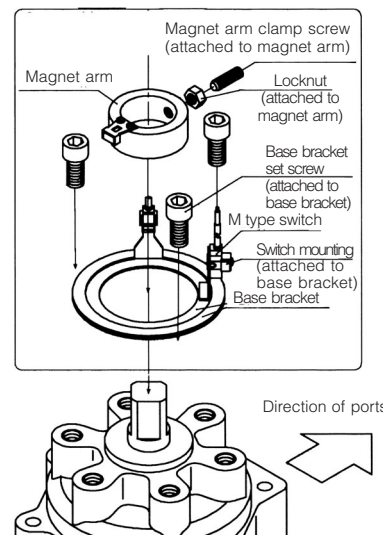
Standard mounting hardware for PRN

Rotary actuator	Base bracket	Magnet arm	Switch mounting
PRN50S&D	FM50-B	FM50-A	FM50-K
PRN150S&D	FM150-B	FM150-A	FM50-K
PRN300S&D	FM300-B	FM300-A	FM300-K
PRN800S&D	FM800-B	FM800-A	-

PRN50, PRN150, PRN300

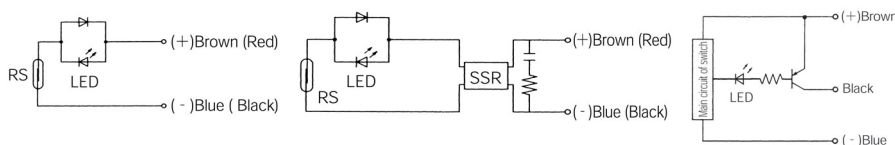


PRN800



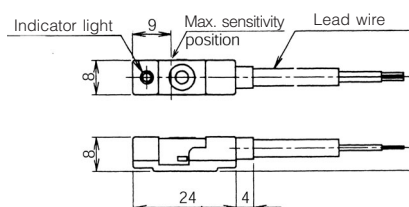
Technical data

	MA-1	MA-2L	MA-2H	MT-3	MTP-3
Application	Relay, PLC	Relay	Relay	Relay, PLC, IC circuit	Relay, PLC, IC circuit
Output method	Reed switch	Reed switch	Reed switch	NPN	PNP
Operating voltage (V)	AC100 - DC24	AC100/110	AC200/220	DC 5 to 30	DC 10 to 30
Operating current (A)	4,5VA - 1W	4,5VA	4,5VA	5 to 200	5 to 200
Indicating lamp	Red LED up at ON	Red LED up at ON	Red LED up at ON	Red LED up at ON	Yellow LED up at ON
Consumption	5 to 45mA	5 to 150mA	5 to 150mA	20mA at 24V	20mA at 24V
				10mA at 12V	10mA at 12V
		Surge suppressor	Surge suppressor	4mA at 5V	
Internal voltage drop	2V or less	-	-	1,5V or less	1,5V or less
Max. leak current	-	-	-	10μA	10μA
Average operating time	1ms	1ms	1ms	1ms	1ms
Shock resistance	294m/s ²	294m/s ²	294m/s ²	490m/s ²	490m/s ²
Operating temperature	5 to 60°C	5 to 60°C	5 to 60°C	5 to 60°C	5 to 60°C
Protection	IP67	IP67	IP67	IP67	IP67
Lead wire	1m, 2-core	1m, 2-core	1m, 2-core	1m, 3-core, oil resistant	1m, 3-core, oil resistant

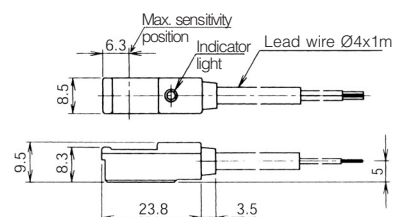


Dimensions (mm)

