



Operation Manual

PRODUCT NAME

Pin Cylinder

型式 / シリーズ / 品番

C * JP2 * * - *

SMC Corporation

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Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots
etc.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



Warning

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



Safety Instructions

Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not covered.

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

1. Product specifications

1-1. Specifications

Bore size (mm)	4	6	10	16
Action	Double acting, Single rod			
Max. operating pressure	0.7MPa			
Min. operating pressure	0.15MPa	0.12MPa	0.06MPa	
Proof pressure	1.05MPa			
Ambient and fluid temperature	Without auto switch: -10~70°C With auto switch: -10~60°C (No freezing)			
Lubrication	Not required (Non-lube)			
Stroke length tolerance	${}^{+1.0}_0$ mm			
Rod end configuration	With thread / Without thread			
Piston speed	50~500mm/s			
Cushion	Rubber bumper			
Mounting	Basic style, Flange style, Foot style, Clevis style, Trunnion style			

* Only the basic style is available when mounting the 4mm tube.

2. Precautions

2-1. Caution on Design

Warning

- ① **There is a possibility of dangerous sudden action by air cylinders if sliding parts of machinery are twisted due to external forces, etc.**

In such cases, human injury may occur; e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be adjusted to operate smoothly and designed to avoid such dangers.

- ② **A protective cover is recommended to minimize the risk of personal injury.**

If a stationary object and moving parts of a cylinder are in close proximity, personal injury may occur. Design the structure to avoid contact with the human body.

- ③ **Securely tighten all stationary parts and connected parts so that they will not become loose.**

Especially when a cylinder operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

- ④ **A deceleration circuit or shock absorber may be required.**

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the impact.

In this case, the rigidity of the machinery should also be examined.

- ⑤ **Consider a possible drop in circuit pressure due to a power outage, etc.**

When a cylinder is used in a clamping mechanism, there is a danger of workpieces dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage, etc. Therefore, safety equipment should be installed to prevent damage to machinery and human injury. Suspension mechanisms and lifting devices also require consideration for drop prevention.

- ⑥ **Consider a possible loss of power source.**

Measures should be taken to protect against bodily injury and equipment damage in the event that there is a loss of power to equipment controlled by pneumatics, electricity, or hydraulics.

- ⑦ **Design circuitry to prevent sudden lurching of driven objects.**

When a cylinder is driven by an exhaust centre type directional control valve or when starting up after residual pressure is exhausted from the circuit, etc., the piston and its driven object will lurch at high speed if pressure is applied to one side of the cylinder because of the absence of air pressure inside the cylinder. Therefore, equipment should be selected and circuits designed to prevent sudden lurching, because there is a danger of human injury and/or damage to equipment when this occurs.

- ⑧ **Consider emergency stops.**

Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, a power outage or a manual emergency stop.

- ⑨ **Consider the action when operation is restarted after an emergency stop or abnormal stop.**

Design the machinery so that human injury or equipment damage will not occur upon restart of operation. When the cylinder has to be reset at the starting position, install manual safety equipment.

Caution

① Do not wipe off the grease attached on the sliding face of the cylinder.

If the grease is removed from the sliding part of the cylinder forcibly, a malfunction could occur. When the cylinder has been in operation for a long distance, the sliding parts become discolored black. In such cases, to prolong cylinder life, wipe off the grease from the sliding parts, and add new grease. (When the grease is wiped off, use water. If it is wiped off with alcohol or special solvent, the seal could be damaged.)

② Avoid giving external force over maximum output to the cylinder.

A pieces of cylinder broken by the force may damage the human and the device.

③ Don't use plural cylinders synchronously without guide.

It is difficult to control speed of the cylinder using air, which is compressive fluid, because speed is given an effect by change of supplied pressure, load, temperature, lubrication and each part, and difference of the performance of each cylinder. For a short time, it is possible to adjust speed of plural cylinders by speed controller, but for a long time, above mentioned factors may break synchronism of those cylinders. If synchronism is broken, lateral load caused by difference of position is given to piston rod and may wear seal and bearing, and make galling to cylinder tube and piston. If it is necessary to use plural cylinders synchronously, use the guide with hardness and high accuracy not to make difference to speed of each cylinder which has individual output.

④ Prevent intrusion of obstruction such as cutting chip from supply port into inside of the cylinder.

If the cylinder is put on the floor at field during positioning for installation, cutting chip made by the drill for mounting hole may intrude from supply port of the cylinder and cause failure.

⑤ Cut the length of piping short.

Too long cylinder piping makes volume of mist in the cylinder (the mist is caused by adiabatic expansion) less than one in the piping tube, and prevent the mist from being released to air. Residual mist in the tube becomes pooled by repeating actuation, and may leads to occurrence of water which removes the grease of the cylinder. As the result of it, the condition of lubrication becomes worse and air leakage caused by wear of seal and malfunction by increase of friction resistance occure. In order to solve this issue, following countermeasure is necessary.

(1) Cut piping tube from solenoid valve to cylinder short as much as possible and make mist release to atmosphere properly. Following formula is eferred.

Converted value of content volume of cylinder to atmospheric pressure $\times 0.7 \geq$ Content volume of piping tube

(2) Make exhaust pressure discharge directly to atmosphere by installing speed exhaust controller ASV or quick exhaust valve.

(3) Direct piping port downwardly so that moisture occurring in piping wouldn't return to cylinder.

⑥ Resumption after a long stop.

When resuming operation after a long stop, there are cases in which the starting pressure rises or there is a delay in the piston starting time due to adhesion. Conducting several cycles of running-in operation will solve this problem. Please consider implementing this before resumption.

2-2. Selection

Speed control

When cylinder is adjusted to desired speed, install speed controller such as SMC's AS series near supply port of air. For this adjustment, either of supply air or exhaust air is squeezed, generally exhaust air is done.

Direction control

When actuating direction of cylinder is changed, install adequate solenoid valve selected among SMC's various models.

Warning

① Confirm the specifications.

The products featured in this catalog are designed for use in industrial compressed air systems. If the products are used in conditions where pressure and/or temperature are outside the range of specifications, damage and/or malfunctions may occur. Do not use in these conditions. (Refer to the specifications.)

② About intermediate stop

In the case of 3 position closed center of a valve, it is difficult to make a piston stop at the required position as accurately and precisely as with hydraulic pressure due to compressibility of air.

Furthermore, since valves and cylinders, etc. are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time.

Caution

① Operate within the limits of the maximum usable stroke.

Refer to the catalog for the air cylinder to be used for the maximum usable stroke.

② Operate the piston within a range such that collision damage will not occur at the stroke end.

The operation range should prevent damage from occurring when a piston, having inertial force, stops by striking the cover at the stroke end. Refer to the 4. Model selection.

③ Use a speed controller to adjust the cylinder drive speed, gradually increasing from a low speed to the desired speed setting.

④ Provide intermediate supports for long stroke cylinders.

An intermediate support should be provided in order to prevent damage to a cylinder having a long stroke, due to problems such as sagging of the rod, deflection of the cylinder body, vibration and external load.

2-3. Mounting

Caution

- ① **Be certain to match the rod shaft center with the load and direction of movement when connecting.**

When not properly matched, problems may arise with the rod and body, and damage may be caused due to friction on areas such as the inner body surface, bushings, rod surface, and seals.

- ② **When an external guide is used, connect the rod end and the load in such a way that there is no interference at any point within the stroke.**
- ③ **Do not scratch or gouge the sliding portion of the cylinder body or the piston rod by striking it with an object, or squeezing it.**

The body bore is manufactured under precise tolerances. Thus, even a slight deformation could lead to a malfunction.

Moreover, scratches or gouges, etc. in the piston rod may lead to damaged seals and cause air leakage.

- ④ **Prevent the seizure of rotating parts.**

Prevent the seizure of rotating parts (pins, etc.) by applying grease.

- ⑤ **Do not use until you verify that the equipment can operate properly.**

After mounting, repairs, or modification, etc., connect the air supply and electric power, and then confirm proper mounting by means of appropriate function and leak tests.

