



FOR SAFETY USE

Be sure to read the following instructions before use.

For common and individual instructions, refer to the text of this catalogue.

The following safety precautions are provided to prevent damage and danger to personnel and to provide instructions on the correct usage of this product. These precautions are classified into 3 categories; “CAUTION”, “WARNING” and “DANGER” according to the degree of possible injury or damage and the degree of impendence of such injury or damage.

Be sure to comply with all precautions along with JIS B8370^(※1) and ISO 4414^(※2), as they include important content regarding safety.

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|------------------|--|
| ⚠ CAUTION | • Indicates a potentially hazardous situation which may arise due to improper handling or operation and could result in personal injury or property-damage-only accidents. |
| ⚠ WARNING | • Indicates a potentially hazardous situation which may arise due to improper handling or operation and could result in serious personal injury or death. |
| ⚠ DANGER | • Indicates an impending hazardous situation which may arise due to improper handling or operation and could result in serious personal injury or death. |

(※1) JIS B8370 : General Rules for Pneumatic Systems

(※2) ISO 4414 : Pneumatic fluid power-General rules relating to systems

⚠ WARNING

- **The applicability of pneumatic equipment to the intended system should be judged by the pneumatic system designer or the personnel who determined specifications for such system.**

As operating conditions for products contained in this catalogue are diversified, the applicability of pneumatic equipment to the intended system should be determined by the pneumatic system designer or the personnel who determined specifications for such system after conducting an analysis or testing as necessary.

The system designer shall be responsible for assuring the intended system performance and safety.

Before making a system, the system designer should thoroughly examine all specifications for such a system and also take into consideration the possibility of any trouble with the equipment.

- **The pneumatic equipment should be handled by persons who have sufficient knowledge and rich experience.**

Improper handling of compressed air will result in danger.

Assembling, operation and maintenance of machinery using pneumatic equipment should be performed by persons who have sufficient knowledge and rich experience.

- **Never operate machinery nor remove the equipment until safety is assured.**

- Before checking or servicing machinery and equipment, be sure to check that steps for prevention of dropping or runaway of the driven component have been completely taken.

- When removing the equipment, make sure that the above-mentioned safety measures have been done beforehand.

Then turn off air supply and power to the system and purge compressed air in the system.

- When restarting machinery and equipment, check that proper prevention of malfunction has been provided for and then restart carefully.

- **When using the pneumatic equipment in the following conditions or environments, take the proper safety measures and consult KURODA beforehand.**

- Conditions and environments other than specified and outdoor use.

- Applications to nuclear power equipment, railroads, aircraft, vehicles, medical equipment, equipment connected with food and drink, amusement facilities and safety devices such as emergency interruption devices, clutch/brake circuits for a press and the likes.

- Applications which require extreme safety and will also greatly affect men and property.



HI-ROTOR/COMMON INSTRUCTIONS ①

Be sure to read them before use.

Also refer to Par. "For Safety Use" and instructions mentioned for each series.

DESIGN

WARNING

- **When HI-ROTOR is subject to load fluctuation, up/down movement and fluctuating frictional resistance, make a safty design in due consideration of such factors.**

Operating speed of HI-ROTOR will increase, causing a damage to machine and an injury to human body.

- **Especially when there is the possibility that the human body is endangered, fit a protective cover.**

When there is the possibility that applied load or the moving part of the HI-ROTOR endangers the human body, design the system so that the human body cannot directly touch these parts.

- **Speed-reducing circuit or shock absorber will be required according to circumstances.**

Set inertial energy to less than allowable value. When load speed is high or mass is large, inertial energy of load exceeds allowable value, making it difficult for HI-ROTOR to absorb shocks.

In this case, provide a speed-reducing circuit or a shock absorber on the load side and also thoroughly examine the rigidity of machine.

- **Take into consideration the possibility of pressure failure in the circuit due to outage etc.**

For an HI-ROTOR used in the clamping mechanism, if clamping pressure in the circuit lowers due to outage etc., clamping force will reduce, so that the load may sometimes come off. To avoid such danger, design the system to incorporate a safety device to protect the human body and machine. Also provide the hanger and lift with proper prevention against dropping.

- **Take into consideration the possibility of power failure.**

Take proper countermeasures against equipment controlled by air pressure, electricity, hydraulic pressure, etc. so as to protect the human body and machine even if these power sources are faulty.

- **Use prevention against runaway of load in designing a circuit.**

If compressed air is supplied to one side of vane without residual air in HI-ROTOR, (for example, HI-ROTOR is operated by 3-position exhaust center type solenoid valve or restarted after residual air in circuit is exhausted), HI-ROTOR will suddenly actuate, causing a damage to machine and an injury to human body.

- **Take into consideration the action of HI-ROTOR in an emergency.**

When the machine is stopped by a person in an emergency or stopped by the safety device due to the occurrence of outage, system trouble, etc., the HI-ROTOR may catch the human body or damage the machine according to circumstances. To avoid such an accident, take into consideration the action of HI-ROTORs in designing a system so as to prevent an injury to the human body and a damage to the machine.

DESIGN

WARNING

- **Take into consideration the action of an HI-ROTOR when it restarts from stoppage in an emergency or abnormal state.**

Make a design to prevent an injury to the human body and a damage to the machine when the HI-ROTOR is restarted.

When it is necessary to reset the HI-ROTOR to the starting position, make a design to incorporate a safety manual control unit.

- **Do not use HI-ROTOR as a shock absorber.**

When abnormal pressure is applied or air leak occurs, speed-reducing effect is considerably lost, sometimes resulting in a damage to machine and an injury to human body.

- **Do not stop HI-ROTOR halfway only by means of directional control valve or do not leave HI-ROTOR stopped there.**

HI-ROTOR and directional control valve are designed to tolerate a certain degree of air leak. Even if HI-ROTOR is stopped halfway by shutting in air using directional control valve without an external stopper provided for HI-ROTOR, the stop position cannot be held due to air leak; this may result in a damage to machine and an injury to human body.

- **Firmly tighten fixed part and joint.**

When using HI-ROTOR for heavy-duty purposes such as continuous operation or using in vibratory place, apply a secure tightening method.

- **Remodeling HI-ROTOR**

Do not remodel HI-ROTOR.

CAUTION

- **Use HI-ROTOR within specified oscillation time.**

If used in lower speed range than specified, HI-ROTOR will not smoothly operate due to a stick and slip phenomenon.

- **Do not apply torque exceeding rated output to HI-ROTOR from the outside.**

If HI-ROTOR receives external force over rated output, it may be broken according to circumstances.

- **When repeatability accuracy for oscillating angle is required, provide a stopper on the outside to stop load directly.**

- **When adjusting the driving speed of an HI-ROTOR, install a speed controller.**

Adjust the driving speed on the low speed side and then adjust it gradually until the prescribed speed is attained.



HI-ROTOR/COMMON INSTRUCTIONS ②

Be sure to read them before use.

Also refer to Par. "For Safety Use" and instructions mentioned for each series.

SELECTION

! WARNING

- **Refer to specifications.**

HI-ROTOR listed in this catalogue are designed for compressed air.

When using other fluid than compressed air, contact KURODA beforehand.

Do not use the HI-ROTOR outside the specified pressure and temperature range; this may result in a breakdown or faulty operation.

INSTALLATION

! WARNING

- **Do not start the system before making sure that equipment is properly operated.**

After installing the HI-ROTOR, connect compressed air and power supply.

Perform functional test and leak test properly and check that the system is correctly operated with safety. Then start the system.

- **Coating with paint**

When coating the resin portion with paint, it may be adversely affected by paint and solvent. For the propriety of painting, contact KURODA beforehand.

Do not peel off the nameplate affixed on the HI-ROTOR and do not erase or smear out the letter on it.

- **When adjusting the oscillation angle of HI-ROTOR by applying pressure, take proper means to prevent HI-ROTOR from rotating beyond required level.**

If HI-ROTOR is rotated beyond required level, it will sometimes cause a hazardous situation.

- **Do not loosen the angle adjust screw of HI-ROTOR over adjustable range.**

If it is loosened over adjustable range, the angle adjust screw will come off, causing a damage to machine and an injury to human body.

- **When using a shaft coupling, select one with degree of freedom.**

If a shaft coupling without degree of freedom is used, a kink will occur due to eccentricity, causing a malfunction or damage to products; this sometimes result in a damage to machine and injury to human body.

- **Provide space for maintenance and inspection.**

INSTALLATION

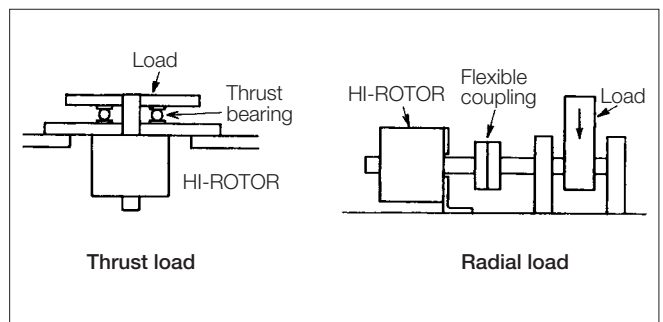
! WARNING

- **Do not apply excessive load to shaft.**

If excessive load over allowable value is applied to shaft, it will cause a malfunction or breakdown, sometimes resulting in a damage to machine and an injury to human body.

HI-ROTOR is capable of receiving up to allowable radial thrust load prescribed in specifications in a state where no inertial load occur. However, avoid using HI-ROTOR in such a manner that load is directly applied to the shaft.

In order to improve operating conditions, it is recommended that no load be directly applied to the shaft by using a method shown in Fig. below:



- **Install an external stopper in a separate place from the shaft.**

If a stopper is located near the shaft, reaction force exerted on the stopper due to torque of HI-ROTOR itself is applied to the shaft and thus damages the shaft and bearing. The reaction force will also break machine and injure human body.

! CAUTION

- **Do not wipe off the model name inscribed on a nameplate etc. with organic solvent.**

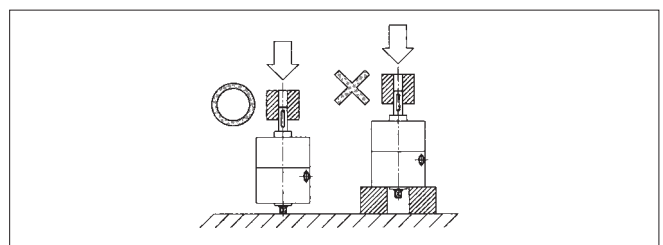
The inscribed indication may be erased.

- **Do not step your foot directly on the shaft and equipment fitted to the shaft.**

Stepping on the shaft directly will cause a damage to bearing etc.

- **Do not hit the shaft with the body fixed or do not hit the body with the shaft fixed; otherwise causing to bend the shaft and damage the bearing.**

When mounting a load on the shaft, set HI-ROTOR in such a manner that the body does not receive force as shown in Fig. below:





HI-ROTOR/COMMON INSTRUCTIONS ③

Be sure to read them before use.

Also refer to Par. "For Safety Use" and instructions mentioned for each series.

PIPING

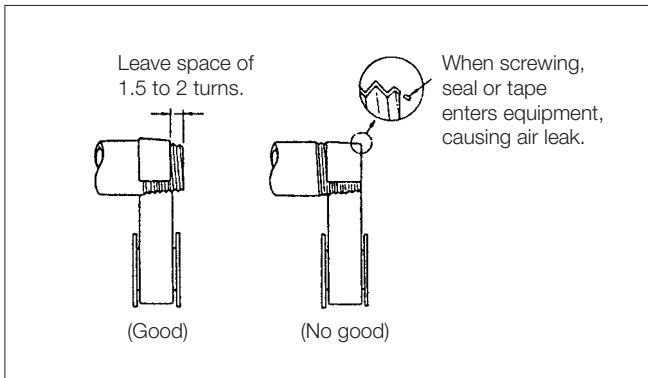
! CAUTION

• Before piping

Thoroughly flush the inside of each pipe to remove chips, coolant, dust, etc. before piping.

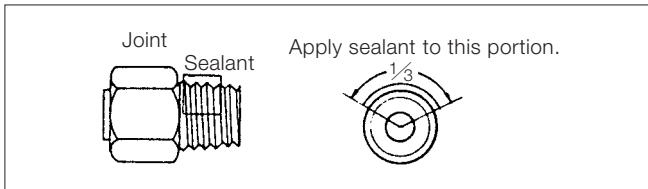
• How to wind a seal tape

When winding a seal tape around the threaded portion, leave space of 1.5 to 2 thread turns.



• How to apply liquid sealant

When applying liquid sealant to the threaded portion, apply a proper amount to about $\frac{1}{3}$ of the periphery of the threaded portion and then screw it.



PIPING

! CAUTION

• Screw of pipe and joint

When screwing the pipe and joint, use care to prevent chips and sealant from entering the pipe and joint.

Tighten them within a proper range of clamping torque.

Port size	Clamping torque (N·m)
M5	1.5~ 2.0
R, Rc $\frac{1}{8}$	7.0~ 9.0
R, Rc $\frac{1}{4}$	12.0~14.0
R, Rc $\frac{3}{8}$	22.0~24.0
R, Rc $\frac{1}{2}$	28.0~30.0

• Avoid wrong piping.

When connecting a pipe to a Rotary Actuator, be careful not to mistake the supply port by referring to the nameplate affixed to the product or the product catalogue.

LUBRICATION

! CAUTION

• HI-ROTOR listed in this catalogue are non-lubrication.

The non-lubricated HI-ROTOR can be used without lubrication, but can be used with lubrication.

When using it with lubrication, do not discontinue supplying oil. Otherwise, the applied lubricant may run off, sometimes resulting in an operation failure.

When using a lubricant, Class 1 turbine oil ISO VG 32 (containing additive) is recommended.

Do not use spindle oil and machine oil. Otherwise, the seal and packing may be damaged.



HI-ROTOR/COMMON INSTRUCTIONS ④

Be sure to read them before use.

Also refer to Par. "For Safety Use" and instructions mentioned for each series.

QUALITY OF AIR

! WARNING

- **Use pure air**

Compressed air containing corrosive gases, chemicals, salt, etc. causes a breakdown or operation ailure. So do not use such air.

! CAUTION

- **Fit an air filter with filtration of 5 μm or fine.**

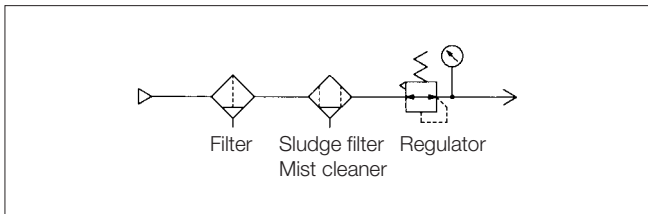
- **Install an air dryer.**

Compressed air containing much drainage causes the operation failure of pneumatic equipment. Install an air dryer, lower the temperature and reduce drainage.

- **Take proper countermeasures against sludge.**

If sludge produced in compressor oil enters pneumatic equipment, it will cause the operation failure of pneumatic equipment.

It is recommendable to use compressor oil (NISSEKI FAIRCALL A68, IDEMITSU DAPHUNY SUPER CS68) featuring minimized sludge production or use a sludge filter or mist cleaner to prevent sludge from entering the pneumatic equipment.



- **Use at low temperature**

When using pneumatic equipment at temperature of 5 °C or below, install an air dryer or take other countermeasures to prevent drainage and moisture in compressed air from freezing or solidifying.

OPERATING ENVIRONMENT

! DANGER

- Do not use HI-ROTOR in a explosive environment.

! WARNING

- Do not use HI-ROTOR in a corrosive environment.
- Do not use HI-ROTOR in a place attended with much dust, water drops or oil drops.

MAINTENANCE AND INSPECTION

! WARNING

- **Inspection before doing maintenance**

Check that proper prevention against drop of load and runaway have been taken, before turning off air and power supply to equipment and discharging air remaining in the system.

For 3-position all port block (closed center) type, compressed air is sealed in between solenoid valve and Rotary Actuator. So purge the residual air.

- **Inspection after finishing maintenance**

When connecting the system to compressed air supply and power supply, HI-ROTOR may sometimes suddenly actuate.

Therefore, when restarting the system, thoroughly check the safety of surrounding conditions before connecting the pneumatic system to compressed air supply and power supply.

Furthermore, perform a proper functional test and a leak test to check that the system normally operates.

- **Disassembling HI-ROTOR**

When disassembling HI-ROTOR, consult our company beforehand.

! CAUTION

- **Draining**

To maintain constant air quality, drain the air filter periodically.



MAGNETIC PROXIMITY SWITCH/Common INSTRUCTIONS ①

Be sure to read them before use.

Also refer to Par. "For Safety Use" and instructions mentioned for each series.

DESIGN AND SELECTION

! WARNING

- Use the switch within the range of specifications described in this catalogue.

Applying load current, voltage, temperature and shock exceeding the range of specifications will cause a damage to the switch and a faulty operation.

Thoroughly read the specifications and use the switch within the range of the specifications.

Especially, be sure to use the switch within the maximum contact capacity and operating current range.