MA-1, MA-2

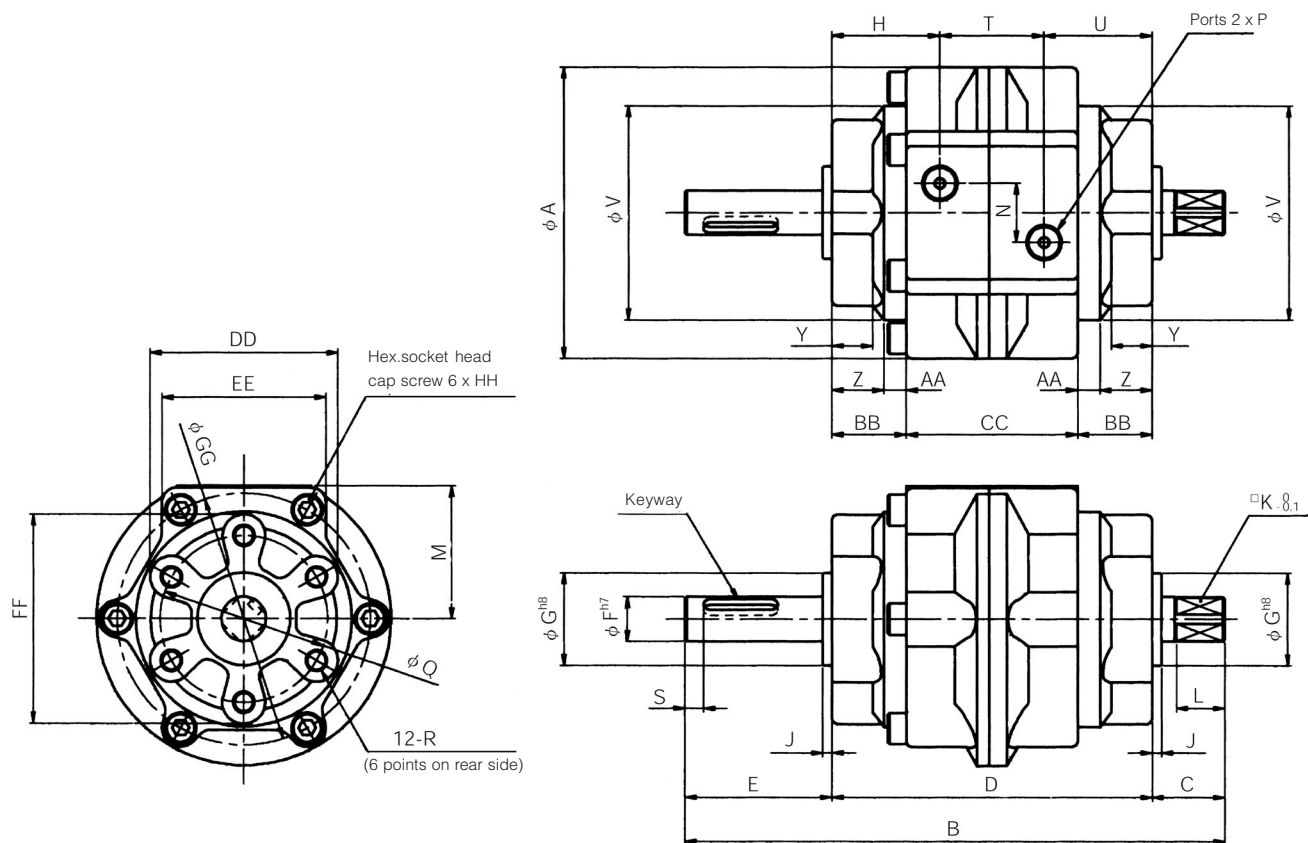


MT3, MTP3



PRN High Torque range - Dimensions (mm)

Standard model

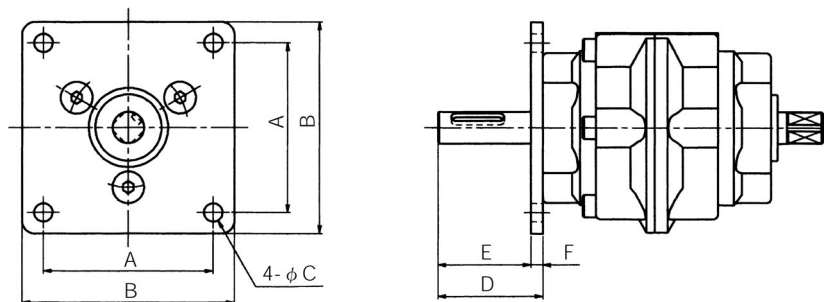


Type	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
PRN50	79,0	145	19,5	86	39,5	12	25	29,0	2,5	10	13	36	16	G1/8	45	M6x1 depth 9	5	28
PRN150	110,0	180	23,5	103	53,5	17	30	34,5	3,0	13	16	51	24	G1/4	70	M8x1,25 depth 12	5	34
PRN300	141,5	220	30,0	125	65,0	25	45	41,5	3,5	19	22	66	32	G3/8	80	M10x1,5 depth 15	5	42
PRN800	196,0	285	44,5	171	69,5	40	70	53,5	4,5	32	35	90	44	G1/2	120	M12x1,75 depth 18	10	64