- ⑥ **Instruction manual**

Install the products and operate them only after reading the instruction manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

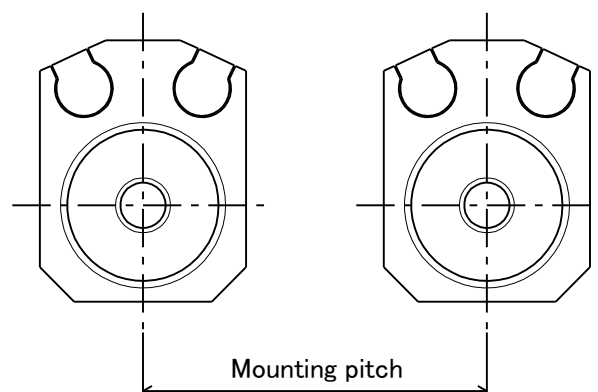
- ⑦ **Set the mounting base suitable to large force given by the cylinder.**

If the mounting base doesn't have enough hardness, the human and the device may be damaged.

- ⑧ **If auto switch cylinders are used in parallel keep the distance between cylinders in accordance with the chart below.**

	(mm)			
	Φ4	Φ6	Φ10	Φ16
D-A9□, D-A9□V	—	20	25	30
D-M9□, D-M9□V D-M9□W, D-M9□WV	25	25	30	35

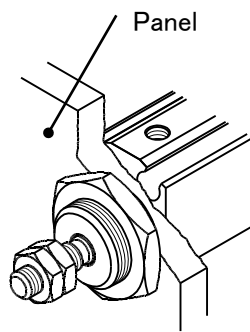
Use caution not to use them, getting closer than the specified pitch.
Otherwise, it may cause auto switch to malfunction.



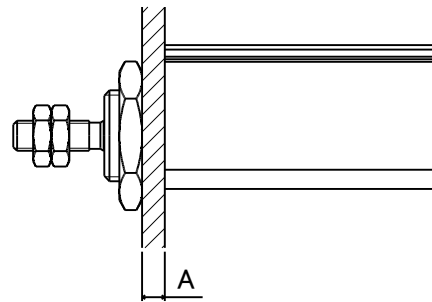
⑨ When the cylinder and bracket are mounted, do not exceed the max. tightening torque stated below.

At the same time, the thickness of the panel used for mounting should be less than the max. A dimension shown in the following table.

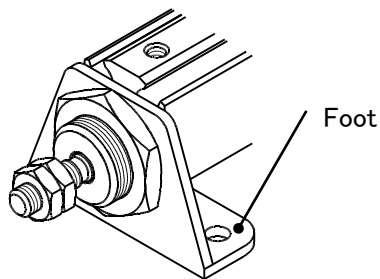
Bore size	Thread size	Max. tightening torque(N·m)	Max. A dimension (mm)
Φ4	M8×1	6.2	3
Φ6	M10×1	12.5	4
Φ10	M12×1	21.0	4
Φ16	M14×1	34.0	5



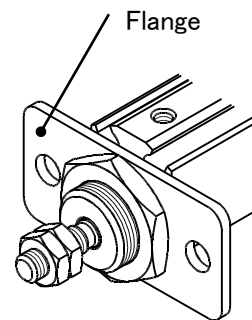
Panel mounting style



Max. panel thickness



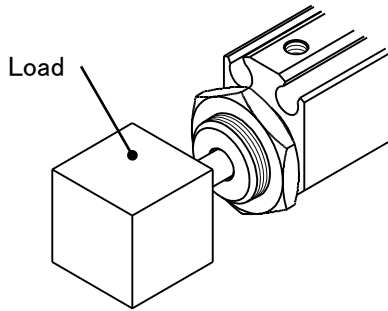
Foot mounting style



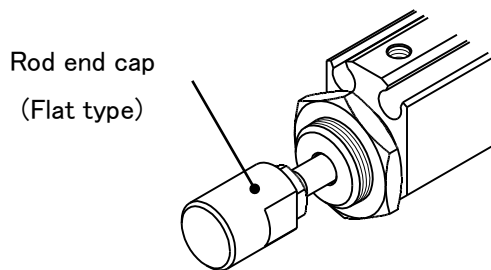
Flange mounting style

⑩ When a load, cap, single knuckle joint or double knuckle joint is mounted on the end of the rod, do not exceed the max. tightening torque in the following table.

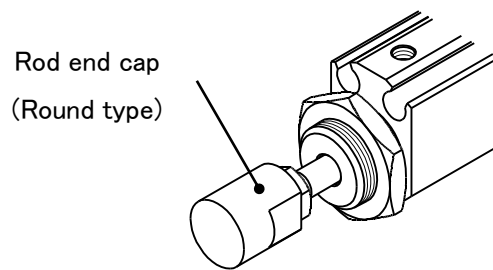
Bore size	Thread size	Max. tightening torque(N·m)
Φ4	M2 × 0.4	0.1
Φ6	M3 × 0.5	0.3
Φ10	M4 × 0.7	0.8
Φ16	M5 × 0.8	1.6



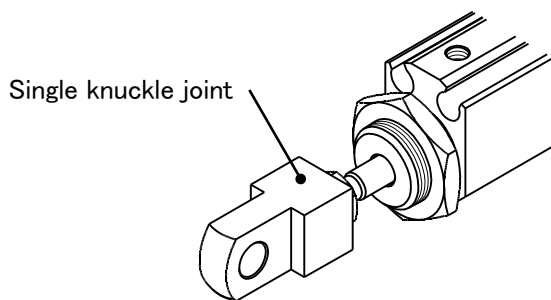
Load mounting style



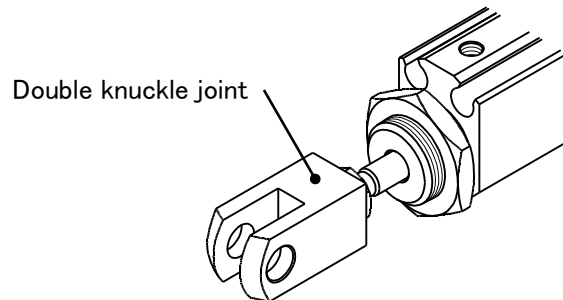
Rod end cap (Flat type) mounting style



Rod end cap (Round type) mounting style



Single knuckle joint mounting style



Double knuckle joint mounting style

2-4. Piping

Caution

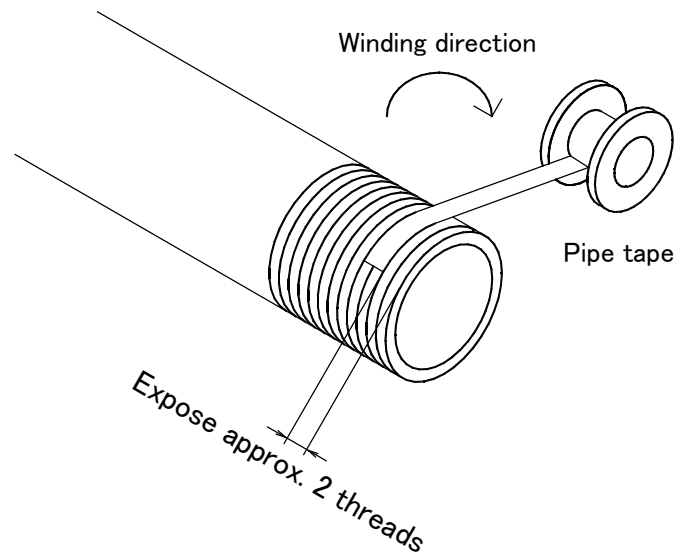
① Before piping

Before piping, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

② Wrapping of pipe tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not get inside the piping.

Also, when the pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



2-5. Lubrication

Caution

① Lubrication of cylinder

The cylinder has been lubricated for life at the factory and can be used without any further lubrication.

However, in the event that it is lubricated additionally, be sure to use Polyalphaolefin oil or equivalent oil.

Stopping lubrication later may lead to malfunctions because the new lubricant will cancel out the original lubricant.

Therefore, lubrication must be continued once it has been started.

2—6. Air Supply

For compressed air supplied to the cylinder, use the air which is filtrated by SMC's filter such as AF series and adjust to specified setting pressure by SMC's regulator such as AR series.

Warning

① Use clean air.

Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or malfunction.

Caution

① When low dew point air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Consider using low dew point products such as 25A-series.

② Install air filters.

Install air filters close to valves at their upstream side. A filtration degree of $5\ \mu\text{m}$ or less should be selected.

③ Install an aftercooler, air dryer, or water separator (Drain Catch).

Air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, aftercooler or water separator, etc.