- Be careful of distance between adjacent HI-ROTOR.

When 2 or more HI-ROTORs, each of switch is equipped with a switch are close installed or a magnetic material moves very close to the HI-ROTOR, there is the possibility that the switch malfunctions due to magnetic interference between the switch and magnetic material.

- Pay attention to switch-on time at the center of stroke.

Example : The vane is set at the center of stroke and load is driven when the vane passes the switch. In this case, if oscillating speed is extremely high, operating time is short even when the switch is turned on.

As a result, load cannot be fully moved according to circumstances.

In this case, oscillating speed is expressed as follows :

$$V = \frac{\text{Operating range of switch (mm)}}{\text{Operating time of load (ms)}} \times 1000 \quad (\text{mm/s})$$

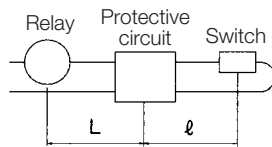
- Reduce the length of wiring as much as practicable.

<Reed switch>

When capacitive load is driven or the wiring from switch to load is long, inrush current increases due to line floating capacity at the time of switch-on ; this results in a damage to the switch or shortens the switch service life.

- In designing a system, provide a distance of more than 40 mm between the HI-ROTOR. (When a permissible distance is specified for each HI-ROTOR, follow the specified distance.)

In case of capacitive load.



When "L" is longer than 10 m, set "l" at 100 to 200 mm.

- Even when using a switch with built-in contact protective circuit and length of wiring is more than 30 m, the protective circuit may not fully absorb inrush current according to circumstances ; this sometimes shortens the switch service life.

For how to connect a protective circuit contact KURODA.

<Proximity switch>

When inrush current caused by line floating capacity occurs, take a proper countermeasure to absorb the rush current.

DESIGN AND SELECTION

! WARNING

- Be careful of leak current.

For a 2-wire proximity switch, current (leak current) flows in it to operate the internal circuit even if the switch is turned off.

When 2 or more switches are connected in parallel, leak current increases corresponding to the number of connected switches.

When leak current is larger than operating current for turning off load, the load is not turned off.

- Be careful of internal voltage drop of switch.

<Reed switch>

When 2 or more switches with LED are connected in series, voltage drop occurs by the number of connected switches due to the resistance of light emitting diode. (Refer to "Internal Voltage Drop" described in "Specifications for Switch".)

Note that load may not be sometimes moved even if the switch operates normally.

When the voltage drop of light emitting diode becomes a problem, use a switch without LED.

<Proximity switch>

When connecting 2-wire proximity switches in series, pay attention to the same points as those for connecting reed switches. However, note that the internal voltage drop is generally larger than that of reed switches.

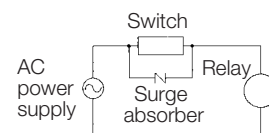
- Do not use load that produces surge voltage.

<Reed switch>

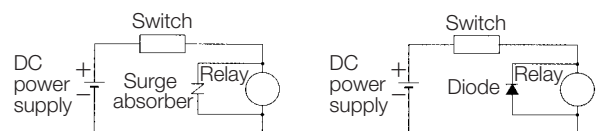
When driving a relay or other load that produces surge voltage, use a switch with built-in contact protective circuit or connect a protective circuit to the switch.

In case of inductive load

Load at 100 V AC



Load at DC



<Proximity switch>

A zener diode for surge protection is connected to the output side of a proximity switch. However, it may be broken if surge is repeatedly applied to it.

When directly driving a relay, solenoid valve or other load that produces surge, use a switch with built-in surge absorbing element.



MAGNETIC PROXIMITY SWITCH / COMMON INSTRUCTIONS ②

Be sure to read them before use.

Also refer to Par. "For Safety Use" and instructions mentioned for each series.

DESIGN AND SELECTION

! WARNING

- **When using the switch in an interlock circuit, pay attention to the following points;**

When a switch for HI-ROTOR is used for interlock signals requiring high degree of reliability, provide the switch with a mechanical protective function against trouble and malfunction or use a double-interlock system by using the switch together with other switch (sensor etc.).

In addition, check the switch periodically to make sure that it works normally.

- **Provide space for maintenance.**

In designing a system, take into account space for maintenance and inspection.

INSTALLATION AND ADJUSTMENT

! WARNING

- **Do not drop or hit the switch.**

When handling the switch, do not drop or hit it or do not apply an excessive shock to it (refer to specification for each switch).

- **Do not swing around the switch while holding the lead wire.**

If excessive tensile force is applied to the lead wire, the inside wire may be broken or the internal mechanism of the switch may suffer a damage.

- **Fix the switch with prescribed clamping torque.**

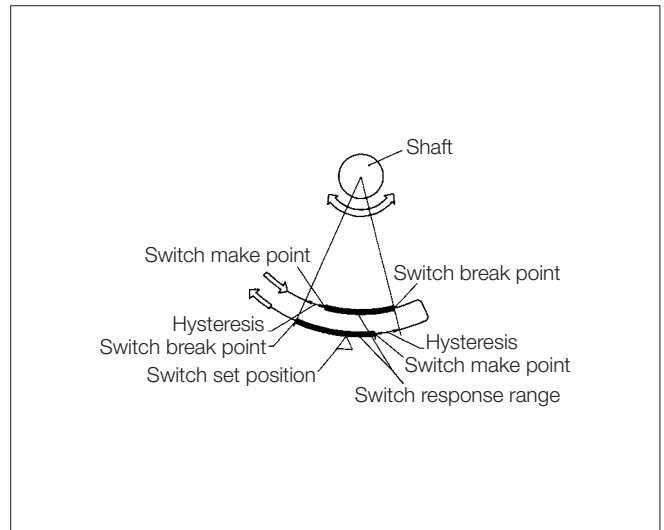
When the switch is fixed with clamping torque exceeding the prescribed value, the set screw, metal fixture, switch, etc. may be broken.

- **Set switch to center of working range.**

When magnet on the shaft rotates in one direction to a point at which the switch is turned on and then rotates in opposite direction to a point at which the switch is turned off, the angle of shaft rotation between these two points is called hysteresis.

When the switch is installed within this range, operation may be unstable according to circumstances.

Install the switch so that magnet is located at the center of working range (within which the switch is turned on.).



! CAUTION

- **Do not wipe off the model name inscribed on a nameplate etc. with organic solvent.**

The inscribed indication may be erased.



MAGNETIC PROXIMITY SWITCH/Common INSTRUCTIONS ③

Be sure to read them before use.

Also refer to Par. "For Safety Use" and instructions mentioned for each series.

WIRING

! WARNING

- **Properly wire in accordance with each lead wire color or terminal No.**

In this case, be sure to turn off power to the electric circuit on the connection side.

- **Do not make wrong wiring.**

As DC current has polarity, do not confuse (+) with (-).

<Reed switch>

When the connection of wiring is reversed, the switch is operated but the lamp is not on.

If current exceeding the prescribed operating range flows to the switch, the lamp will be broken and the switch fails.

<Proximity switch>

Even if the connection of wiring of a 2-lead wire switch is reversed, the protective circuit prevents the breakdown of the switch. In this case, however, the switch is left turned on. Note that, if the connection of wiring of a 2-lead wire switch is reversed with load short-circuited, the switch will be broken.

If the power line of a 3-lead wire switch is reversely wired ("+" replaces with "-"), the protective circuit will protect the switch. However, note that, if the power line is replaced with the output line by mistake, the switch will be broken.

- **Do not wire the switch together with the power line and high voltage line.**

Wire the switch by keeping away from the power line and high voltage line.

Otherwise, the control circuit including the switch may malfunction due to noise.

- **Avoid applying repetitive bending stress and tensile force to the lead wire.**

When setting the switch in a moving part, sag the wiring so that repetitive stress and tensile force will not be applied to the lead wire.

Wiring that produces repetitive bending stress and tensile force cause the breaking of wire.

- **Check for poor insulation.**

Check lead wire connection, extension cable and terminal base for poor insulation. If poor insulation occurs, excess current will flow to the switch, sometimes resulting in a damage to the switch.

- **Be sure to connect load before turning on power supply.**

When a 2-lead wire switch is turned on without connecting load such as relay, PLC, etc., excess current will momentarily flow to the switch, resulting in a damage to the switch.

- **Do not turn on the switch with load short-circuited.**

If the switch is turned on with load short-circuited, excess current will flow to the switch, sometimes resulting in a damage to the switch.

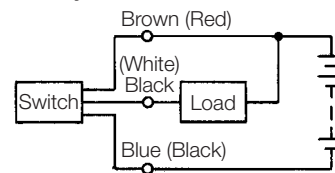
WIRING

! WARNING

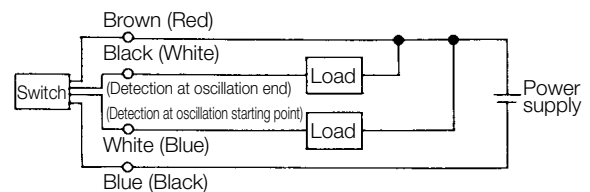
- **It is possible to provide power supply to load and power supply to switches individually and also to use them in common.**

When power supplies are individually provided, they should have the same voltage.

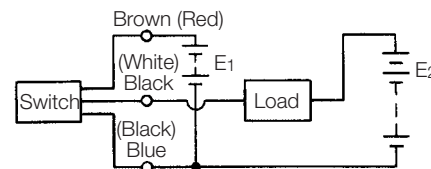
Where power supply to load and power supply to switch are commonly used :



(SR type switch unit)



Where power supply to load and power supply to switch are not commonly used :



E₁ and E₂ should be the same voltage.

Bracketed () color is former color.



MAGNETIC PROXIMITY SWITCH/COMMON INSTRUCTIONS ④

Be sure to read them before use.

Also refer to Par. "For Safety Use" and instructions mentioned for each series.

OPERATING ENVIRONMENT

DANGER

- **Never use the switch in an explosive or ignitable atmosphere.**

As the switch is not proof against explosion, never use it in an explosive gas atmosphere or ignitable atmosphere ; otherwise causing an explosion or fire.

WARNING

- **Do not use the switch in a place where there is a strong magnetic field or a large current.**

If the switch is used in a place where there is a strong magnetic field or a large current (large magnet, spot welding machine, etc.), the switch will malfunction or the magnet will be demagnetized.

- **Do not use the switch in a place where it is always splashed with water.**

Excepting some type of switch, these switches meet structural specifications IP65 prescribed by IEC Standard (refer to specifications for each switch). However, do not use the switch in a place where water is always poured on it; otherwise causing insulation failure and malfunction.

- **Do not use the switch in an environment containing oil and chemicals.**

When the switch is used in an environment containing coolant, washings, oils and chemicals, the inside of the switch is adversely affected even if it is used for a short period of time. When it is necessary to use the switch in such an environment, contact KURODA.

- **Do not use the switch in a place where an extreme temperature change occurs.**

Using the switch in a place attended with an unusual temperature change will adversely affect the inside of the switch. When it is necessary to use the switch in such an environment, contact KURODA.

- **Do not use the switch in a place where an excessive shock occurs.**

〈Reed switch〉

For a reed switch, if an excessive shock (over 980m/s²) is applied to it during operation, the contact may malfunction according to circumstances.

When a proximity switch is used in place of a reed switch, the deficiency can be reduced. In this case, check shock resistance given in specifications.

- **Do not use the switch in a place where surge is produced.**

〈Proximity switch〉

When there is a large surge source around the proximity switch, the circuit element in the switch may be adversely affected.

OPERATING ENVIRONMENT

WARNING

- **Be careful of adjacent magnetic material. Keep the switch away from magnetic material by more than 3.5 mm.**

When there is magnetic material such as iron close to the HI-ROTOR with a built-in magnet is absorbed and thus the switch may not operate according to circumstances.

Note that, when chips and iron powder such as weld spatters accumulate during operation, the same situation as above-mentioned will also occur.

MAINTENANCE AND INSPECTION

DANGER

Perform the following maintenance and inspection periodically.

- **Check the switch set screw and metal fixture for looseness and retighten as necessary.**

If the switch set screw and metal fixture are loosened, the switch set position will shift, resulting in an unstable operation or malfunction.

Readjust the set position and tighten the set screw and fixture.

- **Check the lead wire for damage.**

A damage to the coating of the lead wire may lead to insulation failure and breaking of wire.

When a damage is found, change the switch and repair the lead wire immediately.

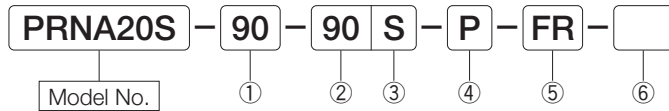
Miniature HI-ROTOR/Standard type

PRNseries

1S, 3S, 10S, 20S, 30S, 1D, 3D, 10D, 20D, 30D



ORDERING INSTRUCTIONS



Single vane	Double vane
PRNA1S	PRNA1D
PRNA3S	PRNA3D
PRNA10S	PRNA10D
PRNA20S	PRNA20D
PRN30S	PRN30D

① Oscillating angle

90	90°
180	180°
270	270°

② Oscillating reference point

90	90°
45	45°

③ Port position

No mark	Standard
S	On the rear cover

(Note) S is not available for Models PRN30S and 30D.

④ Mounting hardware

No mark	No mounting hardware
P	With flange plate
L1	With one foot plate
L2	With two foot plates

⑤ Type of switch units

No mark	No switch	Switch position adjustable
FR	With CT-3 switch	
FU	With CT-3U switch	
FP	With CTP-3 switch	Switch position fixed
SR	With SR switch	
SU	With SU switch	

(Note) • Two switches are provided.
• Only FR and FU are available for PRNA1.
• FP is made-to-order

⑥ Custom-made shafts (Refer to P.53)

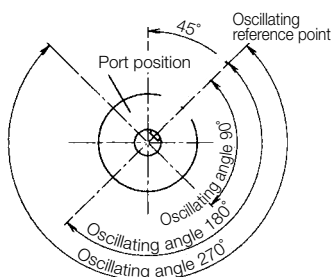
(Note) • Switch units and mounts with two foot plate are not available on "S" (Ports on the rear cover) model.

- Switch units cannot be mounted on HI-ROTORs with two foot plates (L2).
- Mounting hardware comes being not fabricated.

OSCILLATION STARTING POINT AND OSCILLATION ANGLE

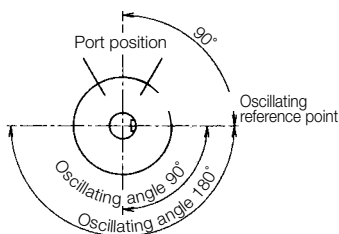
PRNA1S/D, PRNA3S/D,
PRNA10S/D, PRNA20S/D,
PRN30S/D

Oscillating reference point at 45°



PRNA1S, PRNA3S
PRNA10S, PRNA20S

Oscillating reference point at 90°



Oscillating angle and oscillating reference point

Model No.	Oscillating angle			Oscillating reference point	
	90°	180°	270°	45°	90°
PRNA1S	○	○	○	○	—
PRNA3S	△	△	—	—	△
PRNA10S	○	○	○	○	—
PRNA20S	△	△	—	—	△
PRN30S	○	○	○	○	—
PRNA1D	○	—	—	○	—
PRNA3D	○	—	—	○	—
PRNA10D	○	—	—	○	—
PRNA20D	○	—	—	○	—
PRN30D	○	—	—	○	—

○: Standard △: Custom-made

Model Nos. of mounting hardware

Applicable HI-ROTOR	Flange plate	Foot plate
PRNA1S/D	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

(Note) These hardware are provided with set screws.

Miniature HI-ROTOR/PRN series

SPECIFICATIONS

Model No.	Unit	PRNA1S			PRNA3S			PRNA10S			PRNA20S			PRN30S		
Vane		Single vane														
Fluid		Non-lubricated air (Lubricated air)														
Oscillating angle	Degree	90 ⁺⁴	180 ⁺⁴	270 ⁺⁴	90 ⁺⁴	180 ⁺⁴	270 ⁺⁴	90 ⁺⁴	180 ⁺⁴	270 ⁺⁴	90 ⁺⁴	180 ⁺⁴	270 ⁺⁴	90 ⁺³	180 ⁺³	270 ⁺³
Oscillating reference point	Degree	45,90			45			45,90			45			45		
Port size		M5												Rc1/8		
Minimum working pressure	MPa	0.1									0.08			0.1		
Operation pressure range	MPa	0.2~0.7									0.2~1					
Proof withstanding pressure	MPa	1.05									1.5					
Temperature range	°C	-5~80												-5~60		
Maximum frequency of use	Hz	5	3	1.6	4	2.5	1	4	2.5	1.5	3.5	2	1	3	1.5	1
Internal volume	cm ³	1.4	1.4	1.5	3.4	3.4	4	9.8	9.8	12	17	17	21	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		
Mass	kg	0.036			0.07			0.14			0.25			0.47		0.46

Model No.	Unit	PRNA1D			PRNA3D			PRNA10D			PRNA20D			PRN30D		
Vane		Double vane														
Fluid		Non-lubricated air (Lubricated air)														
Oscillating angle	Degree	90 ⁺⁴			90 ⁺⁴			90 ⁺⁴			90 ⁺⁴			90 ⁺³		
Oscillating reference point	Degree	45			45			45			45			45		
Port size		M5												Rc1/8		
Minimum working pressure	MPa	0.08			0.07			0.06			0.08					
Operation pressure range	MPa	0.2~0.7									0.2~1					
Proof withstanding pressure	MPa	1.05									1.5					
Temperature range	°C	-5~80												-5~60		
Maximum frequency of use	Hz	5			4			4			3			3		
Internal volume	cm ³	1.1			2.8			8.1			15			34		
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		
Mass	kg	0.037			0.072			0.14			0.26			0.48		

(Note) • Maximum frequency of use at the supply pressure of 0.5 MPa (Unloaded).

