



Operation Manual

PRODUCT NAME

SMOOTH CYLINDER

MODEL / Series / Product Number

CM2Y-Z、CG1Y-Z、CQ2Y-Z
CQSY、CA2Y-Z SERIES

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 relating to systems.

ISO 4413: Hydraulic fluid power -- General rules relating to systems.

IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)

ISO 10218: Manipulating industrial robots -Safety.

etc.



Caution

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



Warning

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



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious 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. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



Safety Instructions

Caution

The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

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 regulation 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.

Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.



Smooth Cylinder Safety Product Precautions 1

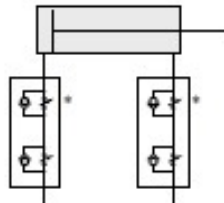
Be sure to read this before handling the products.

Recommended Pneumatic Circuit

⚠ Warning

Horizontal Operation

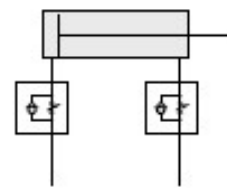
I



Dual speed controller

Speed is controlled by meter-out circuit. Using concurrently the meter-in circuit can alleviate the stick-slip. More stable low speed operation can be achieved than meter-in circuit alone.

II

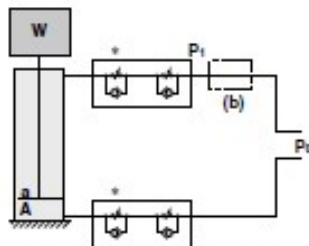


Meter-in speed controller

Meter-in speed controllers can reduce lurching while controlling the speed. The two adjustment needles facilitate adjustment.

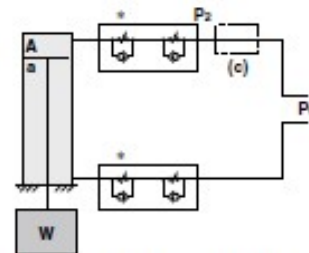
Vertical Operation

I



- (1) Speed is controlled by meter-out circuit. Using concurrently the meter-in circuit can alleviate the stick-slip.*
- (2) Depending on the size of the load, installing a regulator with check valve at position (b) can reduce lurching during descent and operation delay during ascent.
As a guide,
when $W + P_0a > P_0A$,
adjust P_1 to make $W + P_1a = P_0A$.

II



- (1) Speed is controlled by meter-out circuit. Using concurrently the meter-in circuit can alleviate the stick-slip.*
- (2) Installing a regulator with check valve at position (c) can reduce lurching during descent and operation delay during ascent.
As a guide,
adjust P_2 to make $W + P_2A = P_0a$.

W: Load (N) P_0 : Operating pressure (MPa) P_1, P_2 : Reduced pressure (MPa) a: Rod side piston area (mm^2) A: Head side piston area (mm^2)



Smooth Cylinder Safety Product Precautions 2

Be sure to read this before handling the products.

Design

⚠ Caution

- 1. Provide a construction that does not apply a lateral load to the cylinder.**
Applying a lateral load to the cylinder may cause a malfunction.
(Only for low speed cylinders)
- 2. Design the system to prevent vibration from being applied to the cylinder.**
A malfunction may occur due to the vibration.
- 3. Avoid using a guide with obvious variations in operating resistance.**
Operation may become unstable when using a guide that manifests variations in operating resistance, or when the external load changes.
- 4. Avoid a system structure in which the mounting orientation changes.**
Operation may become unstable if the mounting orientation changes.
- 5. Avoid operation where the temperature fluctuates greatly. Also, when using at low temperatures, make sure that frost does not form inside the cylinder and on the piston rod.**
Operation may become unstable.
- 6. Do not use the product at a high frequency.**
Use it at 30 cpm or less as a guideline.
- 7. Adjust the speed in accordance with the operating environment.**
When the operating environment changes, the speed adjustment will be off unless it is reset to reflect operation in the new environment.
- 8. For cylinders with long strokes, sliding resistance will increase due to the deflection of the piston rod and other factors. Take measures such as the installation of a guide. (Only for smooth cylinders)**
- 9. Do not apply excessive lateral load to the piston rod. (Only for smooth cylinders) ^{Note 1)}**
Note 1) Easy checking method
Minimum operating pressure after the cylinder is mounted to the equipment (MPa) = Minimum operating pressure of cylinder (MPa) + (Load weight (kg) x Friction coefficient of guide/Sectional area of cylinder (mm²))
If smooth operation is confirmed within the above value, the load on the cylinder is the resistance of the thrust only and it can be judged as having no lateral load.