④ Use the product within the specified range of fluid and ambient temperature.

Take measures to prevent freezing when below 5°C , since moisture in circuits can freeze and cause damage to seals and lead to malfunctions.

For compressed air quality, refer to "Air Preparation Equipment" catalog.

2—7. Operating Environment

Warning

① When low dew point air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment.

Consider using low dew point products such as 25A-series.

② Do not use in atmospheres or locations where corrosion hazards exist.

Refer to the construction drawings regarding cylinder materials.

③ In dusty locations or where water or oil, etc., splash on the equipment, take suitable measures to protect the rod.

④ When using auto switches, do not operate in an environment with strong magnetic fields.

⑤ Avoid much humidity for storage of cylinder.

Store the cylinder with piston rod retracted under the environment with little humidity and countermeasure for rusty.

2-8. Maintenance

Warning

① Perform maintenance procedures as shown in the instruction manual.

If they are handled improperly, malfunction or damage of machinery or equipment may occur.

② Removal of equipment, and supply/exhaust of compressed air

Before any machinery or equipment is removed, first ensure that the appropriate measures are in place to prevent the falling or erratic movement of driven objects and equipment, then cut off the electric power and reduce the pressure in the system to zero. Only then should you proceed with the removal of any machinery and equipment.

When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent cylinders from suddenly moving.

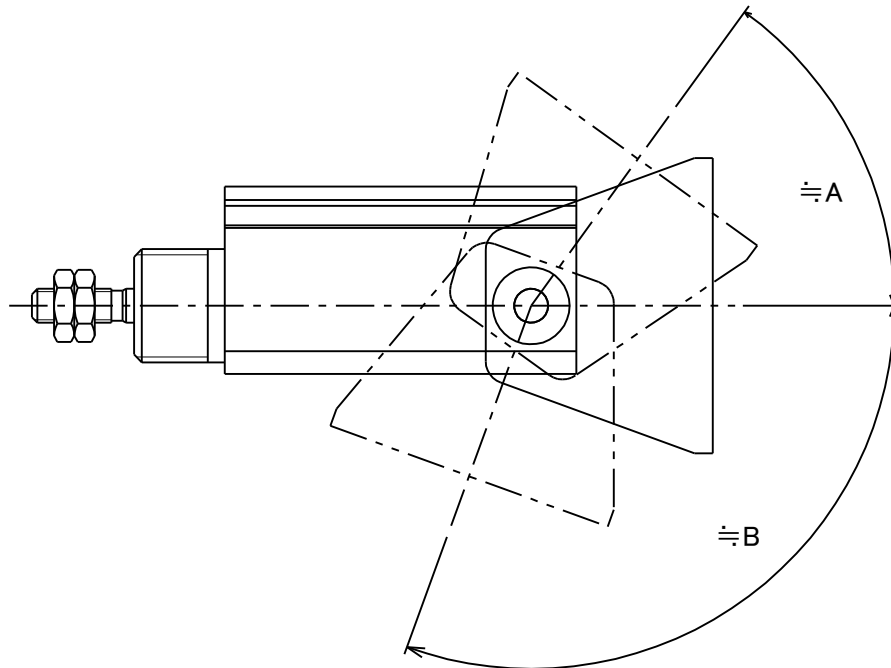
Caution

① Drain flushing

Remove drainage from air filters regularly.

2-9. Rotation angle

Caution



	Φ6	Φ10	Φ16
A	54°	62°	55°
B	110°	110°	102°

2-10. Snap ring installation/removal

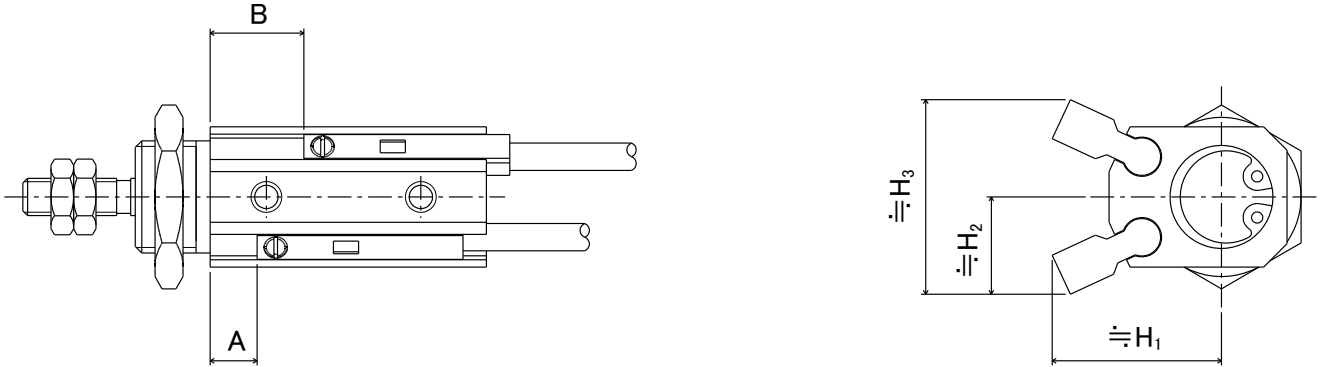
Caution

- ① To replace seals or grease the cylinder during maintenance, use an appropriate pair of pliers (tool for installing a type C snap ring for hole).
After re-installing the cylinder, make sure that the snap ring is placed securely in the groove before supplying air.
- ② To remove and install the snap ring for the knuckle pin or the trunnion pin, use an appropriate pair of pliers (tool for installing a type C snap ring for hole).
In particular, use a pair of ultra-mini pliers, for removing and installing the snap rings on the $\Phi 6$ cylinder.

2-11. Auto switches

The type and specifications of applicable auto switch and the cautions for handling them can be found in the catalogue and operation manual respectively.

① Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height



* When a screw is not mounted on the end of the rod, a nut cannot be mounted.

* A mounting nut is not attached for the clevis and trunnion types.

Part number of auto switch: D-A9□, D-A9□V

Unit: mm

	A (When detecting extended stroke end)	B (When detecting retracted stroke end)								H ₁	H ₂	H ₃
		5st	10st	15st	20st	25st	30st	35st	40st			
Φ4	—	—	—	—	—	—	—	—	—	—	—	—
Φ6	1	6	11	16	21	26	—	—	—	13.0	10.0	20.0
Φ10	1	6	11	16	21	26	31	36	41	16.0	9.5	19.0
Φ16	1	6	11	16	21	26	31	36	41	18.0	12.0	24.0

Part number of auto switch: D-M9□, D-M9□V, D-M9□W, D-M9□WV

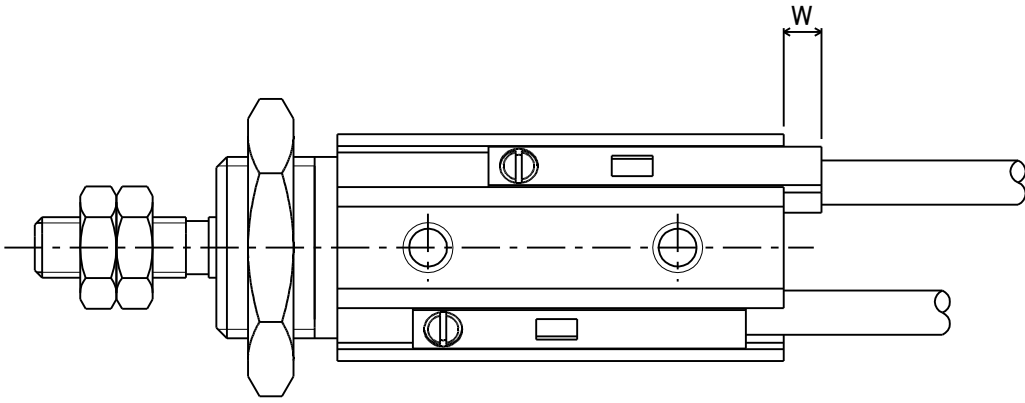
Unit: mm

	A (When detecting extended stroke end)	B (When detecting retracted stroke end)								H ₁	H ₂	H ₃
		5st	10st	15st	20st	25st	30st	35st	40st			
Φ4	4	9	14	19	—	—	—	—	—	14.5	11.5	23.0
Φ6	5	10	15	20	25	30	—	—	—	15.0	11.5	23.0
Φ10	5	10	15	20	25	30	35	40	45	18.0	10.5	21.0
Φ16	5	10	15	20	25	30	35	40	45	20.0	13.0	26.0

* The above numbers are references for the mounting positions of those auto switches that detect a stroke end.