Type	U	V	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	Keyway WxDxL					
PRN50	29,0	58,0	11,0	14,0	6,0	20,0	46	51,0	44,0	57,0	68,0	M5x30 L	4 ⁰ _{-0,03} x 2,5 ⁰ ₀ x 20					
PRN150	34,5	85,2	10,5	15,5	8,0	23,5	56	75,0	61,0	85,0	97,0	M6x35 L	5 ⁰ _{-0,03} x 3 ⁰ ₀ x 40					
PRN300	41,5	110,0	13,0	17,5	10,0	27,5	70	88,5	78,0	98,5	125,0	M8x45 L	7 ⁰ _{-0,036} x 4 ⁰ ₀ x 40					
PRN800	53,2	152,0	14,5	21,1	11,4	32,5	106	130,0	110,0	130,0	173,0	M12x70 L	12 ⁰ _{-0,043} x 2,5 ⁰ ₀ x 40					

PRN High Torque range - Dimensions (mm)

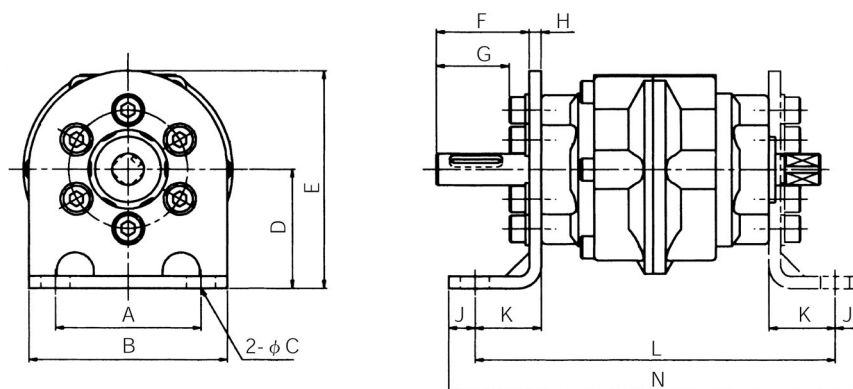
With flange plate



Type	A	B	C	D	E	F
PRN50	64	80	7	39,5	35,0	4,5
PRN150	88	110	9	53,5	47,5	6,0

Note : A flange plate can be fitted turned by steps of 60° from the original position

With foot plate

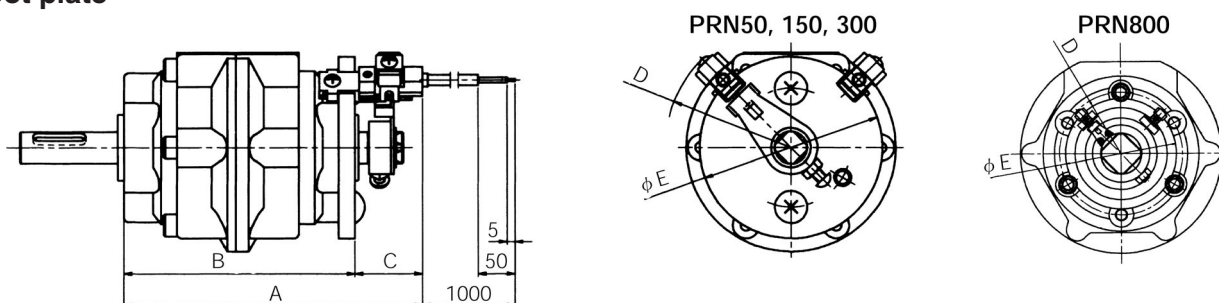


Type	A	B	C	D	E	F	G	H	J	K	L	N
PRN50	55	75	11	45	82,5	35,0	27,5	4,5	10	25	136	156
PRN150	80	110	13	65	115,0	43,5	33,5	10,0	12	28	159	183
PRN300	100	140	15	80	135,0	53,0	40,5	12,0	13	32	189	215
PRN800	140	200	15	110	200,0	54,5	39,5	15,0	15	35	241	271

Note:

A foot plate can be fitted turned by steps of 60° from the original position
Short shaft side : Example with 2 pcs

With foot plate



Type	A	B	C	D	E
PRN50	115,0	87,2	25,5	R47	69
PRN150	131,7	104,2	27,5	R61	97
PRN300	161,2	126,2	35,0	R69	113
PRN800	215,5	174,2	41,3	R60	108