Pneumatic Circuit

⚠ Caution

- 1. The piping length between the speed controller and the cylinder port must be kept as short as possible.**
If the speed controller and the cylinder port are far apart, speed adjustment may be unstable.
- 2. Use a speed controller for low speed operation to easily adjust for low speed operation or a dual speed controller (ASD series) to prevent cylinders from popping out.**
(When the speed controller for low speed operation is used, the maximum speed may be limited.)
Refer to "Recommended Pneumatic Circuit" on page 314.

Mounting

⚠ Caution

- 1. Do not apply a lateral load to the piston rod.**
Applying a lateral load to the piston rod may cause a malfunction. (Only for low speed cylinders)
- 2. Do not apply excessive lateral load to the piston rod. (Only for smooth cylinders) ^{Note 1)}**
Note 1) Easy checking method
Minimum operating pressure after the cylinder is mounted to the equipment (MPa) = Minimum operating pressure of cylinder (MPa) + (Load weight (kg) x Friction coefficient of guide/Sectional area of cylinder (mm²))
If smooth operation is confirmed within the above value, the load on the cylinder is the resistance of the thrust only and it can be judged as having no lateral load.

Lubrication

⚠ Caution

- 1. Operate without lubrication from a pneumatic system lubricator.**
A malfunction may occur when lubricated in this fashion.
- 2. Only use the grease recommended by SMC.**
The low speed cylinder and the low speed cylinder with clean room specifications use different types of grease. The use of grease other than the specified type can cause a malfunction and particulate generation.
• Order using the following part numbers when only maintenance grease is needed.
Grease

Volume	Part no.
5 g	GR-L-005
10 g	GR-L-010
150 g	GR-L-150
- 3. Do not wipe out the grease in the sliding part of the air cylinder.**
Doing so may cause a malfunction.

Air Supply

⚠ Caution

- 1. Take measures to prevent pressure fluctuation.**
A malfunction may occur with the fluctuation of pressure.

1. Product specifications

1-1. Specifications

Fluid	Air	
Proof pressure	1.05MPa	
Maximum operating pressure	0.7MPa	
Minimum operating pressure	Ø12, 16	0.03MPa
	Ø20 ~ 40	0.02MPa
	Ø50 ~ 100	0.01MPa
Ambient and fluid temperature	-10 ~ +70 °C, Built-in magnet type: -10 ~ +60 °C (with no freezing)	
Lubricant	Non-lube (Do not lubricate)	
Stroke length tolerance (mm)	CM2Y, CG1Y, CA2Y	+1.4 0
	CQSY, CQ2Y	+1.0 0
Cushion	Rubber bumper (none for CA2Y)	
Allowable leakage rate	0.5L/min(ANR) or less	
Direction of low-friction	Bi-directional	
Operating piston speed	5 ~ 500 mm/sec	

Warning

- Check the specifications

These products are designed according to use in industrial compressed air systems. If the products are used in conditions where pressure, temperature, etc. are out of specifications, damage and/or malfunction may be caused. Do not use under these conditions. (Please refer to the specifications)

Consult SMC if you use a fluid other than compressed air.

- A deceleration circuit or shock absorber, etc. 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 shock. Install a deceleration circuit to reduce the speed before cushioning or install an external shock absorber to relieve the shock. In this case, the rigidity of the machinery should also be examined.

2. Installation/operating method

2-1. Fluid

Compressed air to be supplied to the cylinder shall be filtered by air filter such as our Series AF and use the regulated air at specified pressure by regulator such as our Series AR.