In the actual setting, determine the actual operation of the auto switch and adjust the position.

② The amount of protrusion of the auto switch



Mounting: Basic style, Flange style, Foot style

	D-M9□ D-M9□W	D-M9□V D-M9□WV	D-A90 D-A96 D-A9□V	D-A93
	W			
Φ4	6	4	—	—
Φ6	6	4	2	4.5
Φ10	2.5	0.5	0	1
Φ16	2.5	0.5	0	1

Mounting: Clevis style, Trunnion style

	D-M9□ D-M9□W	D-M9□V D-M9□WV D-A9□ D-A9□V
	W	
Φ4	—	—
Φ6	1	0
Φ10	0	0
Φ16	0	0

* Zero "0" indicates that the switch doesn't protrude.

③ Operating Range

Unit: mm (at 25°C)

	Φ4	Φ6	Φ10	Φ16
D-A9□ D-A9□V	—	5	6	7
D-M9□ D-M9□V	2	2	2	2
D-M9□W D-M9□WV	2.5	2.5	3	3.5

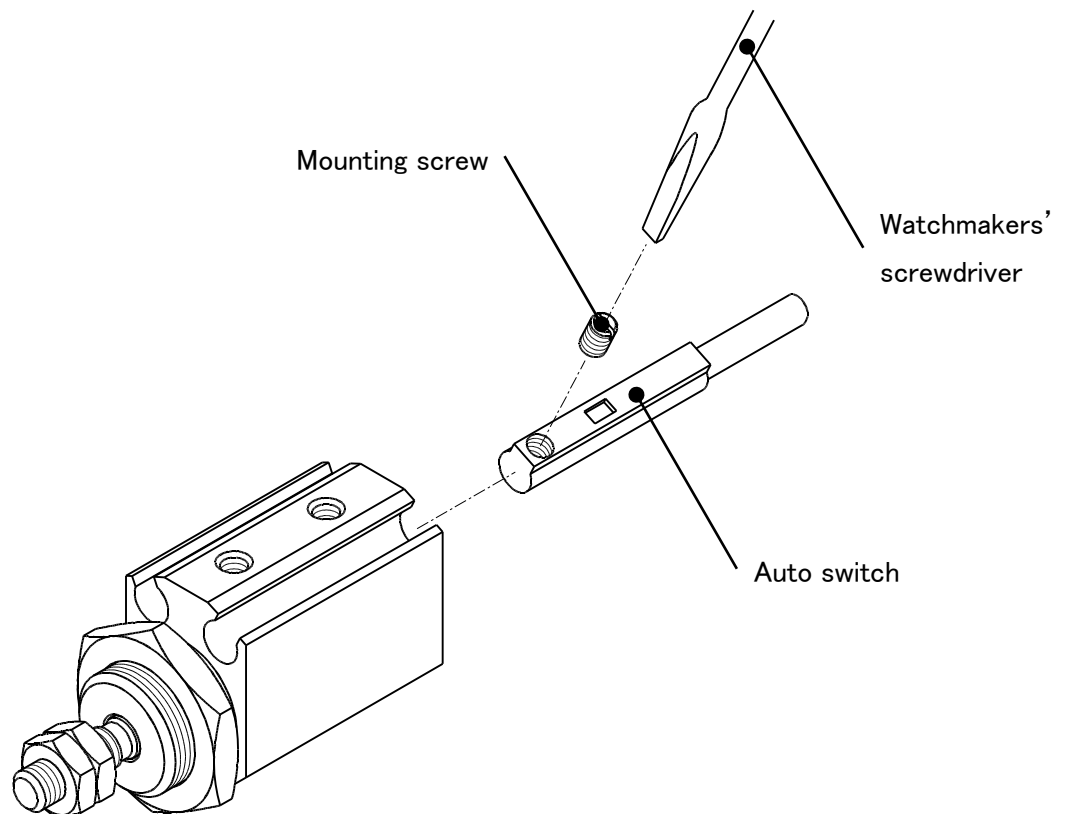
* Since this is a guideline that includes hysteresis, it is not meant to be guaranteed. (Assuming approximately a ±30% dispersion) Substantial changes may be needed depending on the ambient environment.

④ Minimum stroke of auto switch mounting

	1 pc.	2 pcs.
D-A9□ D-A9□V	5	10
D-M9□ D-M9□V	5	5
D-M9□W D-M9□WV	5	10

* D-A9□·D-A9□V cannot be installed on the Φ4 cylinder.

⑤ Auto switch mounting



- ① Fit an auto switch mounting groove to set it roughly to the mounting position for an auto switch.
- ② After confirming the detecting position, tighten up the mounting screw attached to an auto switch, and secure the switch.
- ③ When changing the detecting position, carry out in the state of 1.

When tightening an auto switch mounting screw, use a watchmaker's screwdriver with a grip diameter of 5 to 6mm.

(The tightening torque should be about 0.1 to 0.2 N·m.)

3. Model selection

3-1. Allowable Kinetic Energy

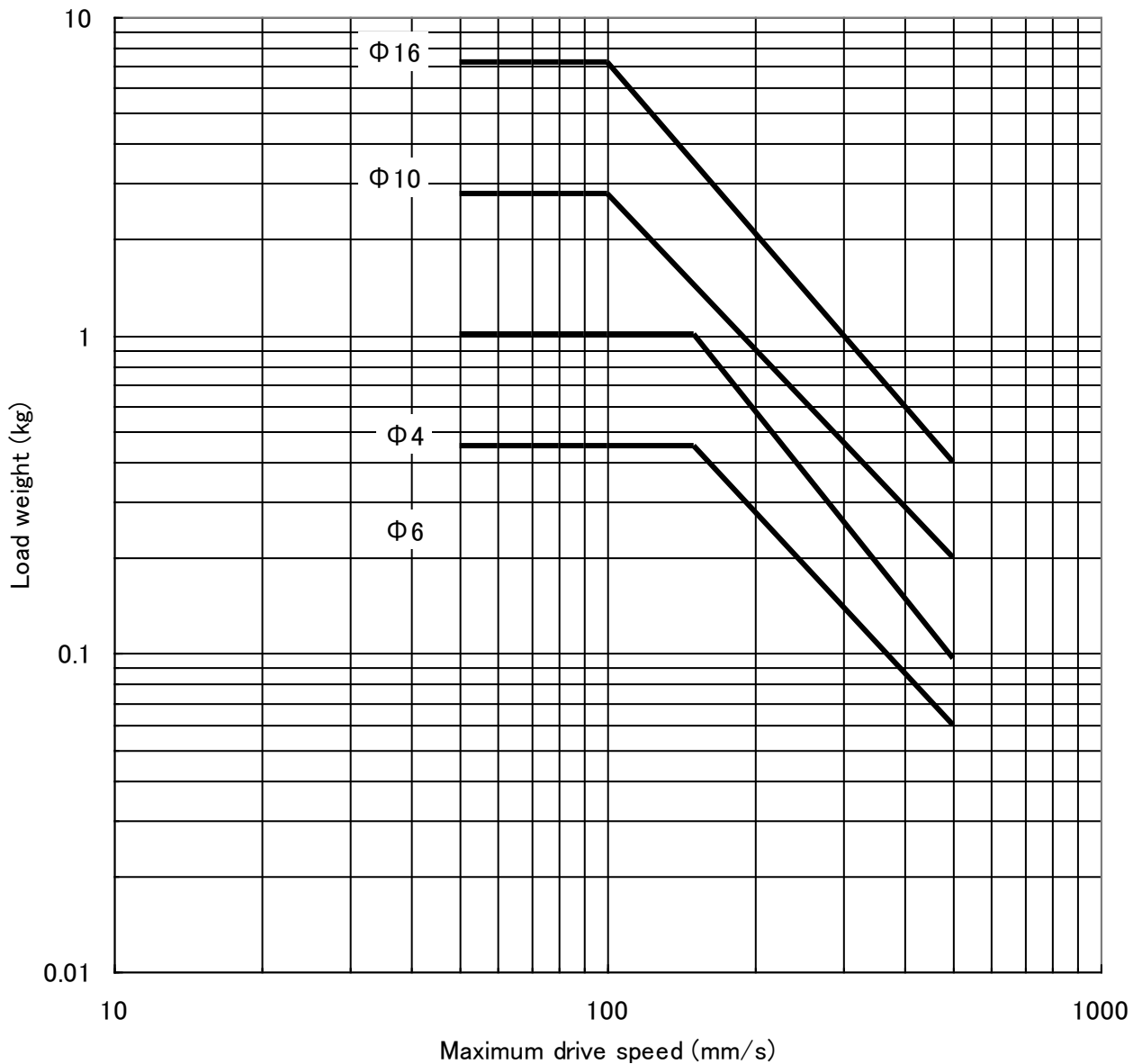
Caution

When driving an inertial load, operate a cylinder with kinetic energy within the allowable value.