PRN High Torque range with Hydro-cushion

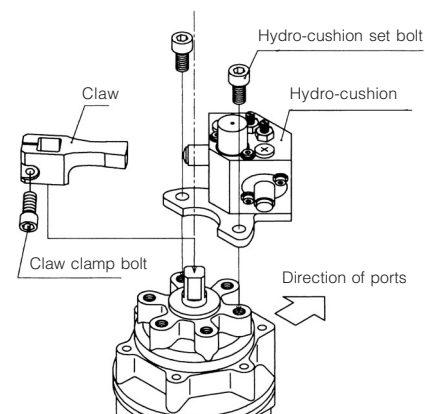
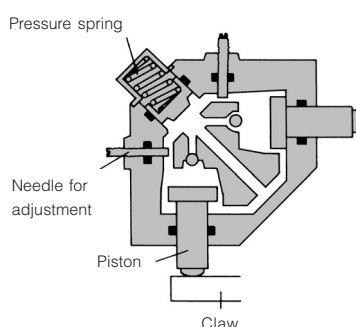
Order Codes

Hydraulic cushion for PRN high torque.
Use these cushions when the inertial energy exceed the allowable energy of the PRN rotary actuator.



Rotary Actuator	Hydro-cushion	Claw for hydro-cushion - Oscillating angle		
		90°	180°	270°
Single vane				
PRN50S	CRN50	CRN50-90-45-T	CRN50-180-45-T	CRN50-270-45-T
PRN150S	CRN150	CRN150-90-45-T	CRN150-180-45-T	CRN150-270-45-T
PRN300S	CRN300	CRN300-90-45-T	CRN300-180-45-T	CRN300-270-45-T
PRN800S	CRN800	CRN800-90-45-T	CRN800-180-45-T	CRN800-270-45-T
Double vane				
PRN50D	CRN50	CRN50-90-45-T		
PRN150D	CRN150	CRN150-90-45-T		
PRN300D	CRN300	CRN300-90-45-T		
PRN800D	CRN800	CRN800-90-45-T		

Principle of operation



Specification

How to select a CRN hydro-cushion ?
Refer page 29.

	Unit	CRN50	CRN150	CRN300	CRN800
Applicable Rotary Actuator		PRN50	PRN150	PRN300	PRN800
Load range	kg x cm2	961	2 942	5 880	19 610
Maximum absorbion energy	mJ	2 940	9 810	19 610	58 840
Max. collision angular velocity	°/s	850	750	650	550
Max.energy capacity per mn	mJ/mn	19 610	70 610	137 290	353 040
Operating temperature	°C	5 to 50	5 to 50	5 to 50	5 to 50
Absorbing angle (one end)	°	11	12	14	15
Weight	kg	0,240	0,420	0,780	1,620

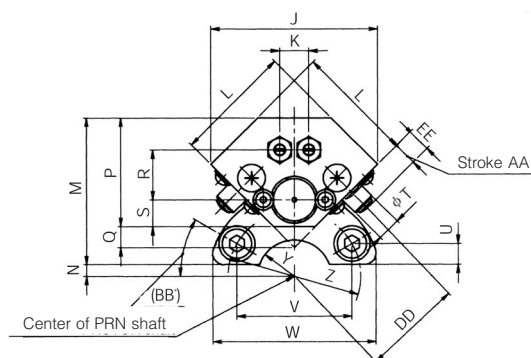
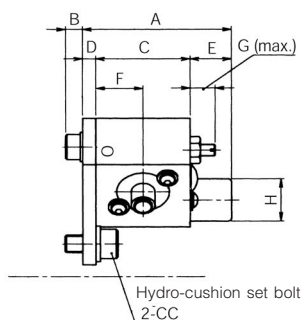
Note :

Energy capability per mn = Absorbing energy x 2N

N: Operation frequency (cycle/mn)

When a rotary actuator is used with a hydro-cushion, keep an operating pressure of 3bar or more.

Dimensions (mm)



Model N°	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	Y	Z	AA	BB	CC	DD	EE
CRN50	50,5	6,0	32	4,5	14	16	8,5	14,4	56,6	9,9	40	50	4	37	7,1	17,0	9,2	8	7,2	39,0	56	R12,5	R45	6,5	30	M6x12	34	8,0
CRN150	56,5	7,2	36	4,5	16	18	8,5	18,4	70,7	11,3	50	62	10	49	8,4	25,5	11,4	10	8,0	60,6	80	R15	R70	10,0	30	M8x16	46	12,0
CRN300	62,5	7,2	42	4,5	16	21	12,0	22,5	91,9	12,7	65	87	8	61	14,2	33,2	14,1	12	12,0	69,2	95	R22,5	R80	15,0	30	M10x20	62	18,0
CRN800	73,0	7,2	50	6,0	17	25	12,0	32,5	127,0	14,2	90	118	17	82	24,7	46,7	20,6	16	13,0	103,9	130	R35	R120	24,0	30	M12x20	90	27,5