Warning

- Use clean air

If compressed air includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., it can cause damage or malfunction.

Caution

- **Install air filter**
Install air filters at the upstream side of valves. The filtration degree should be 5 μm or less.
- **Install an after cooler, air dryer, drain catch, etc.**
Air that includes excessive condensate may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, after cooler, etc.
- **Use the product within the specified range of fluid and ambient temperature.**
Take measures to prevent freezing, since moisture in circuits will be frozen under 5°C, and this may cause damage to seals and lead to malfunction.
- **Lubrication to the low-friction type cylinder.**
Please do not lubricate this cylinder. If it is lubricated, grease will be washed away and will cause the increase of sliding resistance.

2-2. Design

The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Warning

- **There is a possibility of dangerous sudden action by air cylinder if sliding parts of machinery are twisted due to external forces, etc.**
In such cases, human injury; e.g. hands or feet would be caught in the machinery or damage to the machinery itself may occur. Therefore, the machinery should be designed to avoid such dangers.
- **A protective cover is recommended to minimize the risk of personal injury.**
If a driven object and moving parts of a cylinder have possibility of danger to human body, design the structure to avoid having contact with the human body.
- **Securely tighten all stationary parts and connected parts so that they will not become loose.**
Adopt a secure tightening method if the cylinder is used in an environment where the operating frequency is high and receives a lot of vibration.
- **Design the machinery that external force which exceeds the maximum output shall not be applied to the cylinder.**
Cylinder breakage may present a danger to human body or machinery.
- **Consider aptitude of the mounting table's rigidity, as the cylinder brings great power.**
It may present a danger to human body or machinery.
- **Consider a possible drop in operating pressure due to a power outage, etc.**
When a cylinder is used in a clamping mechanism, there is a danger of work dropping if there is a drop of pressure in circuit 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.
- **Consider a possible loss of power source.**
Measures should be taken to protect against human injury and equipment damage in the event that there is a loss of power to equipment controlled by air pressure, electricity or hydraulics, etc.
- **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 power outage, a manual emergency stop or a safety device under abnormal conditions.
- **Consider the action when operation is restarted after an emergency stop or abnormal stop.**
Design the machine 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.
- **Intermediate stops.**
When intermediate stop of a cylinder is performed with a 3 position closed center directional control valve, it is difficult to achieve stopping positions as accurate and minute as with hydraulic pressure, due to the 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. Contact SMC in case it is necessary to hold a stopped position for an extended period.

Caution

- **Operate the piston within a range such that collision damage will not occur at the end of the stroke.**
Operate within a range such that damage will not occur when the piston having inertial force stops by striking the cover at the stroke end. Refer to the cylinder selection procedures for the range within which damage will not occur.
- **If a clearance between clevis or trunnion and companion bearing is wide, bending load will be applied to the pin. Thus, do not make this clearance that wide.**
- **Do not let chips or extraneous materials enter inside the cylinder from the inlet.**

2-3. Mounting / installation

Caution

- **Minimum lateral load shall be applied to the bearing of the piston rod.**
If excessive lateral load is given to the bearing part, sliding resistance will increase. Mount so that it shall be the minimum amount.
- **Make sure to connect the rod and the load so that their axial center and movement directions match.**
If they do not match, stress could be applied to the rod and the tube, causing the inner surface of the tube, the bushing, the rod surface, and the seals to wear and to become damaged.
- **When an external guide is used, connect the external slider and the load in such a way that there is no interference at any point within the stroke.**
- **Do not scratch or gouge the sliding part of the cylinder tube or the piston rod by striking it with an object or squeezing it.**
The tube bore is manufactured under precise tolerances. Thus, even a slight deformation could lead to a malfunction. Furthermore, any scratches or gouges on the sliding part of the piston rod could damage the seals, which could cause air leakage
- **Prevent the rotating parts from seizing.**
Apply grease to the rotating parts (such as the pin) to prevent them from seizing.
- **Do not use until you verify that the equipment can operate properly.**
After mounting, repair or modification, etc., connect the air supply and electric power, and then confirm proper mounting by means of appropriate function and leak inspections.
- **Do not let chips or extraneous material enter inside the cylinder from the inlet.**
When installing cylinder on the work site, chips came out of drilling holes can enter the cylinder from the inlet. Pay attention that those should not enter the cylinder.