The range in the chart below that is delineated by bold solid lines indicates the relation between load weights and maximum driving speeds.

Bore size	Φ4	Φ6	Φ10	Φ16
Allowable Kinetic Energy(J)	0.75×10^{-2}	1.2×10^{-2}	2.5×10^{-2}	5.0×10^{-2}

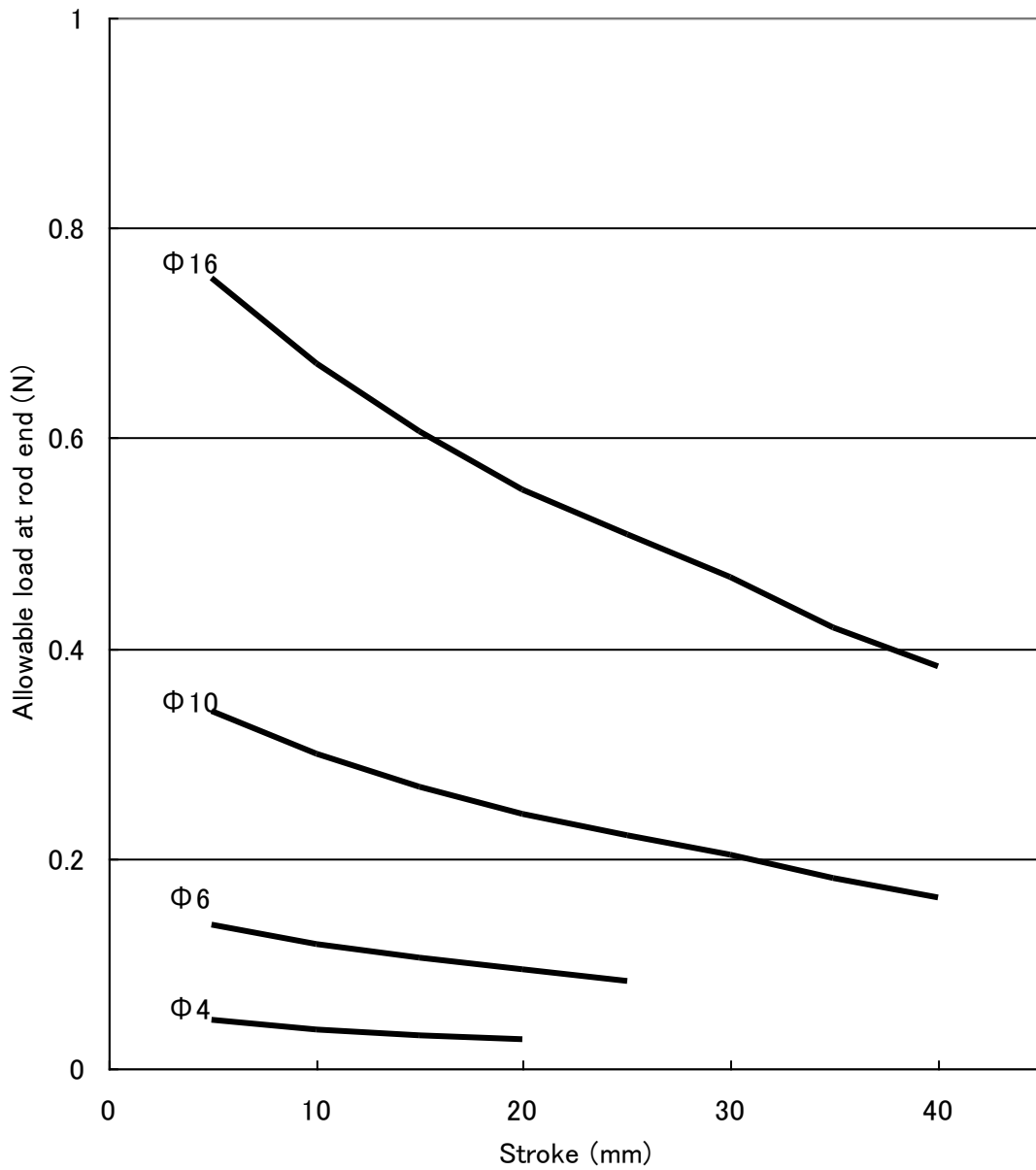
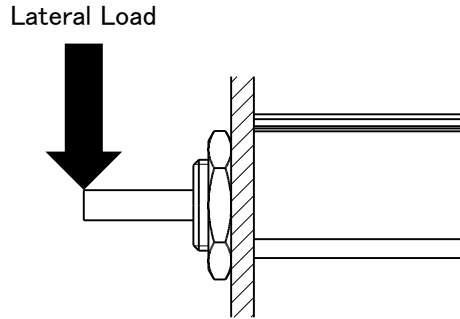
(Supply pressure : at P=0.7MPa)



3-2. Lateral Load at Rod End

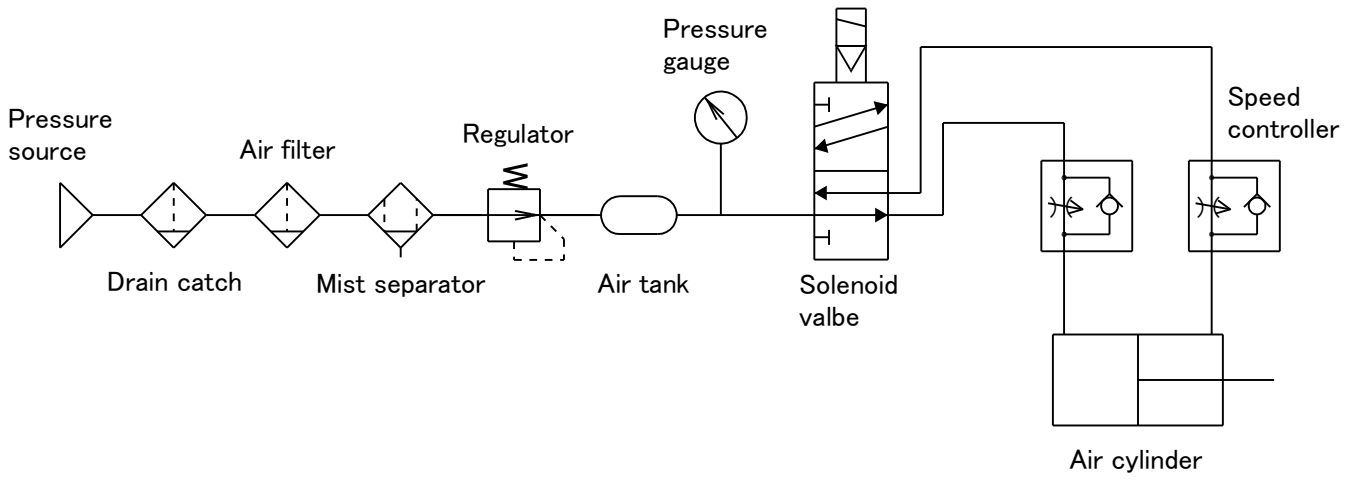
Caution

In principle, the load applied to the piston rod should always be kept in the axial direction. If this situation cannot be avoided, keep the lateral load applied on the bushing of the cylinder, to 1/50 or less of the maximum output of the cylinder.



4. Pneumatic circuit

The typical circuit for GJP2 series where air filter, regulator, solenoid valve and speed controller (meter-out) are used for operation is as follows.



5. Maintenance and Check

5-1. Daily check

- ① Is the operation smooth?
- ② Is there any abnormal change in the piston speed and cycle time?
- ③ Is there any abnormality in the stroke?