- Make sure to use the HI-ROTOR within allowable energy. Refer to page 68 for the allowable energy calculation.
- HI-ROTORS with keyways are provided with keys.
- For HI-ROTORS other than standard, consult KURODA.

Output (Effective torque)

(Unit : N·cm)

Model No.		Supply pressure (MPa)								
		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Single vane	PRNA1S	4.9	7.6	10.1	12.9	15.6	18.5	—	—	—
	PRNA3S	10	17	24	31	38	45	—	—	—
	PRNA10S	35	56	75	98	120	139	—	—	—
	PRNA20S	59	95	133	170	210	249	287	326	368
	PRN30S	110	180	250	319	410	480	580	650	720
Double vane	PRNA1D	10.4	16.5	22.5	28.6	34.7	41.1	—	—	—
	PRNA3D	25	39	54	71	86	101	—	—	—
	PRNA10D	76	117	162	211	254	303	—	—	—
	PRNA20D	140	222	306	388	470	553	633	717	807
	PRN30D	270	440	600	770	950	1120	1299	1480	1660

Miniature HI-ROTOR/PRN series

OSCILLATING TIME RANGE

(Unit : s)

Model No.	Oscillating angle		
	90°	180°	270°
PRNA1S, 1D	0.03~0.6	0.06~1.2	0.09~1.8
PRNA3S, 3D	0.04~0.8	0.08~1.6	0.12~2.4
PRNA10S, 10D	0.045~0.9	0.09~1.8	0.135~2.7
PRNA20S, 20D	0.05~1.0	0.1~2.0	0.15~3.0
PRN30S, 30D	0.07~0.7	0.14~1.4	0.21~2.1

(Note) Operate the HI-ROTOR within the oscillating time range prescribed in the above table. Otherwise, the HI-ROTOR will be perform in stick-slip motions.

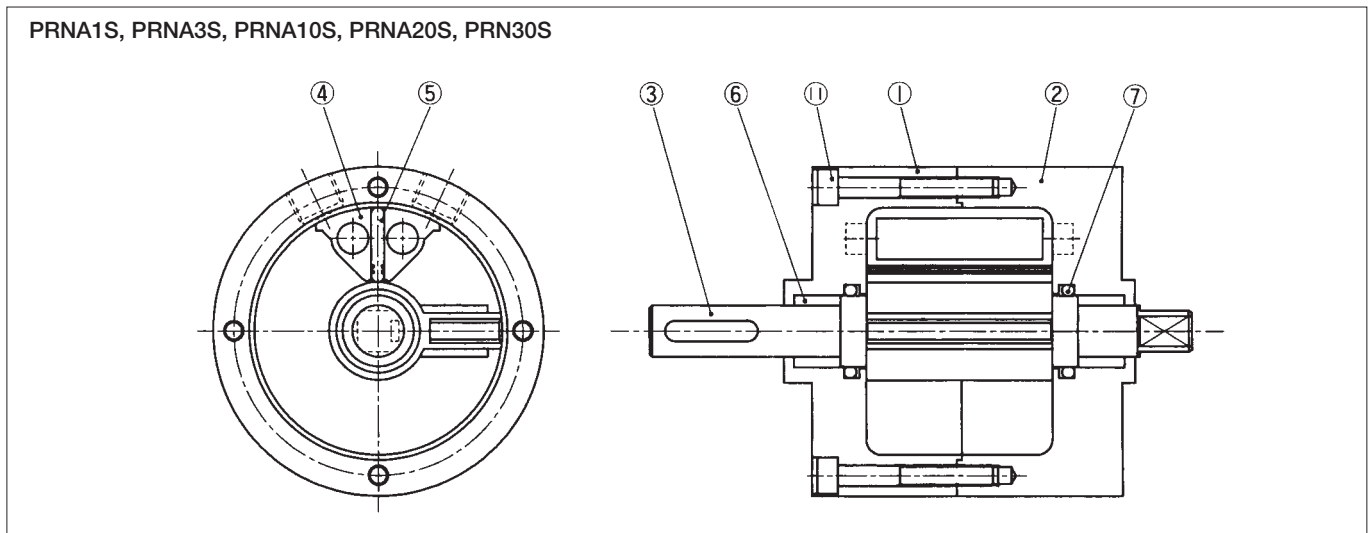
HI-ROTOR with switch/For details, see pages 52 to 54.

CT AND SR TYPE PROXIMITY SWITCHES

Type of switch	Mounting	Load voltage (V)	Load current (mA)	Indicating lamp (Lights up at ON)	Applications
CT-3 CT-3U CTP-3	Switch position adjustable	DC5~30	5~200	○	Relay PLC IC circuit
SR SU	Switch position fixed				

(Note) CTP-3 is made-to-order

STRUCTURE



MAIN COMPONENTS

No.	Description	Material	
		PRN30S	PRNA1S, PRNA3S, PRNA10S, PRNA20S
①	Body A	Aluminium alloy	
②	Body B	Aluminium alloy	
③	Vane shaft	Steel+Resin+Nitrile rubber	Steel+Resin+Hydrogenated nitrile rubber
④	Shoe	Resin	
⑤	Shoe seal	Nitrile rubber	Hydrogenated nitrile rubber
⑥	Bushing	—	
⑦	O-ring	Nitrile rubber	Hydrogenated nitrile rubber
⑪	Set screw	Steel	

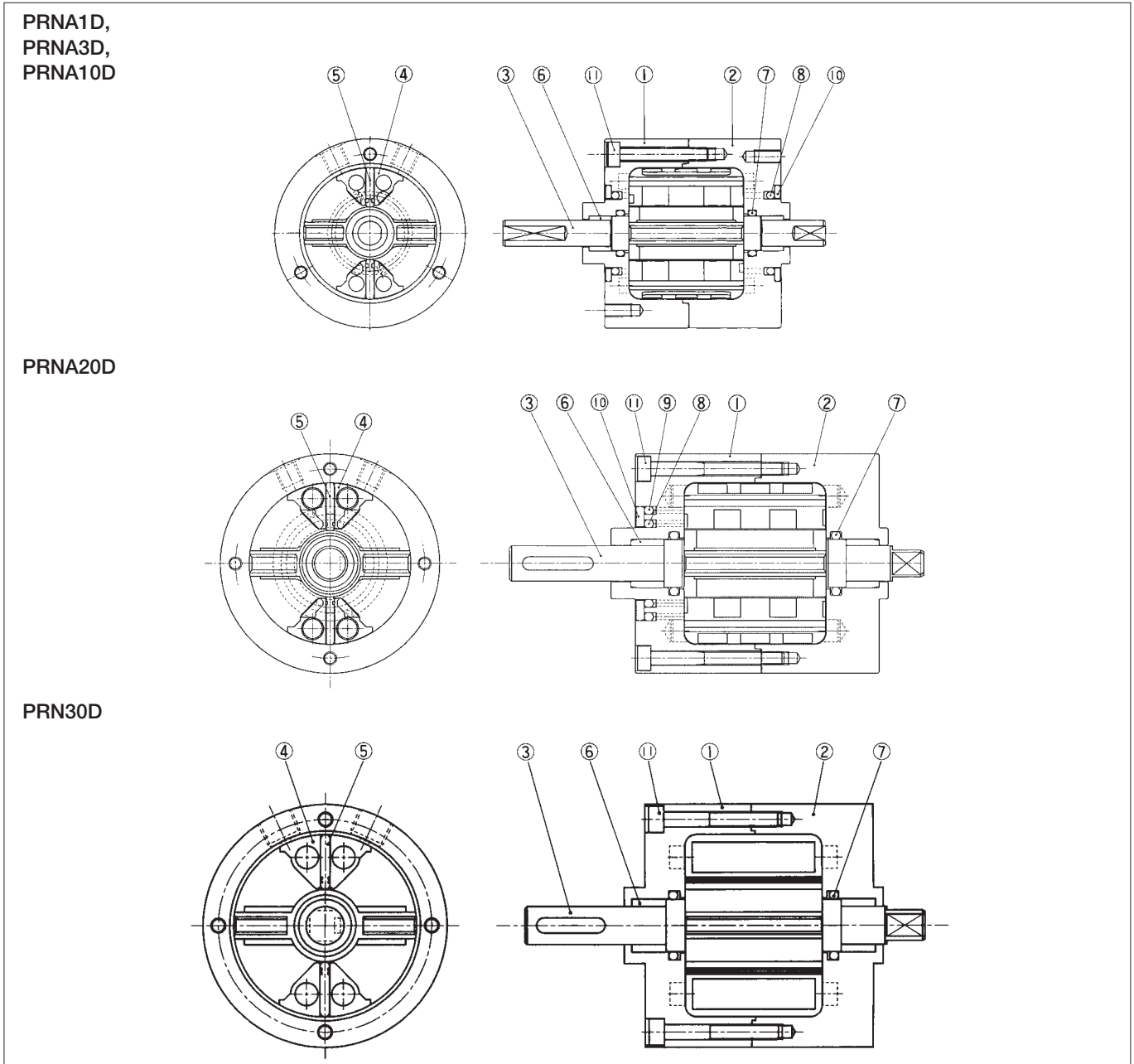
MODEL Nos. OF PACKING KIT

Applicable HI-ROTOR	Model No.
PRNA1S	PRNA1S-PS
PRNA3S, PROA3S	PRNA3S-PS
PRNA10S, PROA10S	PRNA10S-PS
PRNA20S, PROA20S	PRNA20S-PS
PRN30S, PRO30S	PRN30S-PS
PRH30S	PRH30S-PS

(Note) A set of packings consists of part Nos. ③, ⑤ and ⑦.

Miniature HI-ROTOR/PRN series

STRUCTURE



MAIN COMPONENTS

No.	Description	Material	
		PRNA1D, PRNA3D, PRNA10D, PRNA20D	PRN30D
①	Body A	Aluminium alloy	
②	Body B	Aluminium alloy	
③	Vane shaft	Steel+Resin+Hydrogenated nitrile rubber	Steel+Resin+Nitrile rubber
④	Shoe	Resin	
⑤	Shoe seal	Hydrogenated nitrile rubber	Nitrile rubber
⑥	Bushing	—	
⑦	O-ring	Hydrogenated nitrile rubber	Nitrile rubber
⑧	O-ring	Hydrogenated nitrile rubber	Nitrile rubber
⑨	O-ring	Hydrogenated nitrile rubber (PRNA20D only)	—
⑩	Plate	Steel	—
⑪	Set screw	Steel	

MODEL Nos. OF PACKING KIT

Applicable HI-ROTOR	Model No.
PRNA1D	PRNA1D-PS
PRNA3D, PROA3D	PRN3D-PS
PRNA10D, PROA10D PRHA10D	PRNA10D-PS
PRNA20D, PROA20D PRHA20D	PRNA20D-PS
PRN30D, PRO30D PRH30D	PRN30D-PS

(Note) A set of packings consists of part Nos. ③, ⑤ and ⑦.

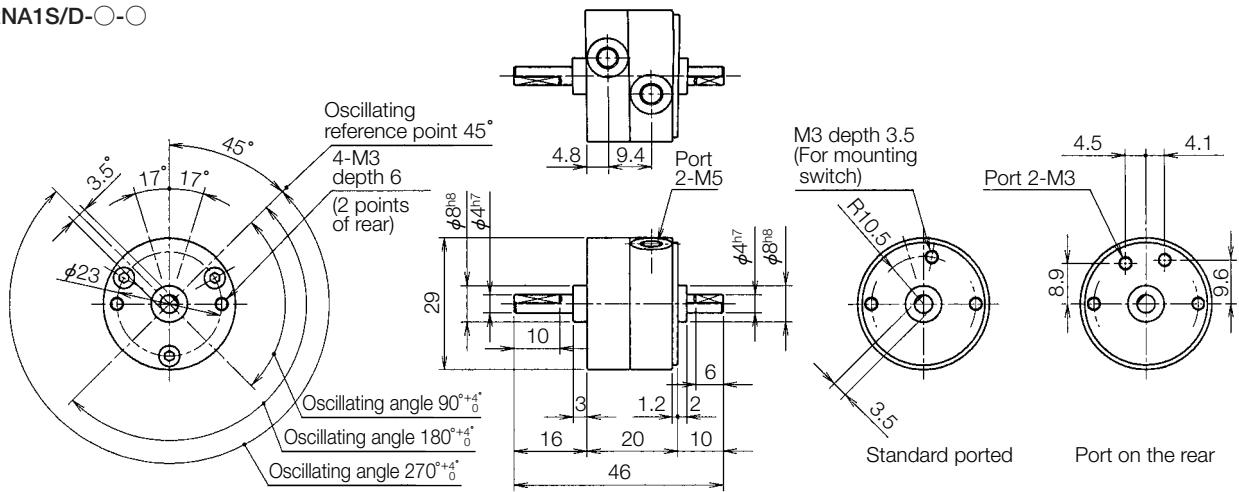
Miniature HI-ROTOR/PRN series

DIMENSIONS

(Unit : mm)

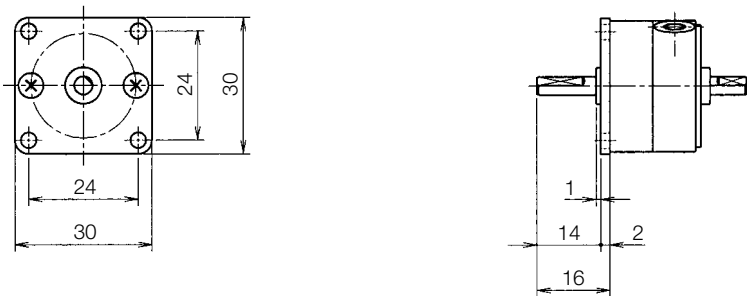
Basic type

PRNA1S/D-○-○



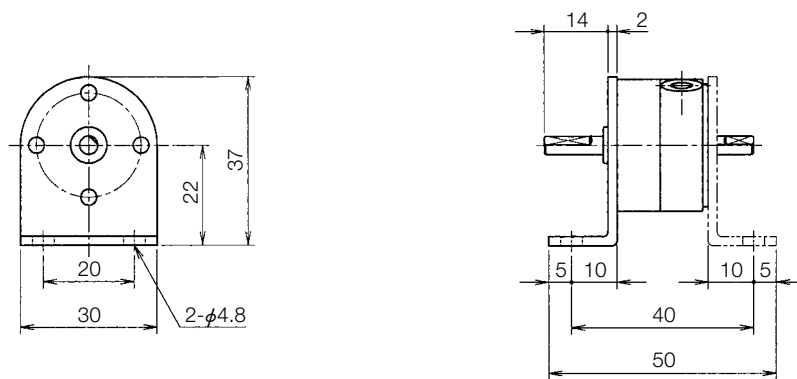
With flange plate

PRNA1S/D-○-○-P



With foot plate

PRNA1S/D-○-○-L1 (L2)

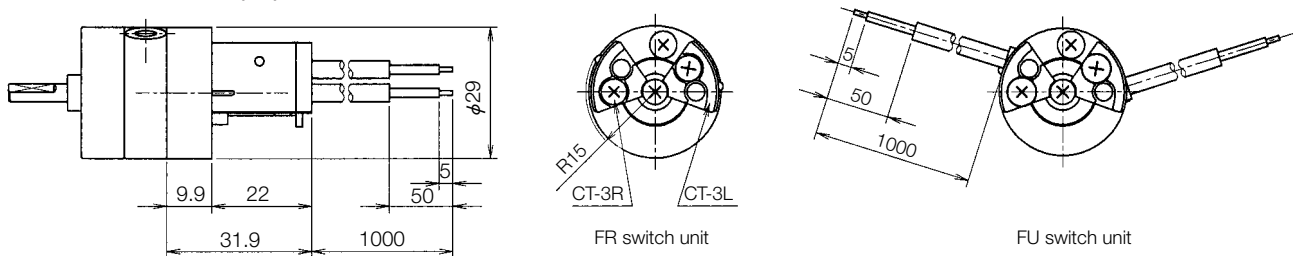


(Note) •A foot plate can be fitted with it turned in steps of 90° from the original posture.
•Short shaft side : Example with L2 (2 pcs.)