PRN High Torque range with Hydro-cushion - Sensors

Order Codes

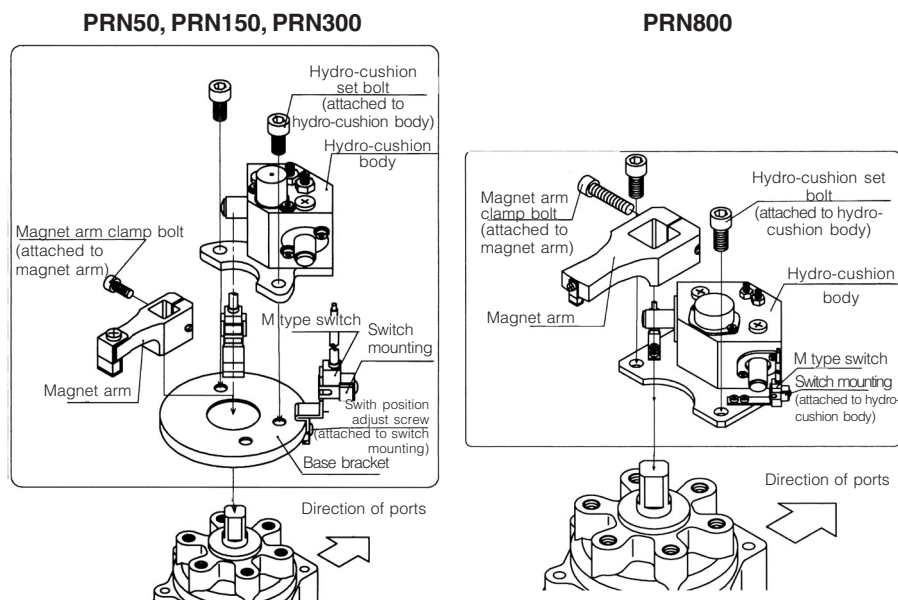
Standard mounting hardware for PRN

Rotary actuator	Base bracket	Magnet arm	Switch mounting
PRN50S&D	FM50-B	FM50-A	FM50-K
PRN150S&D	FM150-B	FM150-A	FM50-K
PRN300S&D	FM300-B	FM300-A	FM300-K
PRN800S&D	FM800-B	FM800-A	-

The switch unit used with a CRN hydro-cushion consists in a 3-part mounting hardware combined with either a reed type or a solid state type sensors. The 3 parts hardware are to be ordered separately :

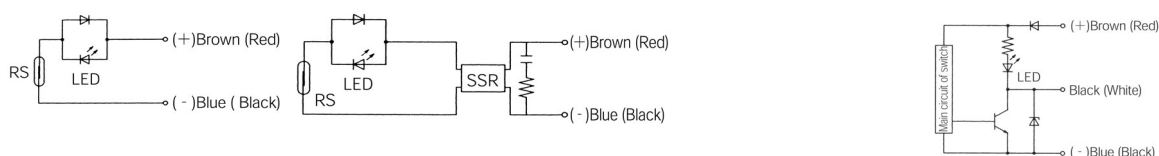
- ï Base bracket
- ï Magnet arm
- ï Switch mounting (except for PRN800)

Switch units with hydro-cushion, refer to page 23.



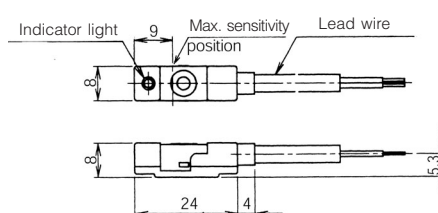
Technical data

	MA-1	MA-2L	MA-2H	MT-3	MTP-3
Application	Relay, PLC	Relay	Relay	Relay, PLC, IC circuit	Relay, PLC, IC circuit
Output method	Reed switch	Reed switch	Reed switch	NPN	PNP
Operating voltage (V)	AC100 - DC24	AC100/110	AC200/220	DC 5 to 30	DC 10 to 30
Operating current (A)	4,5VA - 1W	4,5VA	4,5VA	5 to 200	5 to 200
Indicating lamp	Red LED up at ON	Red LED up at ON	Red LED up at ON	Red LED up at ON	Yellow LED up at ON
Consumption	5 to 45mA	5 to 150mA	5 to 150mA	20mA at 24V 10mA at 12V 4mA at 5V	20mA at 24V 10mA at 12V
Internal voltage drop	2V or less	-	-	1,5V or less	1,5V or less
Max. leak current	-	-	-	10µA	10µA
Average operating time	1ms	1ms	1ms	1ms	1ms
Shock resistance	294m/s ²	294m/s ²	294m/s ²	490m/s ²	490m/s ²
Operating temperature	5 to 60°C	5 to 60°C	5 to 60°C	5 to 60°C	5 to 60°C
Protection	IP67	IP67	IP67	IP67	IP67
Lead wire	1m, 2-core	1m, 2-core	1m, 2-core	1m, 3-core, oil resistant	1m, 3-core, oil resistant