5-2. Periodic check

- ① Are the cylinder mounting bolts and workpieces firmly fixed?
- ② Is the operation smooth?
- ③ Are there any abnormal changes in the piston speed and cycle time?
- ④ Is there any external leakage?
- ⑤ Is there any abnormality in the stroke?
- ⑥ Are there any flaws on the piston rod
- ⑦ Is the drainage of the air filter removed periodically?

Check the above-mentioned items, and if any defects are found, take appropriate measures.

5-3. How to replace the seal

Caution

- ① **Ask SMC to replace the seal if the inside diameter of the tube is 4mm.**

Tubes with a 4mm I.D cannot be disassembled. If they need to be disassembled in order to replace the packing or for other purposes, please contact an SMC representative for the repair.

1. Disassembly of the cylinder

① Cleaning

Prior to disassembly, wipe off any dirt from the outside of the actuator.

This will prevent the intrusion of dust and foreign materials during disassembly.

Take particular care on the surface of the piston rod.

② Removal of snap ring

Remove the snap ring with proper pliers.

③ Removal of head cover

Remove the head cover from the body by pushing the piston rod to the head side.

④ Disassembly

Pull out the piston rod.

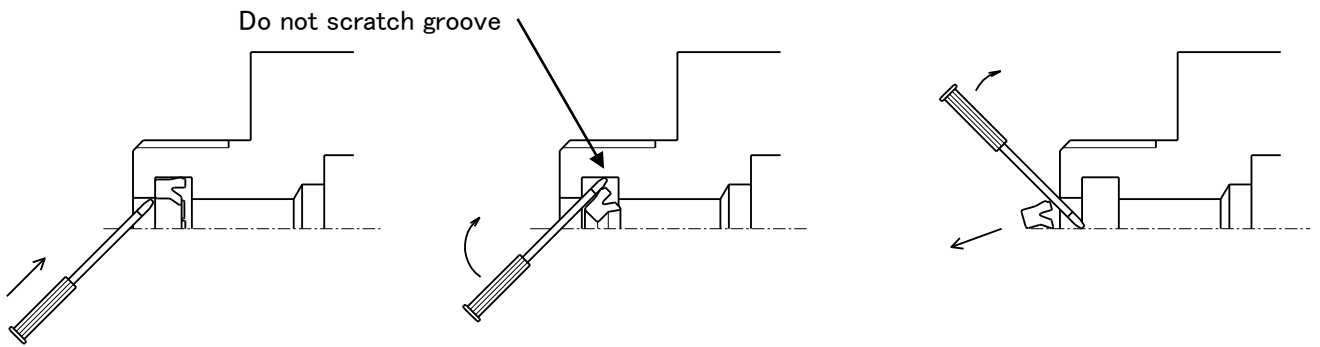
Take care not to scratch or mark the internal face of the tube.

2. Removal of the seal

① Rod seal

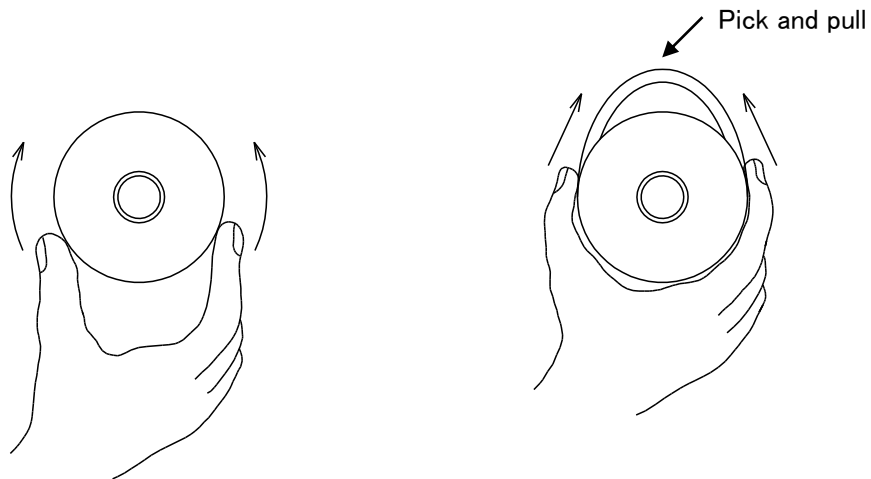
Insert a precision driver etc. from front the body and prise the seal out.

Take care not to scratch or score the seal groove in the body.



② Piston seal

Push the tube gasket partially to make it come off and pull it out manually.



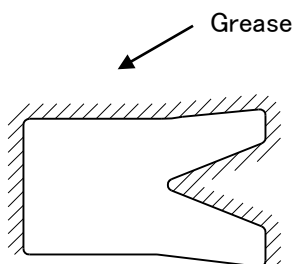
③ Gasket(See above)

Push the gasket partially to make it come off and pull it out manually.

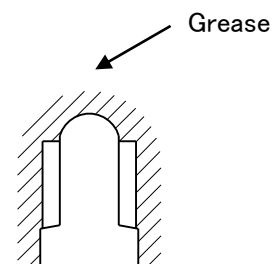
3. Application of grease

① Rod seal and Piston seal

Apply the grease evenly all around the new seal.



Rod seal



Piston seal

② Gasket

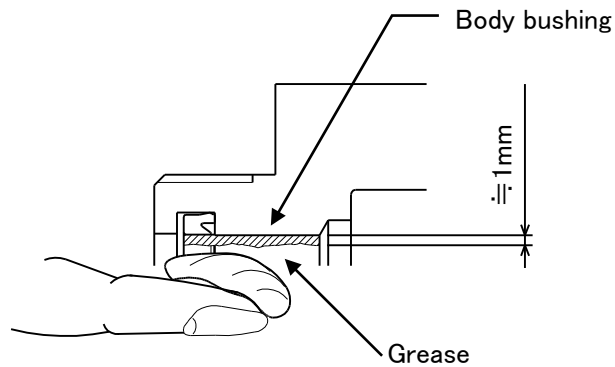
Spread a thin film of grease over the tube gasket.

4. Mounting of seal

① Rod seal

Mount the rod seal with attention to direction.

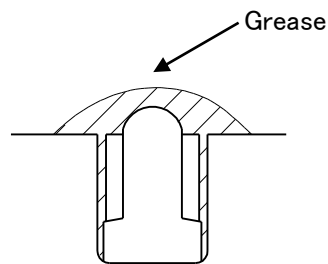
Then, apply the grease on the seal evenly.



② Piston seal

When mounting the seal, ensure there are no twists in the seal.

Also add the grease inside the groove.



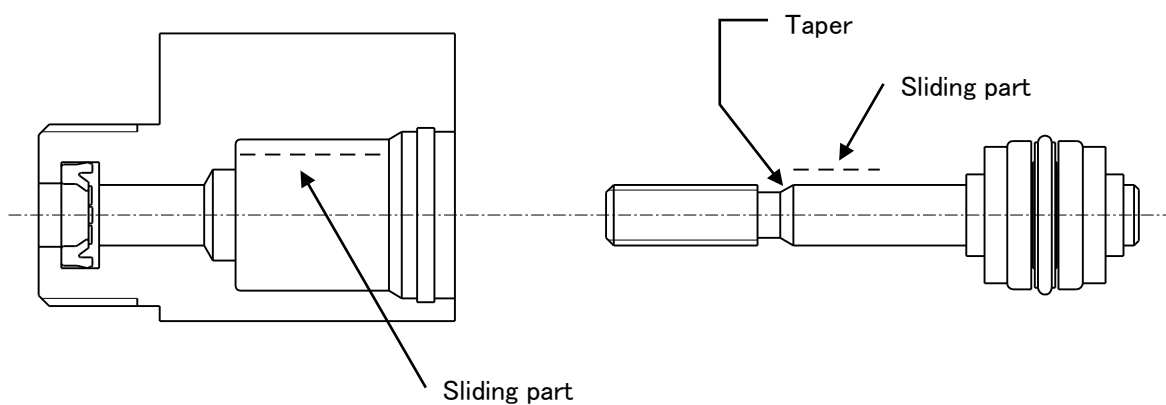
③ Gasket

Pay attention not to make the gasket come off.

5. Application of grease

① Each component of the cylinder

Spread grease entirely over the parts shown.



6. Reassembly of the cylinder

① Insertion of piston rod ASS 'Y

Please insert piston rod ASS 'Y in the body.