With switch unit

(Switch position adjustable type)

PRNA1S/D-○-○-○-FR(FU)



(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

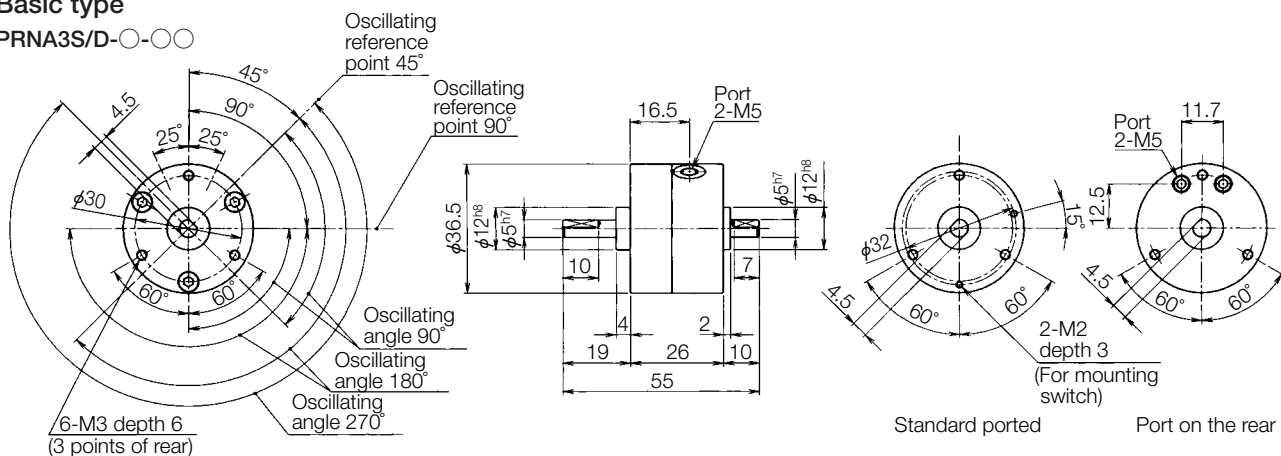
Miniature HI-ROTOR/PRN series

DIMENSIONS

(Unit : mm)

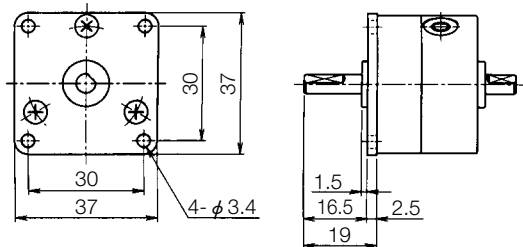
Basic type

PRNA3S/D-○-○-○



With flange plate

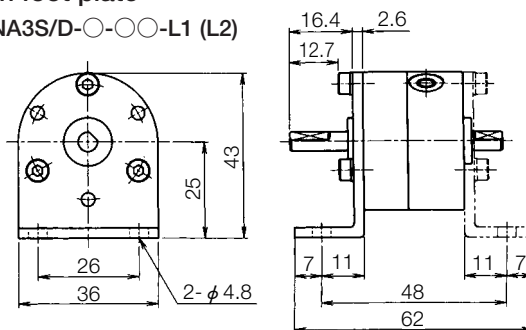
PRNA3S/D-○-○-○-P



(Note) A flange plate can be fitted with it turned in steps of 120° from the original posture.

With foot plate

PRNA3S/D-○-○-○-L1 (L2)

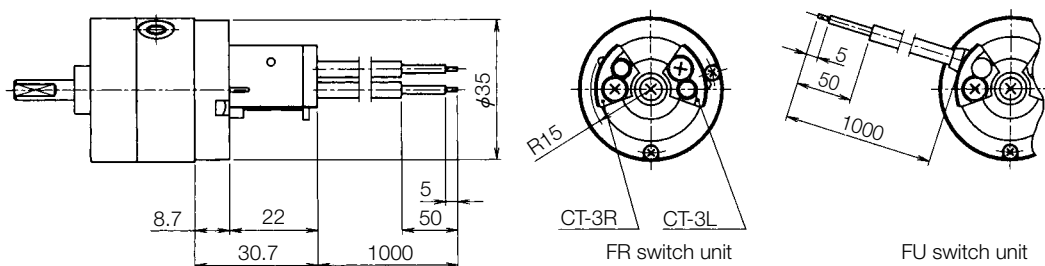


(Note) •A foot plate can be fitted with it turned in steps of 60° from the original posture.

•Short shaft side : Example with L2 (2 pcs.)

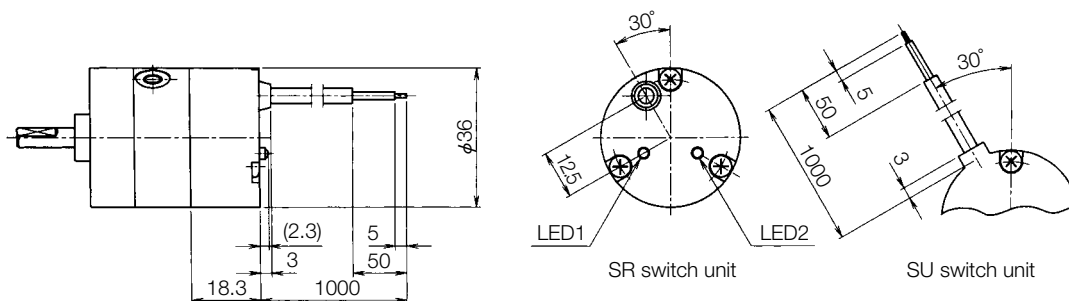
With switch unit (Switch position adjustable type)

PRNA3S/D-○-○-○-FR(FU)



With switch unit (Switch position fixed type)

PRNA3S-○-○-○-SR(SU)



(Note) LED1 comes on at the oscillating reference point and LED2 at the end of oscillation.

(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

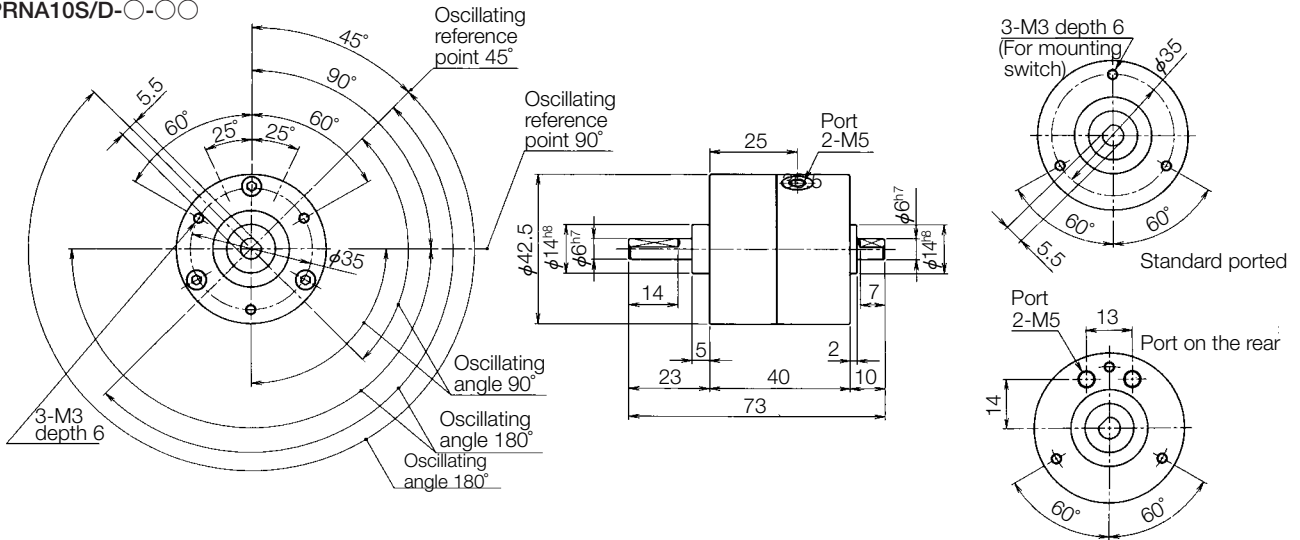
Miniature HI-ROTOR/PRN series

DIMENSIONS

(Unit : mm)

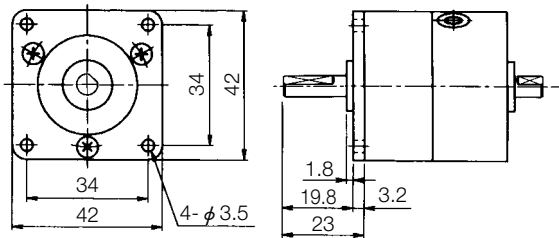
Basic type

PRNA10S/D-○-○-○



With flange plate

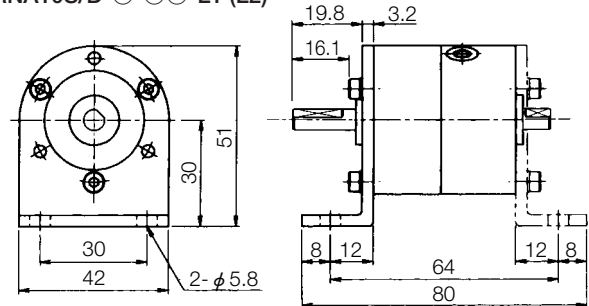
PRNA10S/D-○-○-○-P



(Note) A flange plate can be fitted with it turned in steps of 120° from the original posture.

With foot plate

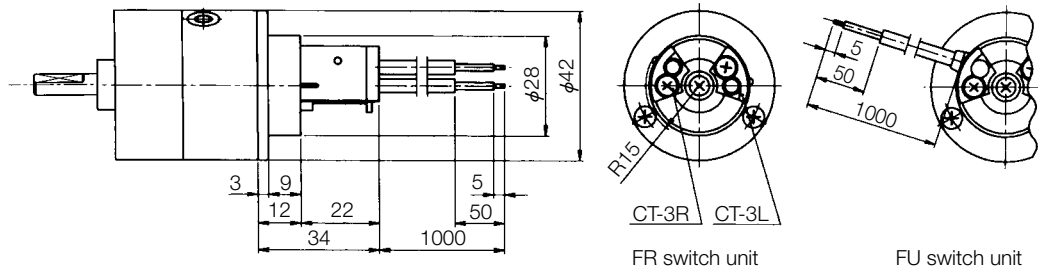
PRNA10S/D-○-○-○-L1 (L2)



(Note) • A foot plate can be fitted with it turned in steps of 60° from the original posture.
• Short shaft side : Example with L2 (2 pcs.)

With switch unit (Switch position adjustable type)

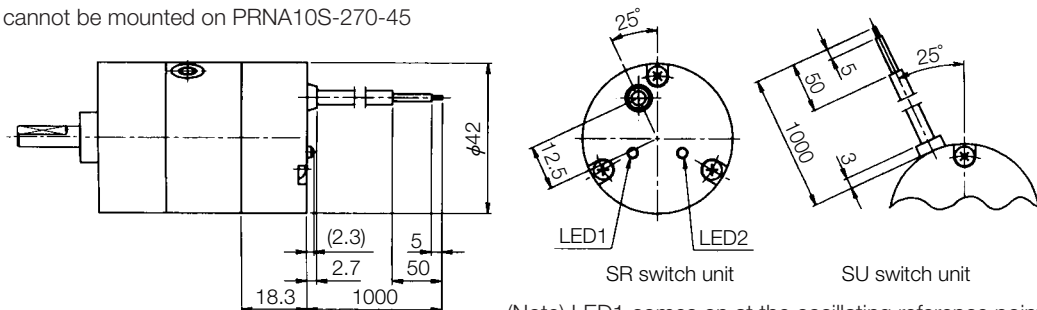
PRNA10S/D-○-○-○-FR(FU)



With switch unit (Switch position fixed type)

PRNA10S/D-○-○-○-SR(SU)

SR and SU switch cannot be mounted on PRNA10S-270-45



(Note) LED1 comes on at the oscillating reference point and LED2 at the end of oscillation.

(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

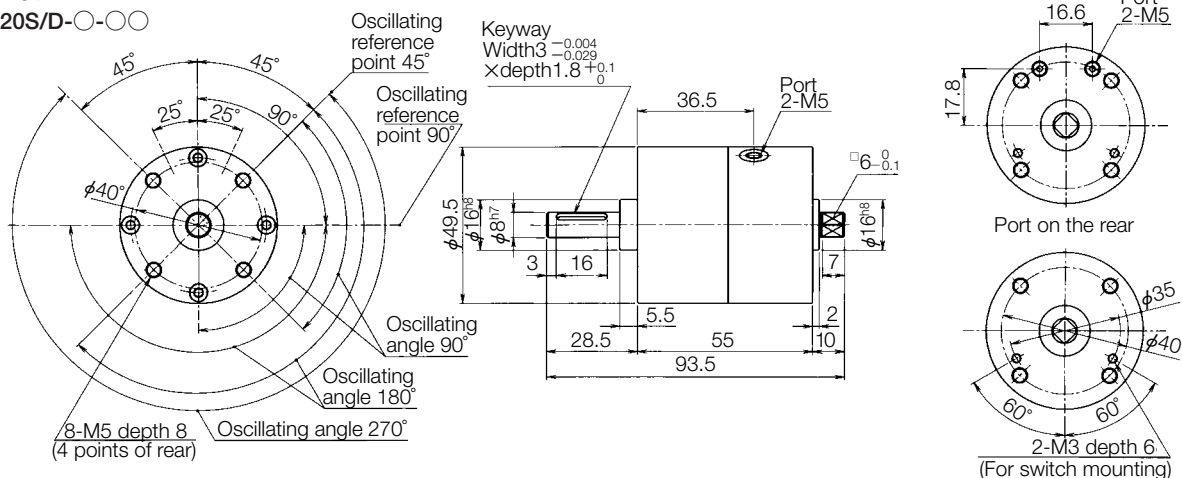
Miniature HI-ROTOR/PRN series

DIMENSIONS

(Unit : mm)

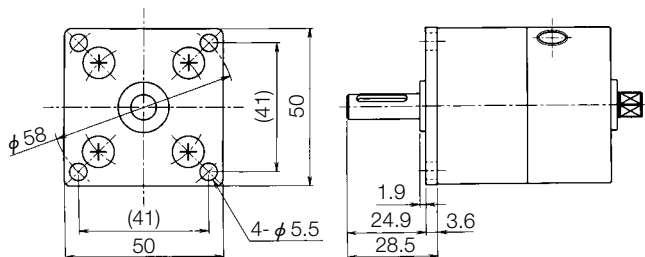
Basic type

PRNA20S/D-○-○-○



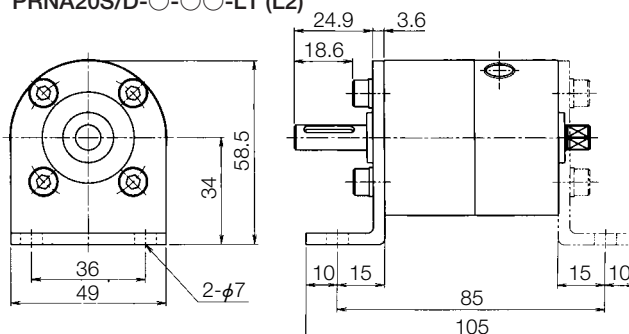
With flange plate

PRNA20S/D-○-○-○-P



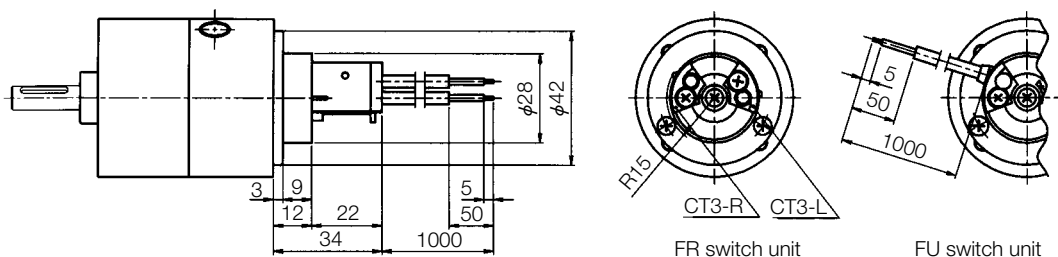
With foot plate

PRNA20S/D-○-○-○-L1 (L2)



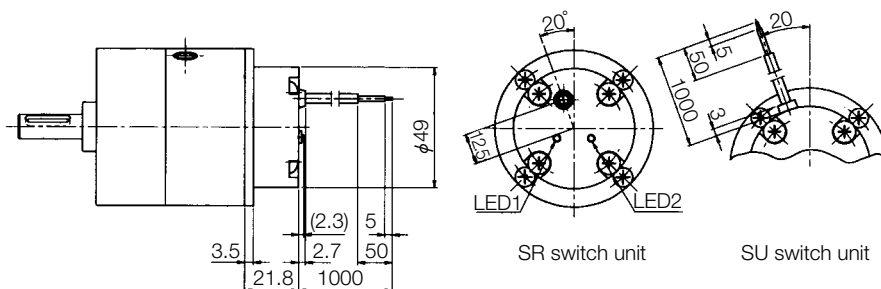
With switch unit (Switch position adjustable type)

PRNA20S/D-○-○-○-FR(FU)



With switch unit (Switch position fixed type)

PRNA20S-○-○-○-SR(SU)



(Note) • A foot plate can be fitted with it turned in steps of 90° from the original posture.