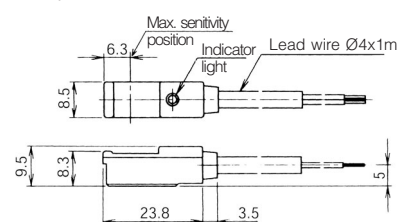


Dimensions

MA-1, MA-2

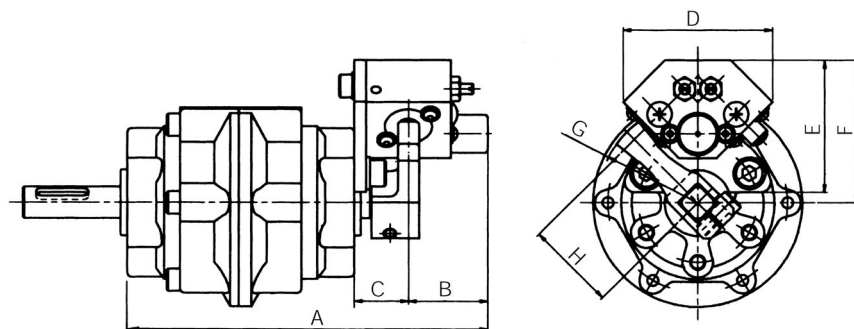


MT3, MTP3



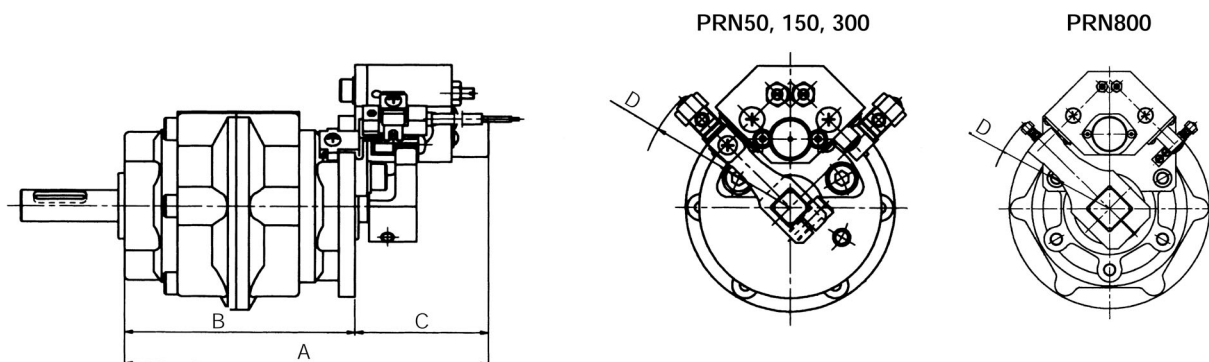
PRN High Torque range with Hydro-cushion - Dimensions (mm)

PRN with hydro-cushion



Type	A	B	C	D	E	F	G	H
PRN50	136,5	30	20,5	56	50	54,0	R38	34
PRN150	159,5	34	22,5	80	62	71,5	R51	46
PRN300	187,5	37	25,5	95	87	96,0	R68	62
PRN800	244,0	42	31,0	130	118	135,0	R78	90

PRN with hydro-cushion and switch unit



Type	A	B	C	D
PRN50	137,7	87,2	50,5	R58,2
PRN150	160,7	104,2	56,5	R72,2
PRN300	188,7	126,2	62,5	R88,2
PRN800	244,0	174,2	69,8	R118,5

Note :

Refer on page 23 for the dimensions of the standard PRN model

For switch unit mounting hardware or hydro-cushion combinations, refer to the required dimensions in each fig.

Selecting a pneumatic Rotary Actuator

Step 1 : Selecting the size of the Rotary Actuator

When a simple static force is required (such as clamping force)

1. Determine the required force, arm length from actuator and operating pressure.

Required force F(N)
 Arm length from actuator l (m)
 Operating pressure P(bar)

2. Calculate the required torque

$$T_s = F \times l \quad (\text{N.m})$$

Required force F(N)
 Arm length from actuator l (m)

3. Compare the effective torque T_h of the actuator under the operating pressure with the required one T_s .

Select a rotary actuator with : $T_h > T_s$

Refer to the tables :

PRO : page 5
 PRN miniature : page 13
 PRN high torque : page 21

When a the load is moving

The required torque for moving a load is the total of resistance torque and acceleration torque.