② Insertion of head cover ASS 'Y

Please insert head cover ASS 'Y in the body.

③ Mounting of the snap ring

Mount the snap ring with proper pliers.

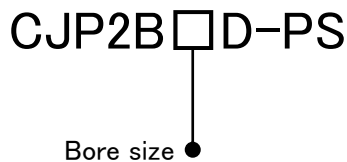
④ Check the assembly condition.

Confirm that there is no air leakage from the seal and that the cylinder can operate smoothly at a minimum operating pressure.

5-4. Consumable parts

① Replaced parts

The service parts are as follows.



Seal Kit

Bore size (mm)	Kit no.	Content and qty.			
		Rod seal	Piston seal	Gasket	Grease package
6	CJP2B6D-PS	1	1	1	1
10	CJP2B10D-PS	1	1	1	1
16	CJP2B16D-PS	1	1	1	1

② Storage of seal (for extended period)

1) Put the seal into an enclosed package for storage

2) Avoid exposure to direct sunlight, high temp. and humidity.

Especially, shut off the equipment which possibly causes heat, radiation and ozone from the package.

3) Do not deform or damage the seal by crushing..

4) The seal may have white powder on the surface during storage. This will not effect the performance of the seal.

③ Grease package

When the grease is added during replacement of the seal and maintenance of the cylinder, use the grease package.

Grease package

Kit no.	Net
GR-L-005	5g

5—5. Bracket

Foot, Flange and trunnion were prepared in this product.

Foot

Bore size (mm)	Kit no.	Net
6	CP-L006A	Foot (1 pc.)
10	CP-L010A	
16	CP-L016A	

*Material of foot is iron.

Flange

Bore size (mm)	Kit no.	Net
6	CP-F006A	Flange (1 pc.)
10	CP-F010A	
16	CP-F016A	

*Material of flange is iron.

Trunnion

Bore size (mm)	Kit no.	Net
6	CP-T006A	• Trunnion (1 pc.)
10	CP-T010A	• Trunnion pin (1 pc.)
16	CP-T016A	• Snap ring (2 pcs.)

*Material of trunnion is iron.

5—6. Accessory Bracket

Single knuckle joint, Double knuckle joint, Knuckle pin, Trunnion pin, Mounting nut, Rod end nut and Rod end cap (Flat type, Round type) were prepared in this product.

Single knuckle joint

Bore size (mm)	Kit no.	Net
6	I-P006A	Single knuckle joint (1 pc.)
10	I-P010A	
16	I-P016A	

*Material of single knuckle joint is iron.

Double knuckle joint

Bore size (mm)	Kit no.	Net
6	Y-P006A	• Double knuckle joint (1 pc.)
10	Y-P010A	• Knuckle pin (1 pc.)
16	Y-P016A	• Snap ring (2 pcs.)

*Material of double knuckle joint is iron.

Knuckle pin

Bore size (mm)	Kit no.	Net
6	IY-P006	• Knuckle pin (1 pc.) • Snap ring (2 pcs.)
10	IY-P010	
16	IY-P016	

*Material of knuckle pin is stainless steel.

Trunnion pin

Bore size (mm)	Kit no.	Net
6	CT-P006	• Trunnion pin (1 pc.) • Snap ring (2 pcs.)
10	CT-P010	
16	CT-P016	

*Material of trunnion pin is stainless steel.

Mounting nut

Bore size (mm)	Kit no.	Net
4	SNPS-004	Mounting nut (1 pc.)
6	SNP-006	
10	SNP-010	
16	SNP-015	

*Material of mounting nut is brass.

Rod end nut

Bore size (mm)	Kit no.	Net
4	NTJ-004	Rod end nut (2 pcs.)
6	NTP-006	
10	NTP-010	
16	NTP-015	

*Material of rod end nut is steel.

Rod end cap (Flat type)

Bore size (mm)	Kit no.	Net
4	CJ-CF004	Rod end cap【Flat type】 (1 pc.)
6	CJ-CF006	
10	CJ-CF010	
16	CJ-CF016	

*Material of rod end cap (flat type) is polyacetal.

Rod end cap (Round type)

Bore size (mm)	Kit no.	Net
4	CJ-CR004	Rod end cap【Round type】 (1 pc.)
6	CJ-CR006	
10	CJ-CR010	
16	CJ-CR016	

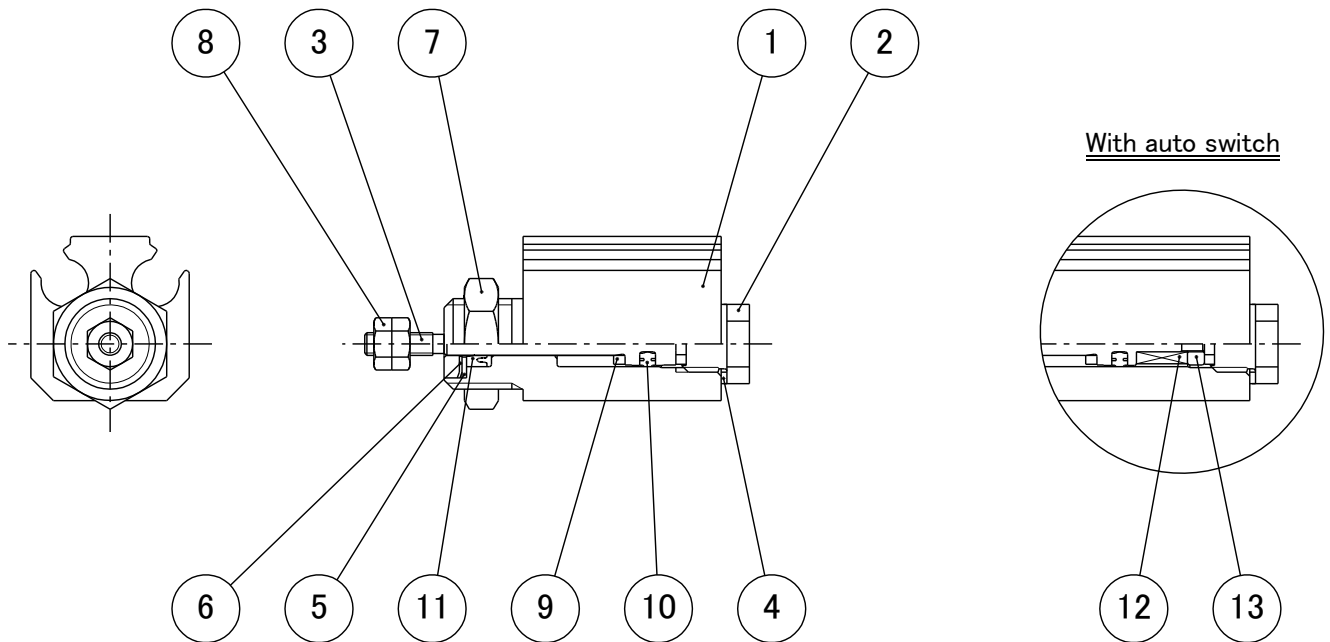
*Material of rod end cap (flat type) is polyacetal.