• Short shaft side : Example with L2 (2 pcs.)

(Note) LED1 comes on at the oscillating reference point and LED2 at the end of oscillation.

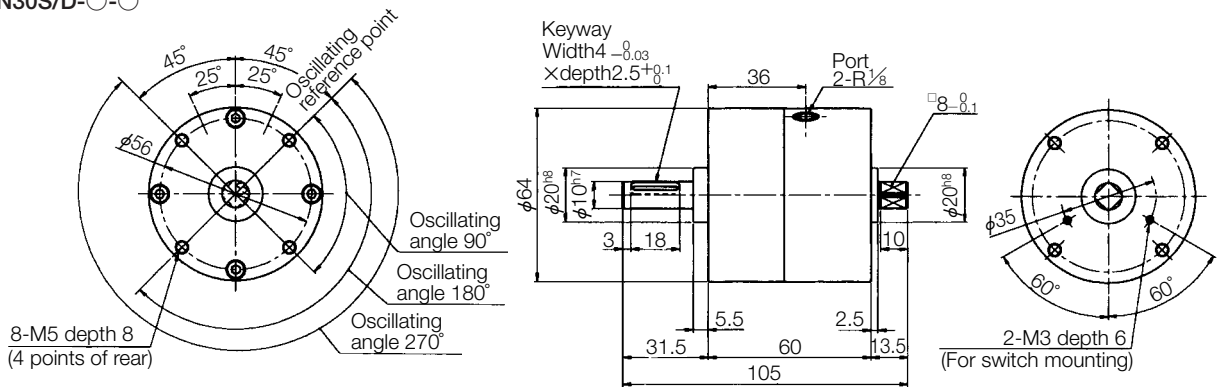
(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

Miniature HI-ROTOR/PRN series

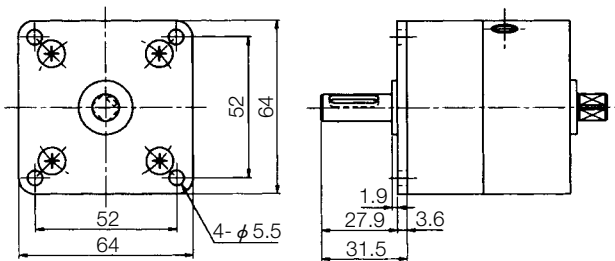
DIMENSIONS

(Unit : mm)

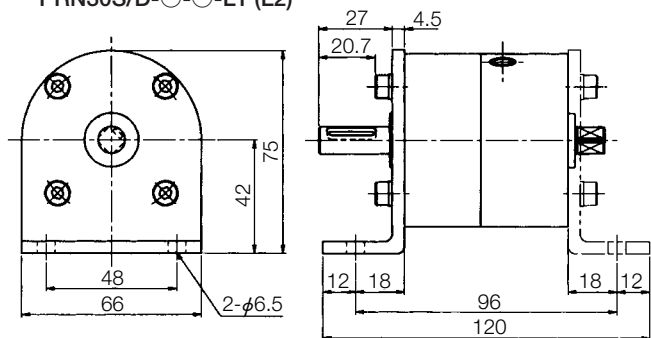
Basic type PRN30S/D-○-○



With flange plate PRN30S/D-○-○-P

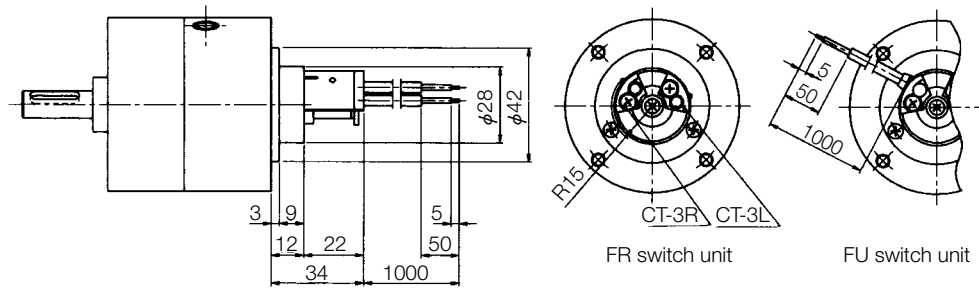


With foot plate PRN30S/D-○-○-L1 (L2)

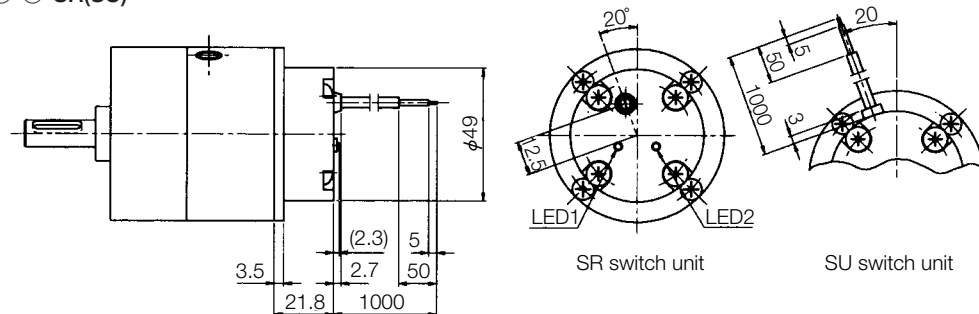


(Note) • A foot plate can be fitted with it turned in steps of 90° from the original posture.
• Short shaft side : Example with L2 (2 pcs.)

With switch unit (Switch position adjustable type) PRN30S/D-○-○-○-FR(FU)



With switch unit (Switch position fixed type) PRN30S/D-○-○-○-SR(SU)



(Note) LED1 comes on at the oscillating reference point and LED2 at the end of oscillation.

(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

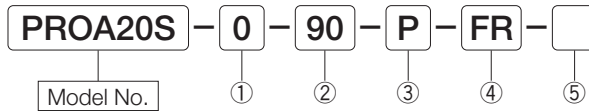
Miniature HI-ROTOR / Variable oscillating angle type

PROseries

3S, 10S, 20S, 30S, 3D, 10D, 20D, 30D



ORDERING INSTRUCTIONS



Single vane	Double vane
PROA3S	PROA3D
PROA10S	PROA10D
PROA20S	PROA20D
PRO30S	PRO30D

① Oscillating angle

0	Angle setting not specified
Desired angle*	Angle setting specified

* Custom-made

② Oscillating reference point

90	90° (PROA3S, 10S, 20S)
45	45° (PROA3D, 10D, 20D) (PRO30S/D)

③ Mounting hardware

No mark	No mounting hardware
P	With flange plate
L1	With one foot plate

④ Type of switch units

No mark	No switch	
FR	With CT-3 switch	Switch position adjustable
FU	With CT-3U switch	
FP	With CTP-3 switch	

(Note) • Two switches are provided.

• FP is made-to-order

⑥ Option

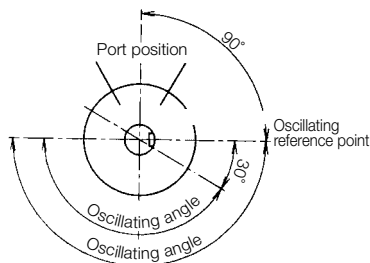
No mark	Without protective cover
K	With protective cover

(Note) For HI-ROTORs with switches, the protective cover cannot be mounted.

OSCILLATION STARTING POINT AND OSCILLATION ANGLE

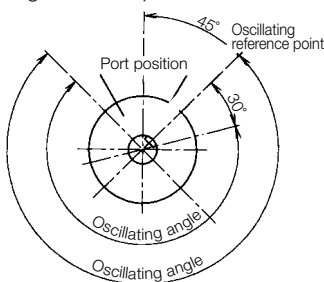
PROA3S, PROA10S, PROA20S

Oscillating reference point at 90°



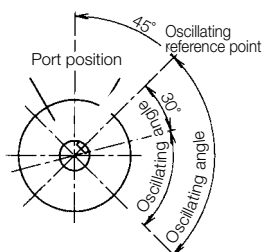
PRO30S

Oscillating reference point at 45°



PROA3D, PROA10D, PROA20D, PRO30D

Oscillating reference point at 45°



(Note) • HI-ROTORs of which the angle setting is not specified are shipped with fixed the reference point stopper but not the angle setting stopper when delivered. Be sure to attach the accompanying angle setting stopper without fail before use.

• HI-ROTORs of which angle setting is specified (made-to-order) will be delivered with angle setting stopper attached to the approximate position. Be sure to adjust the stopper position with the fine adjust screw before use.

• HI-ROTORs with a switch unit will be delivered together with the switch unit in the package. Assemble them after adjusting the external stopper. For the method of assembly, see Page 54.

• Mounting hardwares are not fabricated to the HI-ROTOR when delivered but are included in the package.

Model Nos. of stopper unit

Applicable HI-ROTOR	Model No.
PROA3S/D	RO3-U
PROA10S/D	RO10-U
PROA20S/D	RO20-U
PRO30S/D	RO30-U

Model Nos. of protective cover

Applicable HI-ROTOR	Model No.
PROA3S/D	PRO3-K
PROA10S/D	PRO10-K
PROA20S/D	PRO20-K
PRO30S/D	PRO30-K

(Note) For details, see page 26.

Model Nos. of mounting hardware

Applicable HI-ROTOR	Flange plate	Foot plate
PROA3S/D	PRN3-P	PRN3-L
PROA10S/D	PRN10-P	PRN10-L
PROA20S/D	PRN20-P	PRN20-L
PRO30S/D	PRN30-P	PRN30-L

(Note) These hardware are provided with set screws.

Miniature HI-ROTOR/PRO series

SPECIFICATIONS

Model No.	Unit	PROA3S	PROA10S	PROA20S	PRO30S
Vane		Single vane			
Fluid		Non-lubricated air (Lubricated air)			
Oscillating angle	Degree	30~180			30~270
Oscillating reference point	Degree	90			45
Port size		M5			Rc1/8
Minimum working pressure	MPa	0.1			
Operation pressure range	MPa	0.2~0.7		0.2~1	
Proof withstanding pressure	MPa	1.05		1.5	
Temperature range	°C	-5~80			-5~60
Maximum frequency of use	Hz	3 (at 180°)	2.5 (at 180°)	2 (at 180°)	1 (at 270°)
Internal volume	cm ³	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
Mass	kg	0.085	0.17	0.28	0.51

Model No.	Unit	PROA3D	PROA10D	PROA20D	PRO30D
Vane		Double vane			
Fluid		Non-lubricated air (Lubricated air)			
Oscillating angle	Degree	30~90			
Oscillating reference point	Degree	45			
Port size		M5			Rc1/8
Minimum working pressure	MPa	0.07		0.08	
Operation pressure range	MPa	0.2~0.7		0.2~1	
Proof withstanding pressure	MPa	1.05		1.5	
Temperature range	°C	-5~80			-5~60
Maximum frequency of use	Hz	4 (at 90°)	4 (at 90°)	3 (at 90°)	3 (at 90°)
Internal volume	cm ³	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
Mass	kg	0.087	0.18	0.29	0.53

(Note) •The allowable energy differs from that of the PRN series.

•Maximum frequency of use at the supply pressure of 0.5MPa (Unloaded).

•Make sure to use the HI-ROTOR within allowable energy. Refer to page 68 for the allowable energy calculation.

•HI-ROTORs with keyways are provided with keys.

•For HI-ROTORs other than standard, consult KURODA.

Output (Effective torque)

(Unit : N·cm)

Model No.		Supply pressure (MPa)								
		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Single vane	PROA3S	10	17	24	31	38	45	—	—	—
	PROA10S	35	56	75	98	120	139	—	—	—
	PROA20S	59	95	133	170	210	249	287	326	368
	PRO30S	110	180	250	319	410	480	580	650	720
Double vane	PROA3D	25	39	54	71	86	101	—	—	—
	PROA10D	76	117	162	211	254	303	—	—	—
	PROA20D	140	222	306	388	470	553	633	717	807
	PRO30D	270	440	600	770	950	1120	1299	1480	1660

Miniature HI-ROTOR/PRO series

EXTERNAL STOPPER SPECIFICATIONS

(Unit : Degree)

Model No.	PROA3S	PROA10S	PROA20S	PRO30S	PROA3D	PROA10D	PROA20D	PRO30D
Minimum angel setting	30							
Maximum angle setting	180			270	90			
Pitch for angle setting	15							
Angle fine adjustment range	-9~+6							
Oscillating reference poit fine adjust range	±3				-1~+3	±3		
Fine adjust range at maximum angle setting	-9~+6			-9~+3	-9~+1	-9~+3		

OSCILLATING ANGLE SETTING RANGE AND REFERENCE POINT

Model No.		Oscillation angle setting range	Oscillating reference point
Single vane	PROA3S	30~180°	90°
	PROA10S		
	PROA20S		
	PRO30S	30~270°	45°
Double vane	PROA3D	30~90°	45°
	PROA10D		
	PROA20D		
	PRO30D		

HI-ROTOR with switch/ For details, see pages 53.

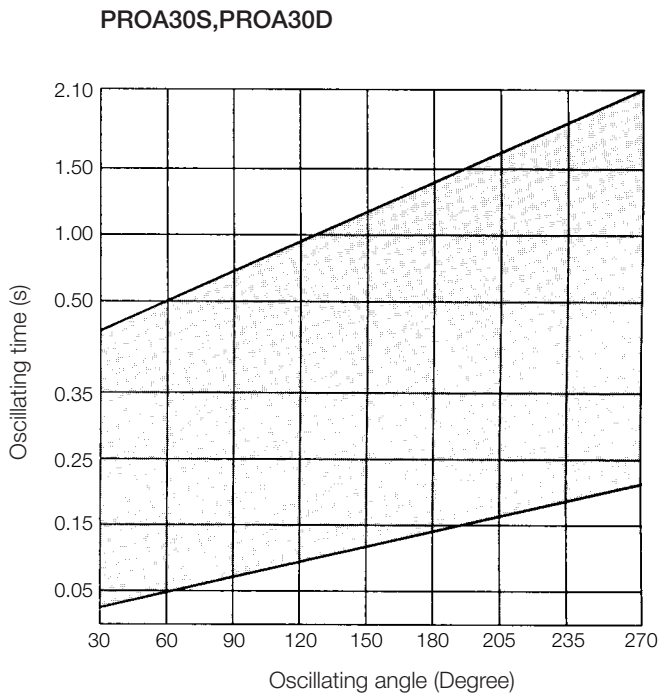
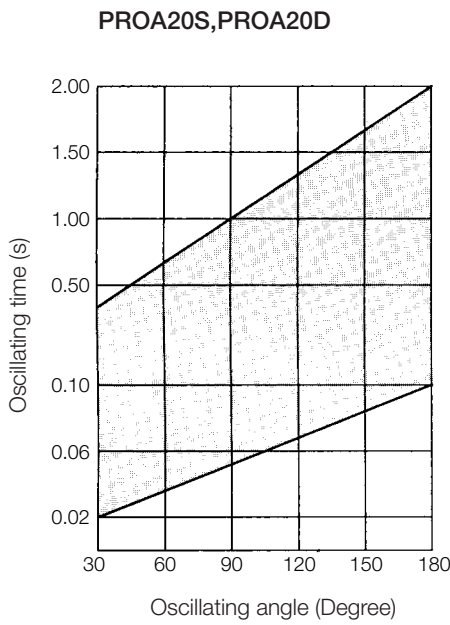
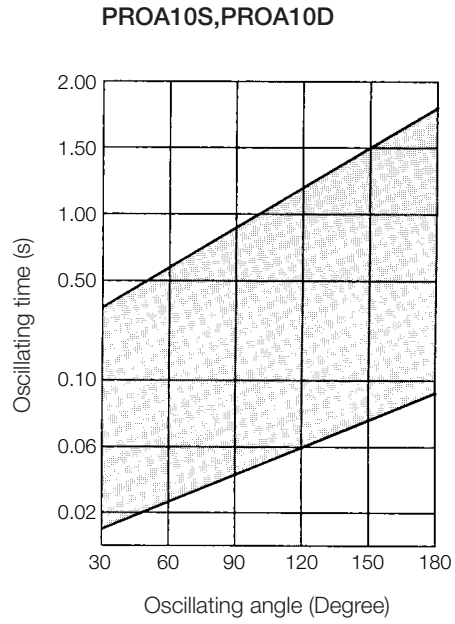
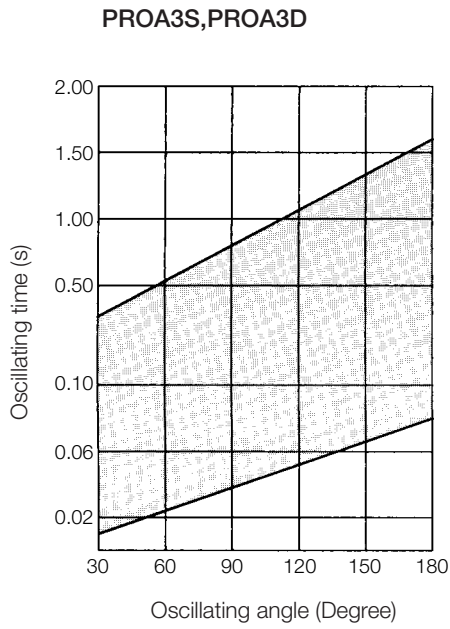
CT TYPE PROXIMITY SWITCHES