The resistance torque is the sum of friction, gravity and external force and torques.

The acceleration torque is provided to accelerate the load to certain speed against inertia.

1. Calculating the resistance torque T_r

a) Determine the resistance force, arm length from actuator and operating pressure.

Required force F(N)
 Arm length from actuator l (m)
 Operating pressure P(bar)

b) Calculate the resistance torque T_r

$$T_r = k \times F \times l \quad (\text{N.m})$$

k : margin factor k = 2 when there is no load variation
 k = 5 when there is a load variation

Note : When there is a load variation, if $k < 5$, the angular velocity increases and thus smooth operation cannot be obtained

2. Calculating the acceleration torque T_a

a) Determine the oscillating angle \ddot{E} and oscillating time t. Oscillating time is the time required for the vane to operate from starting point to the oscillation end.

Oscillating angle \ddot{E} (rad) $90^\circ = 1.5708 \text{ rad}$
 $180^\circ = 3.1416 \text{ rad}$
 $270^\circ = 4.7124 \text{ rad}$

Oscillating time t (s)

b) Calculate the moment of inertia

The moment of inertia is determined from the shape and the mass of the load.

Moment of inertia J (kg.m²)

c) Calculating angular acceleration

$$\ddot{\cdot} = \ddot{E} / t^2 \quad (\text{rad/s}^2)$$

\ddot{E} (rad) : Oscillating angle

t (s) : Oscillating time

d) Calculating acceleration torque T_a

$$T_a = 5 \times J \times \ddot{\cdot} \quad (\text{N.m})$$

J : Moment of inertia of the load (kg.m²)

$\ddot{\cdot}$: Angular acceleration (rad/s²)

3. Calculating the required torque T_s

$$T_s = T_r + T_a \quad (\text{N.m})$$

T_r : Resistance torque (N.m)

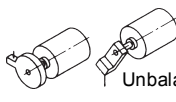
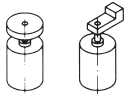

T_a : Acceleration torque (N.m)

4. Compare the effective torque T_h of the actuator under the operating pressure with the required one T_s .

Select a rotary actuator with : $T_h > T_s$

Refer to :

PRO : p 5, PRN miniature : p 13, PRN high torque : p 21

Calculating the resistance torque	Horizontal load	Vertical load
Required	Load resistance exists External force Balanced load Unbalanced load	Load resistance exists External force  Balanced load Unbalanced load Gravity load
	No load resistance exists Balanced load Unbalanced load 	No load resistance exists  Balanced load
Not required		

Selecting a pneumatic Rotary Actuator (cont.)

Step 2 : Checking the oscillating time

Check if the oscillating time is within the specification of each model. Refer to the pages :

PRO :	page 6
PRN miniature :	page 14
PRN high torque :	page 21

Step 3 : Checking the allowable energy

On the inertia matter, use the rotary actuator so that the inertial energy is lower than the allowable energy of the rotary actuator. Check as indicated here after :

1. Calculate the angular velocity $\dot{\alpha}$

$$\dot{\alpha} = \ddot{\alpha} / t \text{ (rad/s)}$$

$\ddot{\alpha}$ (rad) : Oscillating angle

t (s) : Oscillating time

2. Calculate the inertial energy of the load E

$$E = 1/2 \times J \times \dot{\alpha}^2 \text{ (J)}$$

J : Moment of inertia of the load (kg.m²)

$\dot{\alpha}$: Angular velocity (rad/s)

3. Check if the inertial energy E is within the allowable energy indicated in the specifications of each actuator.

PRO :	page 5
PRN miniature :	page 13
PRN high torque :	page 21

Note :

If the inertial energy exceeds the allowable energy, the actuator may be damaged. Therefore, it is necessary to take the following measures :

- Select a larger size the allowable energy of which is higher than the energy required
- Slow down the oscillating time
- Use a hydro-cushion CRN (high torque PRN)
- Fit a cushion or other shock absorber directly on the load side.