6. Troubleshooting

Trouble	Phenomenon	Possible cause	Remedy	Related section
<ul style="list-style-type: none"> ▪ The operation is not smooth. ▪ The force output is reduced. ▪ The cylinder doesn't operate. 	Air leakage (external)	<ol style="list-style-type: none"> 1、 The rod seal is damaged by flaws on the piston rod. 2、 The rod seal is damaged by a lack of grease on the piston rod. 3、 The rod seal is damaged by use at temp out of the specified range. 4、 Shortage of grease 5、 Foreign materials are allowed to enter. 	<ol style="list-style-type: none"> 1、 Replace piston rod and rod seal. 2、 Apply the grease on piston rod and replace seal. 3、 Keep operating temp. range and replace rod seal. 4、 Add grease. 5、 Remove foreign materials from rod seal. 	<p>2-1</p> <p>6-3</p> <p>6-4</p>
	Air leakage (internal)	<ol style="list-style-type: none"> 1、 The piston seal is worn due to grease washed away by water. 	<ol style="list-style-type: none"> 1、 Install air cleaning equipment, in the line, and replace the piston seal. 	<p>3-6</p> <p>6-3</p>
	A lack of pneumatic pressure	<ol style="list-style-type: none"> 1、 The pressure from the factory source is reduced. 2、 The regulator setting has been displaced. 3、 The piping is clogged. 	<ol style="list-style-type: none"> 1、 Supply adequate pressure. 2、 Set regulator properly. 3、 Flush the piping. 	<p>2-1</p> <p>3-4</p> <p>3-6</p>
	Overload	<ol style="list-style-type: none"> 1、 The lateral load has been exceeded. 	<ol style="list-style-type: none"> 1、 Use within the allowable value. 	<p>4-2</p>
	Low operating speed	<ol style="list-style-type: none"> 1、 The speed is lower than specified piston speed. 	<ol style="list-style-type: none"> 1、 Use within specifications. 	<p>2-1</p>
	Improper pneumatic circuit design.	<ol style="list-style-type: none"> 1、 The system construction is not suitable. 	<ol style="list-style-type: none"> 1、 Select adequate size of tube, fitting, directional control valve, speed controller etc. 	<p>3-2</p> <p>3-4</p>
	<ul style="list-style-type: none"> ▪ A part is damaged. 	Breakage of damper, piston rod, rod cover and body	<ol style="list-style-type: none"> 1、 The speed is too high due to insufficient adjustment of the speed controller. 2、 The kinetic energy exceeds the allowable value. 3、 The pressure from the factory source is reduced. 4、 An abnormal external force is applied. 	<ol style="list-style-type: none"> 1、 Adjust the speed with the speed controller again so that the speed will decrease within the specifications. 2、 Use within the allowable value. 3、 Use within the allowable value. 4、 Mechanism interference, eccentric load and overload could cause deformation and damage of the cylinder. Remove these factors.

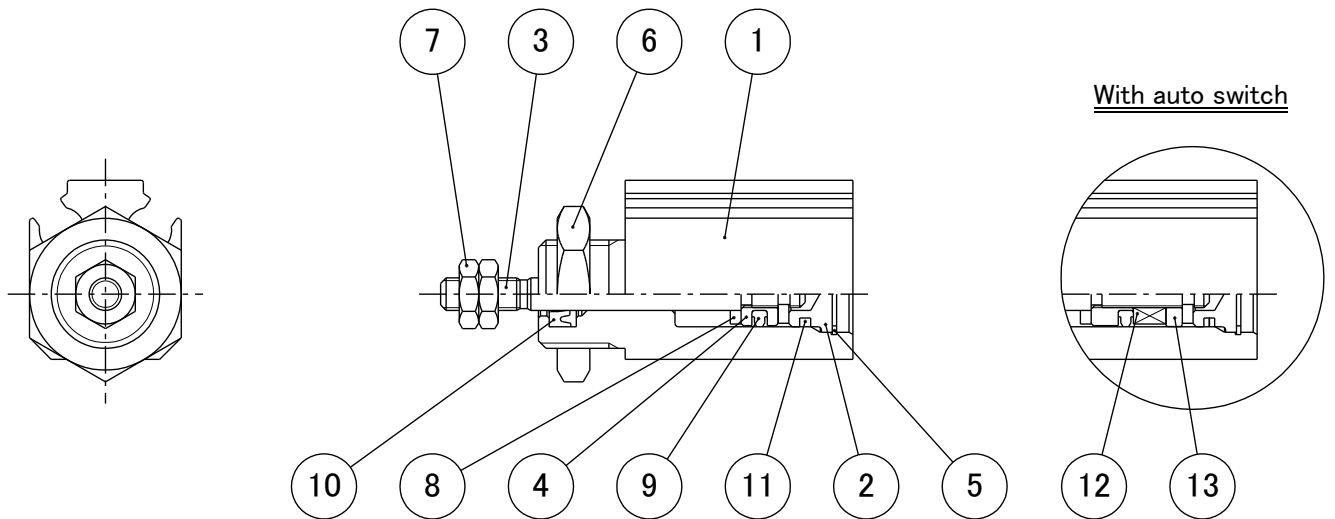
7. Basic construction

Φ4



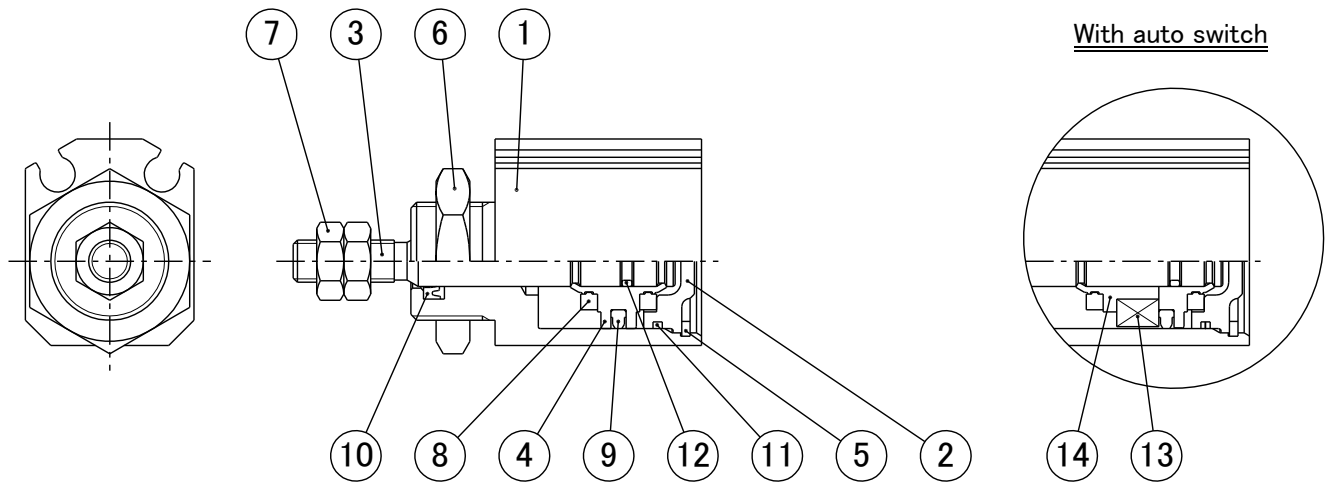
13	Magnet holder	Brass	1	
12	Magnet	Magnetic material	1	
11	Rod seal	NBR	1	
10	Piston seal	NBR	1	
9	Bumper	Urethane	2	
8	Rod end nut	Steel	2	Nickel plated
7	Mounting nut	Brass	1	Electroless nickel plated
6	Snap ring	Tool steel	1	Phosphate coated
5	Seal holder	Special-purpose steel	1	Nickel plated
4	Gasket	SUS+NBR	1	
3	Piston	Stainless steel	1	
2	Head cover	Brass	1	Electroless nickel plated
1	Body	Aluminum alloy	1	Hard anodized
No	Description	Material	Qty	Note

Φ6



13	Magnet holder	Brass	1	
12	Magnet	Magnetic material	1	
11	Gasket	NBR	1	
10	Rod seal	NBR	1	
9	Piston seal	NBR	1	
8	Bumper	Urethane	2	
7	Rod end nut	Steel	2	Nickel plated
6	Mounting nut	Brass	1	Electroless nickel plated
5	Snap ring	Tool steel	1	Phosphate coated
4	Piston	Brass	1	
3	Piston rod	Stainless steel	1	
2	Head cover	Brass	1	Electroless nickel plated
1	Body	Aluminum alloy	1	Hard anodized
No	Description	Material	Qty	Note

Φ 10·16



14	Magnet holder	Aluminum alloy	1	Φ 16:Chromated
		Brass	1	Φ 10
13	Magnet	Magnetic material	1	
12	Piston gasket	NBR	1	
11	Gasket	NBR	1	
10	Rod seal	NBR	1	
9	Piston seal	NBR	1	
8	Bumper	Urethane	2	
7	Rod end nut	Steel	2	
6	Mounting nut	Brass	1	Electroless nickel plated
5	Snap ring	Tool steel	1	Phosphate coated
4	Piston	Aluminum alloy	1	Φ 16:Chromated
		Brass	1	Φ 10
3	Piston rod	Stainless steel	1	
2	Head cover	Aluminum alloy	1	Φ 16:Chromated
		Brass	1	Φ 10:Electroless nickel plated
1	Body	Aluminum alloy	1	Hard anodized
No	Description	Material	Qty	Note

Revision history
1. Review of contents
2. Review of contents

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2. Review of contents

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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