Type of switch	Mounting	Load voltage (V)	Load current (mA)	Indicating lamp (Lights up at ON)	Applications
CT-3 CT-3U CTP-3	Switch position adjustable	DC5~30	5~200	○	Relay PLC IC circuit

(Note) CTP-3 is made-to-order

Miniature HI-ROTOR/PRO series

OSCILLATING TIME RANGE

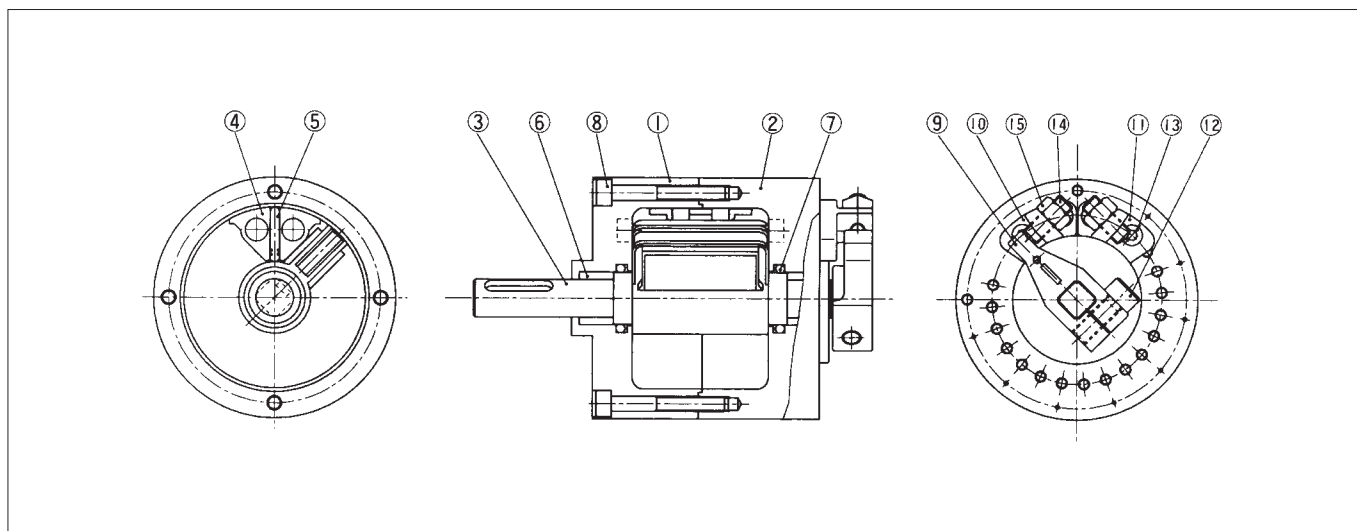


(Note) Operate HI-ROTORs within the range of duration shown in the above charts. Otherwise, the HI-ROTORs will tend to move in stick-slip motion.

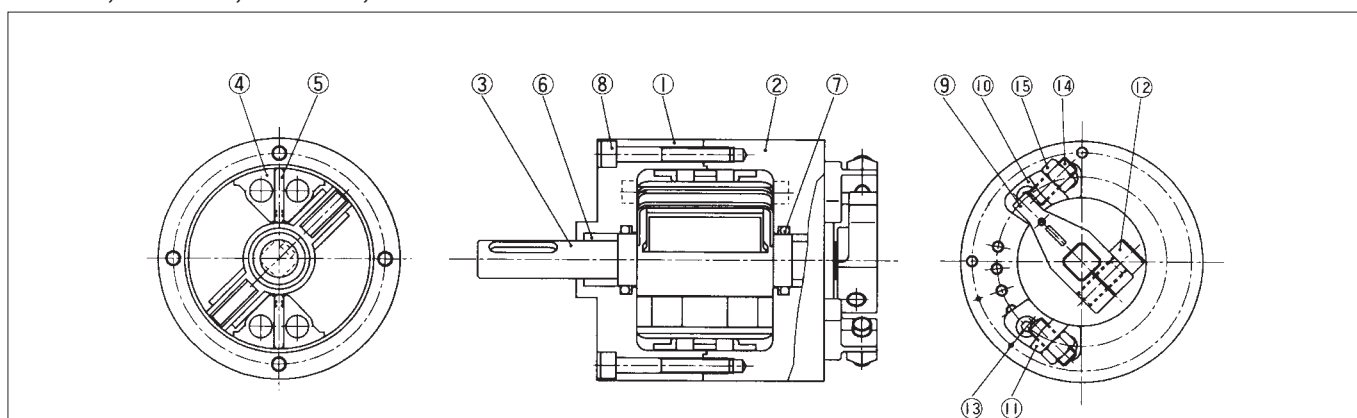
Miniature HI-ROTOR/PRO series

STRUCTURE

PROA3S, PROA10S, PROA20S, PRO30S



PROA3D, PROA10D, PROA20D, PRO30D



(Note) The above figure is the structural drawing of PRO30D.

The body of PROA3D, 10D and 20D has the same structure as standard HI-ROTOR PRNA3D, 10D and 20D. (See Page 16)

MAIN COMPONENTS

No.	Description	Material	
		PROA3, PROA10, PROA20	PRO30
①	Body A	Aluminium alloy	
②	Body B	Aluminium alloy	
③	Vane shaft	Steel+Resin+Hydrogenated nitrile rubber	Steel+Resin+Nitrile rubber
④	Shoe	Resin	
⑤	Shoe seal	Hydrogenated nitrile rubber	Nitrile rubber
⑥	Bushing	—	
⑦	O-ring	Hydrogenated nitrile rubber	Nitrile rubber
⑧	Set screw	Steel	
⑨	Claw	Steel	
⑩	Stopper L	Steel	
⑪	Stopper R	Steel	
⑫	Claw set screw	Steel	
⑬	Stopper set screw	Steel	
⑭	Fine-adjust screw	Steel	
⑮	Locknut	Steel	

COMPONENTS OF STOPPER UNIT

A stopper unit consists of ⑨, ⑩, ⑪, ⑫, ⑬, ⑭ and ⑮ shown in the above list.

MODEL Nos. OF PACKING KIT

Same as those for standard type HI-ROTOR (PRN series), See page 15 to 16.

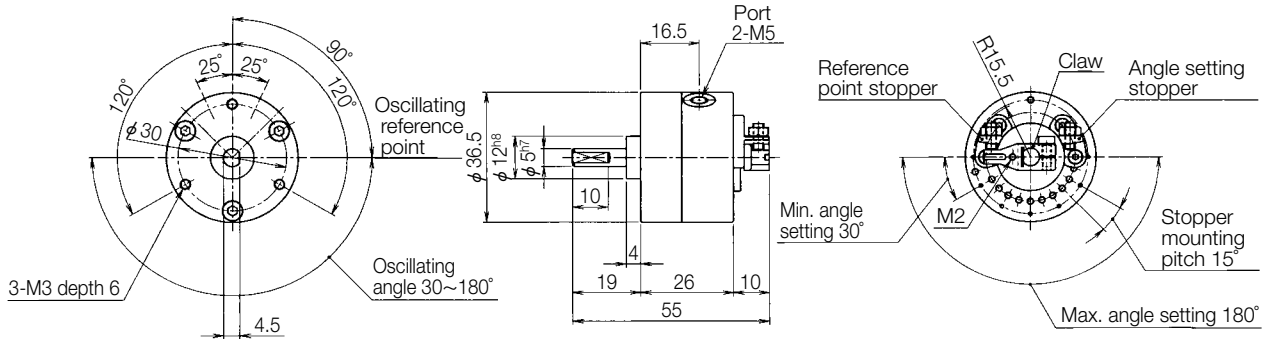
Miniature HI-ROTOR/PRO series

DIMENSIONS

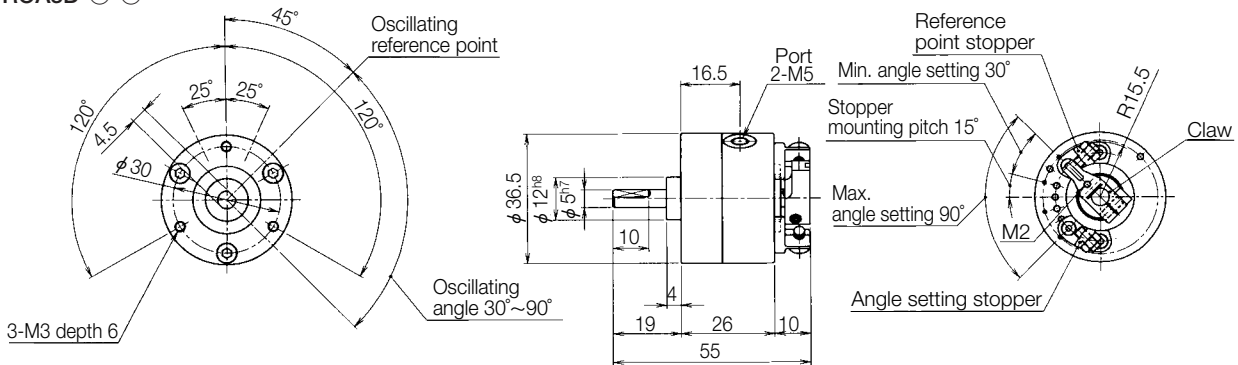
(Unit : mm)

Basic type

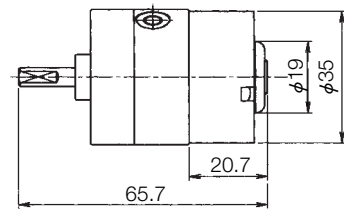
PROA3S-○-○



PROA3D-○-○

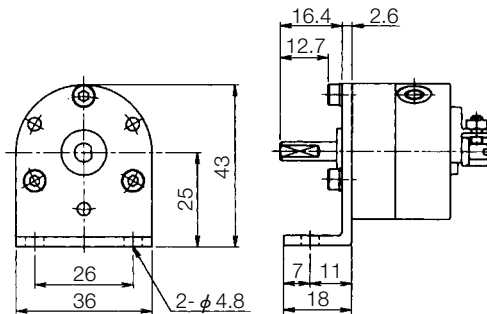


With protection cover



With foot plate

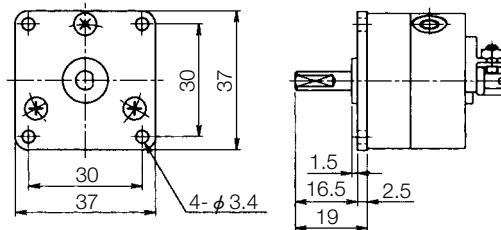
PROA3S/D-○-○-L1



(Note) A foot plate can be fitted with it turned in steps of 60° from the original posture.

With flange plate

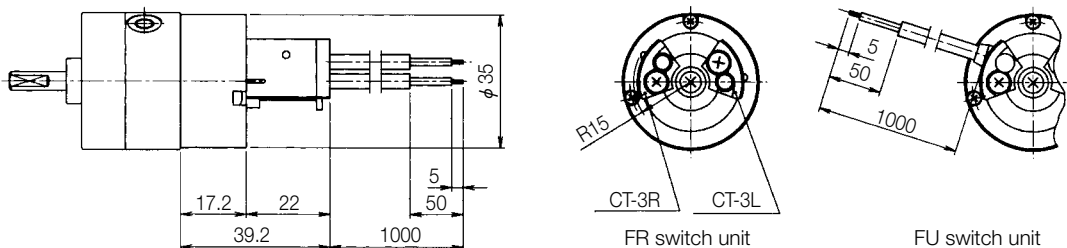
PROA3S/D-○-○-P



(Note) A flange plate can be fitted with it turned in steps of 120° from the original posture.

With switch unit (Switch position adjustable type)

PROA3S/D-○-○-○-FR(FU)



(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

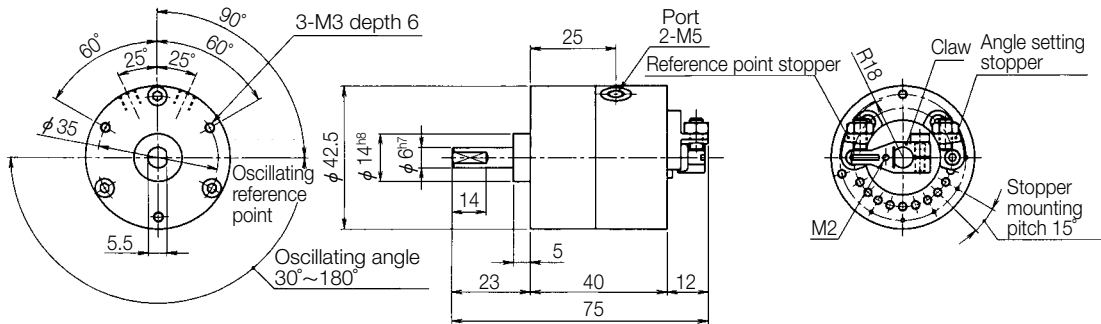
Miniature HI-ROTOR/PRO series

DIMENSIONS

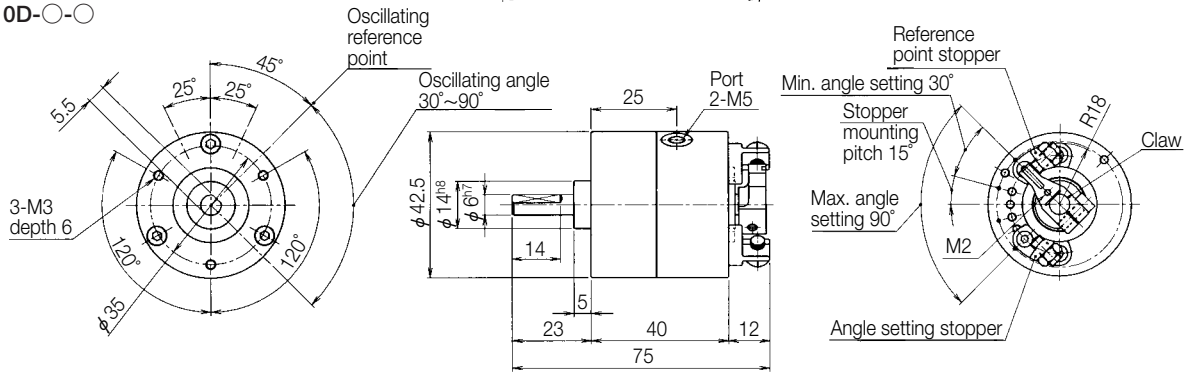
(Unit : mm)

Basic type

PROA10S-○-○

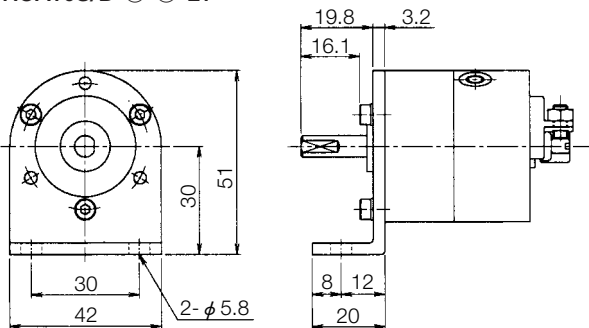


PROA10D-○-○



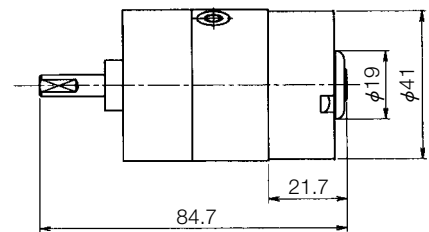
With foot plate

PROA10S/D-○-○-L1



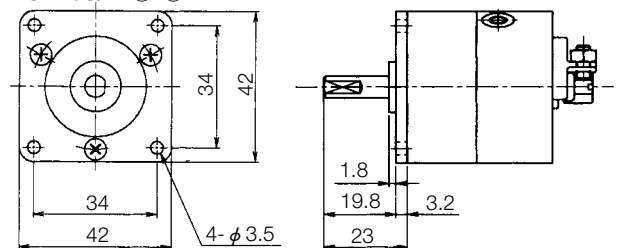
(Note) A foot plate can be fitted with it turned in steps of 60° from the original posture.