Selecting a hydro-cushion CRN

1. Calculate the moment of inertia by the shape and mass of the load, and make sure that it is within the allowable energy of the hydro-check

2. Make sure that the collision angular velocity is less than the maximum allowable (refer to the table page 25)

$$\dot{\alpha}_0 = 1,2 \times \dot{\alpha} \text{ (°/s)}$$

$\dot{\alpha}_0$: Mean angular velocity (°/s)

3. Calculate the collision energy from the load and the collision angular velocity

$$E1 = 1/2 \times J \times \dot{\alpha}_0^2 \text{ (J)}$$

J : Moment of inertia (kg.m²)

$\dot{\alpha}_0$: Collision angular velocity (rad/s) 1° = 0.0174 rad

4. Find the energy generated from the torque of the actuator

$$E2 = 1/2 \times T \times \ddot{\alpha} \text{ (J)}$$

T : Torque of the rotary actuator (N.m)

$\ddot{\alpha}$: Absorbion angle of the cushion (one side) refer to page 25 (rad)

5. Check that E1 + E2 is equal or less than the maximum absorbstion energy

(table page 25)

6. Find the energy per minute from the operation frequency

$$Em = 2 \times N \times (E1+E2) \text{ (J/mn)}$$

N : operation frequency (mn)

7. Make sure that Em is equal or less than the maximum energy capacity per mn (table page 25)

Rotary Actuators - Common instructions

Installation



Warning

The Rotary Actuators should be installed according to the rules of safe use of compressed air and the general rules relating to systems, especially the European Machinery Directive.

Do not apply excessive stress to the shaft.

1. Heavy thrust load should be avoided

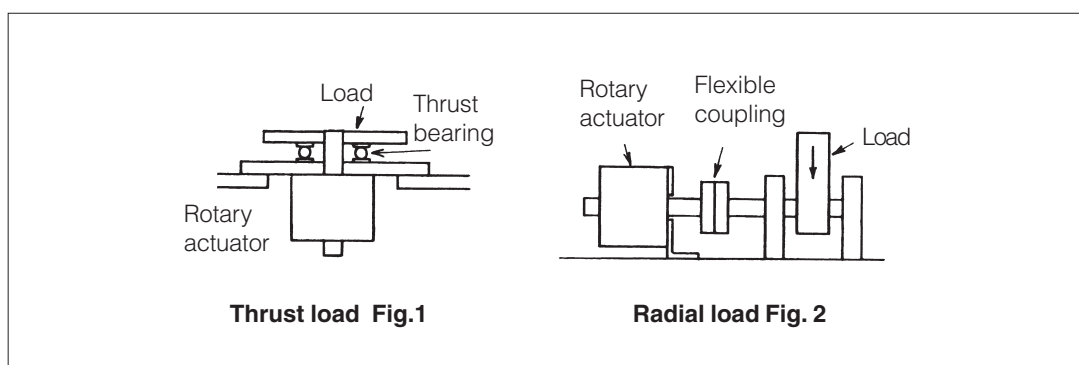
When the thrust load is higher than the allowable thrust load prescribed in the specifications, please use a bearing as shown in fig. 1.

2. Heavy radial loads should be avoided

When the radial load is higher than the allowable radial load prescribed in the specifications, please use flexible coupling as shown in fig. 2.

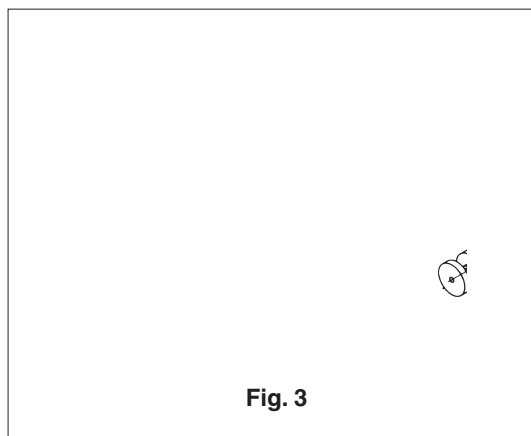
3. Check the allowable energy

If the impact energy is higher than the allowable energy, use a CRN hydro-cushion or external stoppers operating directly on the load.



Do not hit the shaft when the body is fixed or the body when the shaft is fixed.

When mounting a load or couplings on the shaft, set the rotary actuator in such a way that the body does not receive any force, as shown in the Fig. 3.



Rotary Actuators - Common instructions (cont.)**Lubrication****Caution**

The rotary actuators listed in this catalogue operate non-lubricated.

This product is design to be used with non-lubricated air, however, they may be used with or without lubricated air. When used with lubricated air, this must be continued as the original lubricant may have run off, which could result in operation failure.

When using a lubricant, Class 1 turbine oil ISO VG32 (containing additive) is recommended. Do not use spindle oil and machine oil, that may damage the seals.