With protection cover



With flange plate

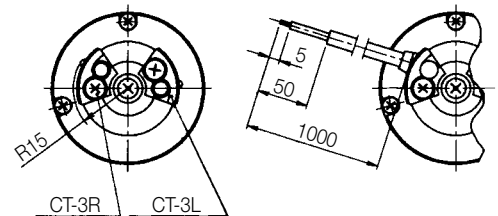
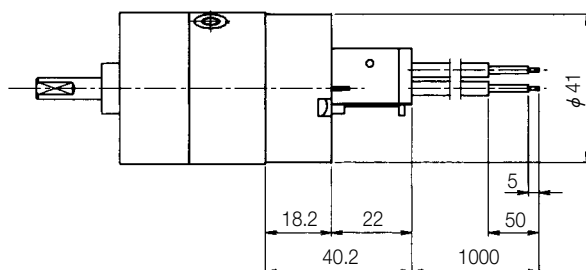
PROA10S/D-○-○-P



(Note) A flange plate can be fitted with it turned in steps of 120° from the original posture.

With switch unit (Switch position adjustable type)

PROA10S/D-○-○-○-FR(FU)



FR switch unit

FU switch unit

(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

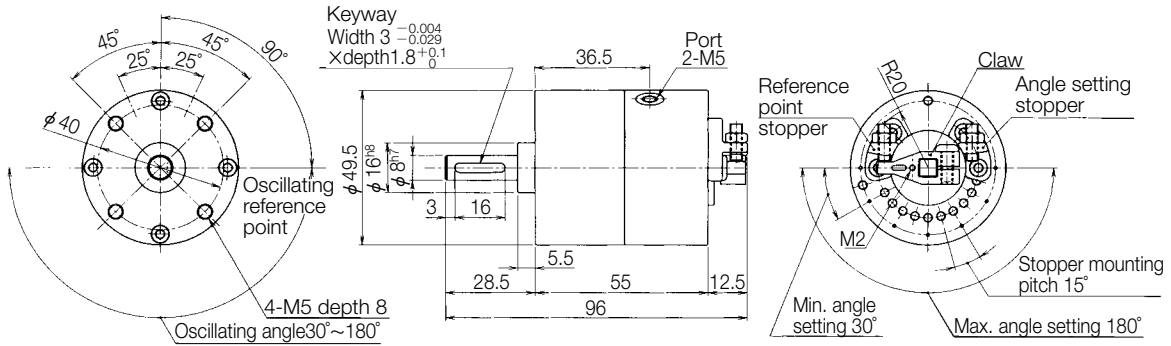
Miniature HI-ROTOR/PRO series

DIMENSIONS

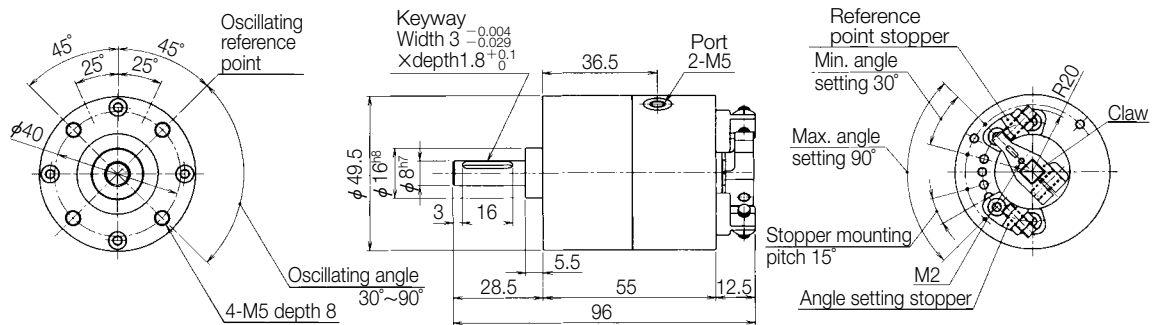
(Unit : mm)

Basic type

PROA20S-○-○

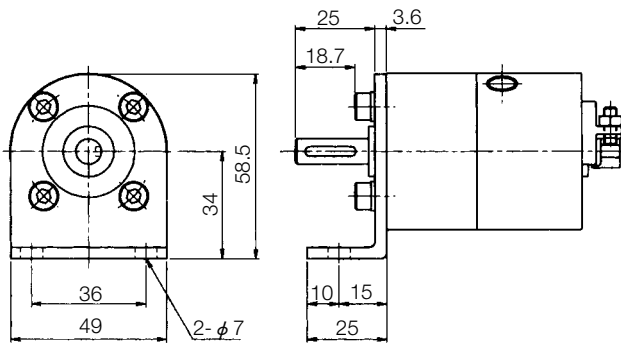


PROA20D-○-○



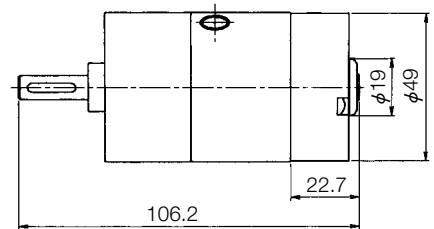
With foot plate

PROA20S/D-○-○-L1



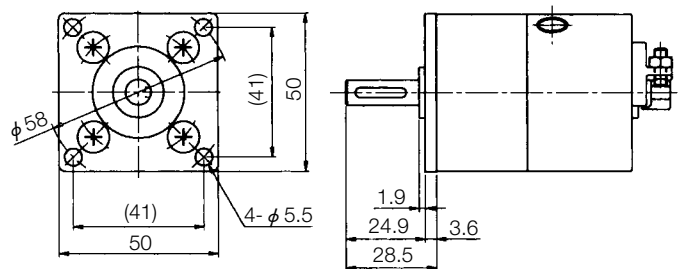
(Note) A foot plate can be fitted with it turned in steps of 90° from the original posture.

With protection cover



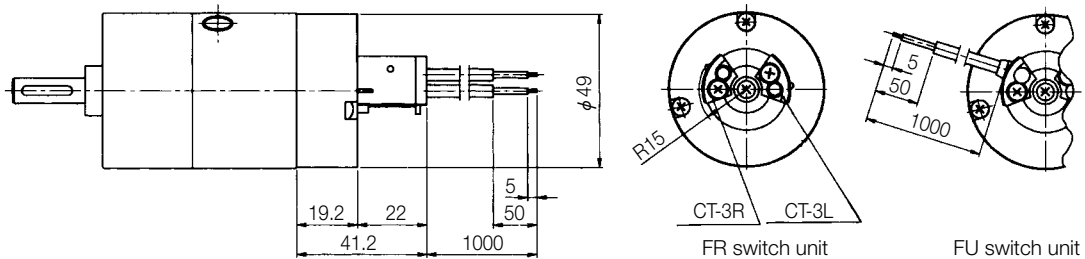
With flange plate

PROA20S/D-○-○-P



With switch unit (Switch position adjustable type)

PROA20S/D-○-○-○-FR(FU)



(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

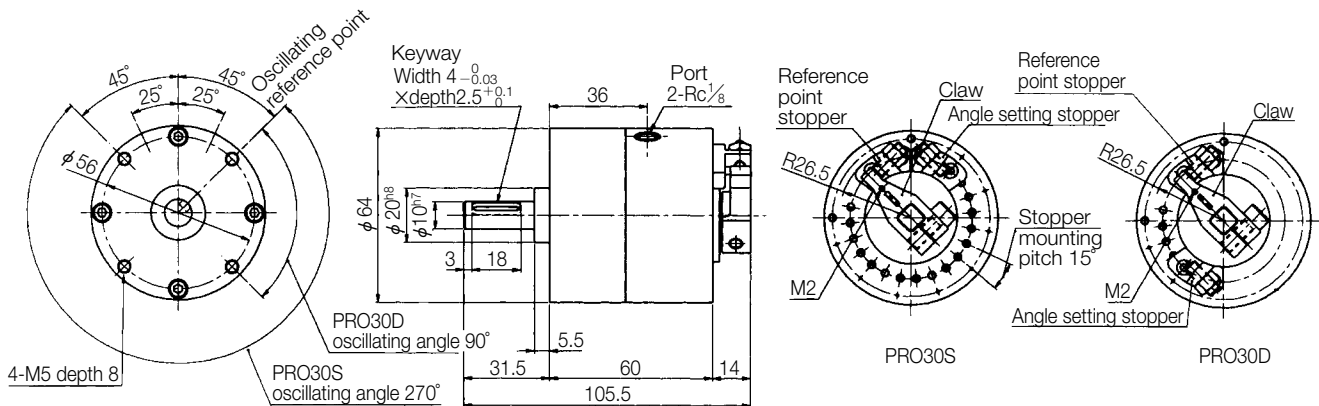
Miniature HI-ROTOR/PRO series

DIMENSIONS

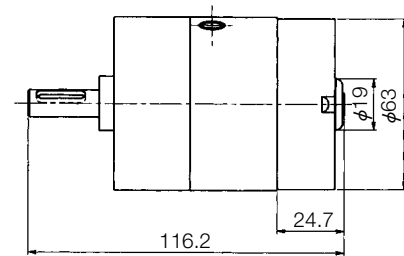
(Unit : mm)

Basic type

PRO30S/D-○-○

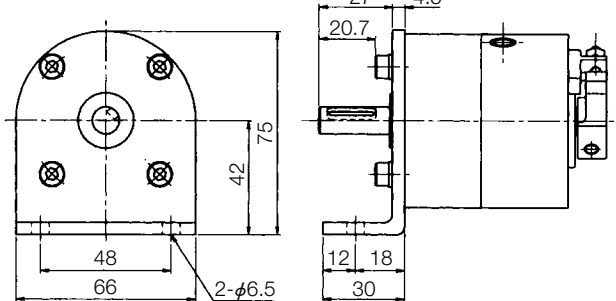


With protection cover



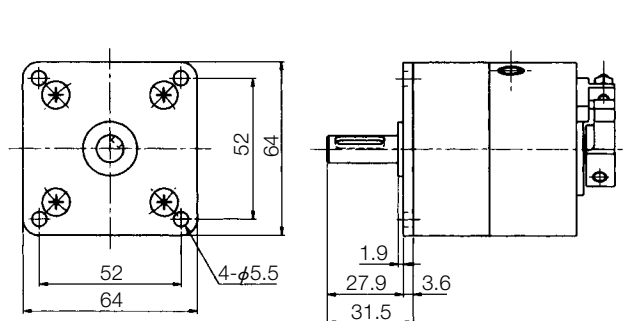
With foot plate

PRO30S/D-○-○-L1



With flange plate

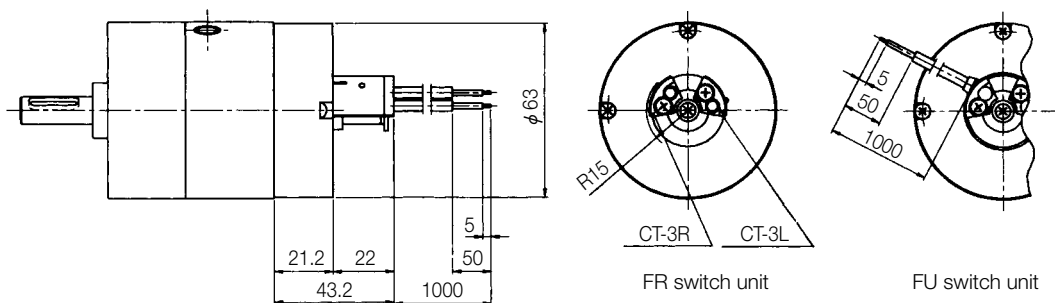
PRO30S/D-○-○-P



(Note) A foot plate can be fitted with it turned in steps of 90° from the original posture.

With switch unit (Switch position adjustable type)

PRO30S/D-○-○-○-FR(FU)



(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

Miniature HI-ROTOR/PRO series



INDIVIDUAL INSTRUCTIONS

Be sure to read them before use.

Also refer to Par. "For Safety Use" and common instructions.

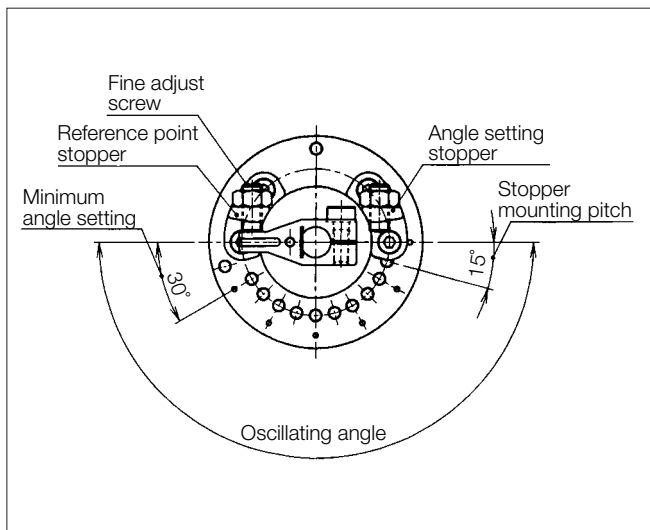
SETTING ANGLE

! WARNING

- Be sure to attach the reference point stopper and angle setting stopper before starting the HI-ROTOR.
- When setting the stoppers at the oscillation reference point and at the maximum oscillating angle, be careful not to set them outside the adjustable range. Otherwise, the vane will run against the internal stopper and damage it. Be sure to adjust the angle so that the claw will stop when it touches the external stopper.
- The reference point stopper is fixed and immovable.
- The oscillation angle is determined by the claw when it hits the fine adjust screw of each stopper. The accuracy of the stop angle dose not take into consideration wear from operation. When the oscillation angle has changed to wear, readjust it with the fine adjust screw.

STRUCTURE OF VARIABLE OSCILLATING ANGLE MECHANISM

Attach external stoppers to the tapped hole provid on the HI-ROTOR body. Two types of stoppers are provided: a reference point stopper and an angle setting stopper. The reference point stopper has been attached to the fixed position (oscillating reference point). On the other hand, the angle setting stopper is attached to a position where the desired angle can be set. The HI-ROTOR stops when the claw fitted to the shaft run against the stopper. Fine adjustment of the angle can be accomplished with the adjust screw on the stopper.



SETTING THE OSCILLATING ANGLE

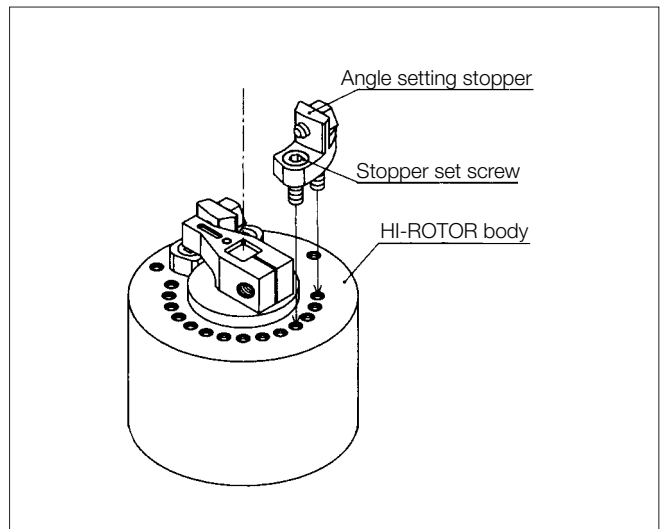
! CAUTION

• HI-ROTORs of which the angle setting is not specified (Standard)

For these HI-ROTORs, only the reference point stopper has been fixed and the angle setting stopper is shipped with the HI-ROTOR when delivered. Therefore, you are required to attach the angle setting stopper to the position for the desired angle setting. The angle setting stopper can be attached at intervals of 15°. For setting procedures, refer to "How to set the oscillating angle" (Page 20).

• HI-ROTORs of which the angle setting is specified (Made-to-order)

These HI-ROTORs are delivered with the reference point stopper and angle setting stopper fixed at the specified angle. However, you are required to adjust the fine adjust screws provided on each stopper to set the exact angle.





INDIVIDUAL INSTRUCTIONS

Be sure to read them before use.

Also refer to Par. "For Safety Use" and common instructions.

HOW TO SET THE OSCILLATING ANGLE

! CAUTION

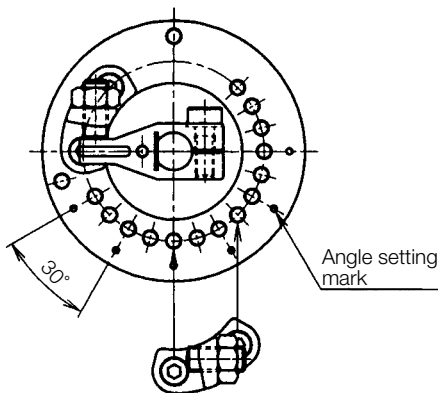
• When the angle setting equals the stopper mounting pitch (15°)

- 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, at an interval of 30°, near the tapped hole.

Angle setting

Model No.	Angle setting (at 15° intervals)
PROA3S/D	30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°, 165°, 180°
PROA10S/D	
PROA20S/D	
PRO30S/D	30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°, 165°, 180°, 195°, 210°, 225°, 240°, 255°, 270°

In case of 90°



- Then, rotate the fine adjust screws on the reference point stopper and angle setting stoppers until the correct angle is obtained. After completing the angle setting, tighten the locknut without fail.

Angle fine adjust range

Reference point stopper fine adjust range	*±3°
Angle setting stopper fine adjust range	-9°~+6°
Angle setting stopper fine adjust range for maximum angle setting	** -9°~+3°

(Note) *PROA3D : -1° to +3°

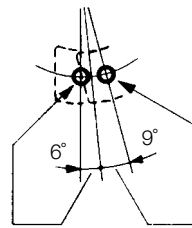
**PROA3D : -9° to +1°

HOW TO SET THE OSCILLATING ANGLE

! CAUTION

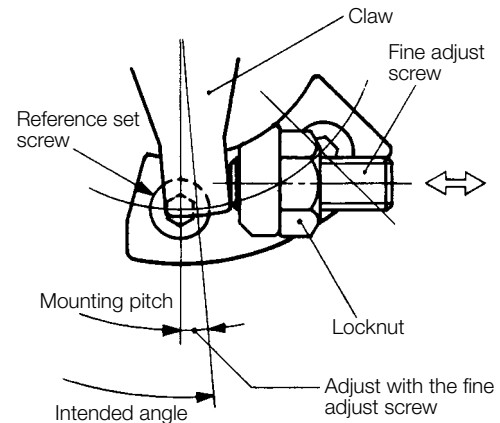
• When the angle setting lies between two 15° stops:

- When the desired angle lies between two 15° stops, fix the stopper into the tapped hole with the arrow as shown in the Fig. below and fix it.



When the desired angle lies in the 6° portion on this side (viewing from the reference point) between the stops, insert the stopper so its reference side comes into contact with the set screw on this side. When the intended angle lies in the remaining 9° portion between stops, attach the stopper so that its reference side comes into contact with the set screw on the other side (viewing from the reference point).

- Then, rotate the fine adjust screw fitted to the stopper to obtain the correct angle. After completing the angle setting, tighten the locknut without fail.



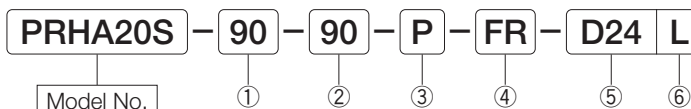
Miniature HI-PAL HI-ROTOR/With solenoid valve

PRHseries

10S, 20S, 30S, 10D, 20D, 30D



ORDERING INSTRUCTIONS



Single vane	Double vane
PRHA10S	PRHA10D
PRHA20S	PRHA20D
PRH30S	PRH30D

① Oscillating angle

90	90°
180	180°
270	270°

② Oscillating reference point

90	90°
45	45°

③ Mounting hardware

No mark	No mounting hardware
P	With flange plate
L1	With one foot plate
L2	With two foot plates

④ Type of switch units

No mark	No switch	
FR	With CT-3 switch	Switch position adjustable
FU	With CT-3U switch	
FP	With CTP-3 switch	Switch position fixed
SR	With SR switch	
SU	With SU switch	

(Note) • Two switches are provided.

• SR and SU are not available for PRHA10S-270-40.

• FP is made-to-order

⑤ Solenoid valve voltage

D24	DC24V
100	AC100/110V
200	AC200/220V

⑥ Solenoid valve wiring specifications

L	Lead wire
SP	Plug-in connector with indicator light & surge suppressor
UP	Plug-in connector with indicator light & surge suppressor

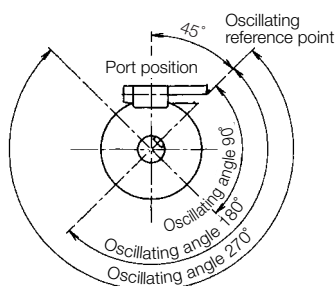
(Note) • Switch units cannot be mounted on HI-ROTORs with two foot plates (L2).

• Mounting hardware comes being not fabricated.

OSCILLATING REFERENCE POINT AND OSCILLATING ANGLE

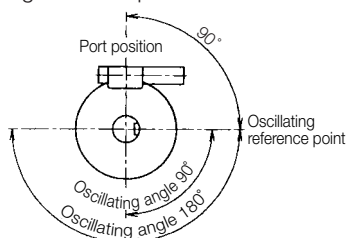
PRHA10S, 20S, PRH30S
PRHA10D, 20D, PRH30D

Oscillating reference point at 45°



PRHA10S, 20S

Oscillating reference point at 90°



Oscillating angle and oscillating reference point

Model No.	Oscillating angle			Oscillating reference point	
	90°	180°	270°	45°	90°
PRHA10S	○	○	○	○	—
	△	△	—	—	△
PRHA20S	○	○	○	○	—
	△	△	—	—	△
PRH30S	○	○	○	○	—
PRHA10D	○	—	—	○	—
PRHA20D	○	—	—	○	—
PRH30D	○	—	—	○	—

○: Standard △: Custom-made

Model Nos. of mounting hardware

Applicable HI-ROTOR	Flange plate	Foot plate
PRHA10S/D	PRN10-P	PRN10-L
PRHA20S/D	PRN20-P	PRN20-L
PRH30S/D	PRN30-P	PRN30-L

(Note) These hardware are provided with set screws.

Model Nos. of packing kit

Same as those for standard type HI-ROTOR (PRN series). See Page 15.

Miniature HI-PAL HI-ROTOR/PRH series

SPECIFICATIONS

Model No.	Unit	PRHA10S			PRHA20S			PRH30S			PRHA10D	PRHA20D	PRH30D
Vane		Single vane									Double vane		
Fluid		Non-lubricated air (Lubricated air)											
Oscillating angle	Degree	90 ⁺⁴	180 ⁺⁶	270 ⁺⁶	90 ⁺⁴	180 ⁺⁶	270 ⁺⁶	90 ⁺³	180 ⁺³	270 ⁺³	90 ⁺⁴	90 ⁺³	
Oscillating reference point	Degree	45, 90		45	45, 90		45	45			45		
Port size		M5			Rc1/8						M5	Rc1/8	
Operation pressure range	MPa	0.2~0.7			0.2~0.8						0.2~0.7	0.2~0.8	
Temperature range	°C	-5~50											
Solenoid valve mounted		PCS245 (DC24, AC100/110V, AC200/220V)											
Mass	kg	0.23	0.22	0.37			0.58	0.57	0.23	0.38	0.59		

(Note) Other specifications are the same as Standard type PRN series. See Page 14.

OUTPUT (Effective torque)

(Unit : cm)

Model No.		Supply pressure (MPa)						
		0.2	0.3	0.4	0.5	0.6	0.7	0.8
Single vane	PRHA10S	35	56	75	98	120	139	—
	PRHA20S	59	95	133	170	210	249	287
	PRH30S	110	180	250	319	410	480	580
Double vane	PRHA10D	76	117	162	211	254	303	—
	PRHA20D	140	222	306	388	470	553	633
	PRH30D	270	440	600	770	950	1120	1299

OSCILLATING TIME RANGE

(Unit : s)

Model No.	Supply pressure (MPa)		
	90°	180°	270°
PRHA10S, 10D	0.045~0.9	0.09~1.8	0.135~2.7
PRHA20S, 10D	0.05~1.0	0.1~2.0	0.15~3.0
PRH30S, 30D	0.07~0.7	0.14~1.4	0.21~2.1

(Note) Operate the HI-ROTOR within the oscillating time range prescribed in the above table. Otherwise, the HI-ROTOR will be perform in stick-slip motions.

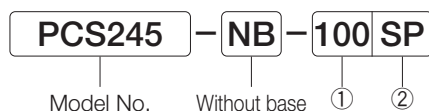
SPEED CONTROL

Although HI-PAL HI-ROTORs are not provided with a speed control mechanism, the speed can be easily controlled with the metering valve or speed controller. For the metering valve and speed controller, please instruct.

HI-PAL HI-ROTOR	PRHA10, 20, PRH30
Metering valve	MV-M5
Speed controller	SPF-H-M5, SPER-H-M5, SPSR-H-M5
Speed controller with push-in fitting	MB4R-M5-O, M4R-M5-O MB6R-M5-O, M6R-M5-O

SOLENOID VALVE

Ordering instructions for solenoid valves



① Solenoid valve voltage ② Solenoid valve wiring specifications

D24	DC24V	L	Lead wire
100	AC100/110V	SP	Plug-in connector with indicator light & surge suppressor
200	AC200/220V	UP	Plug-in connector with indicator light & surge suppressor

The standard solenoid valve is a 2-position solenoid valve with single solenoid. For specific solenoid valves, consult KURODA.

Type of solenoid valve	Model
2-position solenoid valve with a double solenoid	PCD245
3-position solenoid valve with a double solenoid(Closed center)	PCD345
3-position solenoid valve with a double solenoid(Exhaust center)	PCE345
3-position solenoid valve with a double solenoid(Pressure center)	PCO345

HI-ROTOR with switch/

For details, see pages 52 to 54.

CT AND SR TYPE PROXIMITY SWITCHES

Type of switch	Mounting	Load voltage (V)	Load current (mA)	Indicating lamp (Lights up at ON)	Applications
CT-3 CT-3U CTP-3	Switch position adjustable	DC5~30	5~200	○	Relay PLC IC circuit
SR SU	Switch position fixed				

(Note) CTP-3 is made-to-order

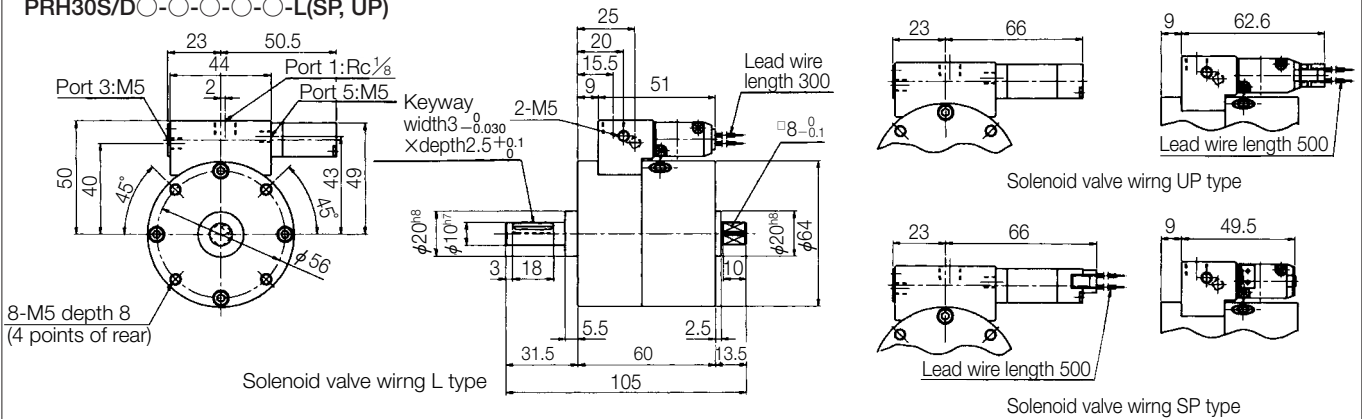
Miniature HI-PAL HI-ROTOR/PRH series

DIMENSIONS

(Unit : mm)

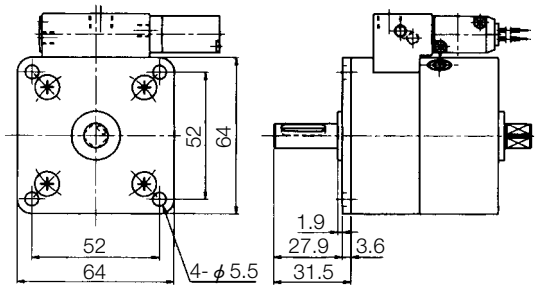
Basic type

PRH30S/D-○-○-○-○-○-○-L(SP, UP)



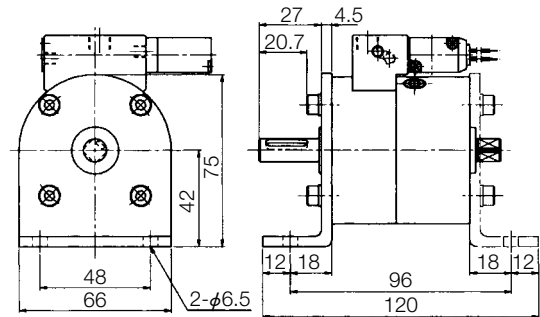
With foot plate

PRH30S/D-○-○-○-○-○-○-P



With flange plate

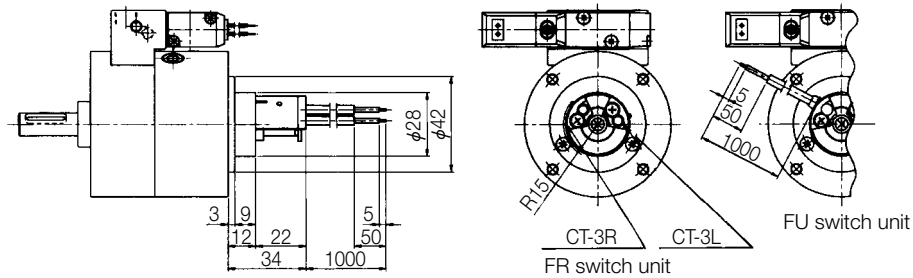
PRH30S/D-○-○-○-○-○-○-L1(L2)



With switch unit

(Switch position adjustable type)

PRH30S/D-○-○-○-○-○-○-FR(FU)



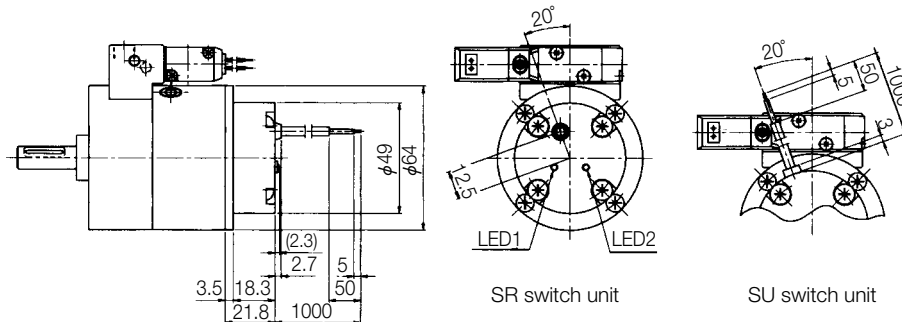
(Note) •A foot plate can be fitted with it turned in steps of 90° from the original posture.

•Short shaft side : Example with L2 (2 pcs.)

With switch unit

(Switch position fixed type)

PRH30S/D-○-○-○-○-○-○-SR(SU)



(Note) LED1 comes on at the oscillating reference point and LED2 at the end of oscillation.

(Note) For switch unit-mounting hardware combinations, refer to the required dimensions in each Fig.

HI-ROTOR with special shape of shaft (Made-to-order)

Miniature HI-ROTOR/ PRNA1, PRNA3, PRNA10, PRNA20, PRN30

For detailed specifications, size and time of delivery, contact KURODA.
For other models than listed below, consult with KURODA.

<p>Symbol : X1 Long shaft side : Female screw</p>	<p>Symbol : X2 Short shaft side : Female screw</p>	<p>Symbol : X3 Both sides : Female screw</p>
<p>Symbol : X4 Long shaft side : Male screw</p>	<p>Symbol : X5 Short shaft side : Male screw</p>	<p>Symbol : X6 Both sides : Male screw</p>
<p>Symbol : X7 Long shaft side : Round bar</p>	<p>Symbol : X8 Short shaft side : Round bar</p>	<p>Symbol : X9 Both sides : Round bar</p>
<p>Symbol : X10 Long shaft side : Cut</p>	<p>Symbol : X11 Short shaft side : Cut</p>	<p>Symbol : X14 Both sides : Round bar</p>
<p>Symbol : Y1 Hollow shaft (Through-hole alone)</p>	<p>Symbol : Y2 Hollow shaft (Through-hole, Short shaft side : Female screw)</p>	

Model No.	M(Female screw)	L
PRNA3	M3	6
PRNA10	M3	6
PRNA20	M3	6
PRN30	M4	8

(Note) • Thread pitch : Metric coarse thread
• PRNA20 and PRN30 are provided with keyway according to circumstances.

Model No.	M(Male screw)	L ₁	L ₂
PRNA3	M4	8	6
PRNA10	M4	8	6
PRNA20	M5	10	6
PRN30	M8	20	8

(Note) Thread pitch : Metric coarse thread

Model No.	ϕd	L ₁	L ₂
PRNA1	3	10	7
PRNA3	4	10	7
PRNA10	5	14	7
PRNA20	4	20	7
PRN30	5	22	10

Model No.	ϕd	L ₁	L ₂
PRNA1	4	16	14
PRNA3	5	19	17
PRNA10	6	23	20
PRNA20	8	28.5	27
PRN30S	10	31.5	28.5
PRN30D	10	31.5	22

Model No.	ϕD	ϕd	M(Female screw)
PRNA1	4	1.5	—
PRNA3	5	2	M3
PRNA10	6	2	M3
PRNA20	8	2.5	M3
PRN30	10	3	M5

(Note) • Thread pitch : Metric coarse thread
• PRNA20 and PRN30 are provided with keyway according to circumstances.