2-4. Operating conditions environment

Warning

- **Do not use in environments where there is a danger of corrosion.**
Refer to the construction drawing regarding cylinder materials.
- **Do not use in an area that is dusty or where water or oil splashes on the cylinder.**
It would affect grease of the piston rod or inside the cylinder. Also, it will increase sliding resistance.
- **Humid place is not suitable for storing cylinder.**
Store cylinders in not humid place in order to prevent from rusting, and also piston rods shall be pulled in.

Caution

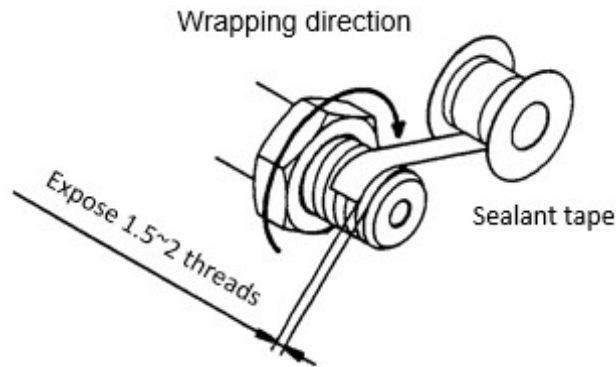
- **Preparation before piping**

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

- **Wrapping of sealant tape**

When connecting pipes and fittings, etc., be sure that cutting chips from the pipe threads and sealing material do not get inside the piping.

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



2-5. Speed control

When the cylinder speed is adjusted, please install a speed controller such as our Series AS at the air supply port and adjust as specified speed. Speed controller is available in two types: meter-in type which adjusts speed by throttling air supplied to cylinder and meter-out type which regulates air exhausted from cylinder.

Caution

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

2-6. Directional control

If the direction of cylinder operation is changed, use conforming solenoid valve from our various solenoid valves.

Warning

- **Design a circuit that prevents lurching of a driven object (piston).**

If the cylinder is operated by exhaust center type directional control valve or when restarting after exhausting residual pressure in the circuit, etc., the driven object (piston) will lurch at a high speed if pressure is supplied to one side of the cylinder with air in the cylinder is exhausted. In such cases, human injury; e.g. hands or feet would be caught in the machinery or damage to the machinery itself may occur. Therefore, choose the appropriate product and design the circuit to avoid lurching.

- **Intermediate stops.**

When intermediate stop of a cylinder is performed with a 3 position closed center directional control valve, it is difficult to achieve stopping positions as accurate and minute as with hydraulic pressure, due to the 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. Contact SMC in case it is necessary to hold a stopped position for an extended period.

3. Maintenance

Caution

- **When replacing seals, apply new grease for seals and then assemble.**

If the product is operated without applying grease, seals will be significantly worn and lead to air leakage at an early time.

3-1. Check

3-1-1. Daily checks

- 1) Smooth operation
- 2) Changes in piston speed and cycle time
- 3) Stroke

3-1-2. Periodic checks

- 1) Loosening of cylinder mounting bolts and rod end nut
- 2) Loosening or abnormal deflection of cylinder mounting frame
- 3) Smooth operation
- 4) Changes in piston speed and cycle time
- 5) External leakage
- 6) Stroke
- 7) Flaws on the rod
- 8) Drainage of air filter

Check the above items. If there is any abnormality, correct the abnormality and take proper measures such as further screw tightening and greasing. Contact SMC for repair of the cylinder, if necessary.

Warning

- **Maintain the cylinder basically on the above points. Depending on situation, perform necessary checks.**

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

- **Machine maintenance, and supply and exhaust of compressed air.**

Having machine serviced, check that measures are taken to prevent dropping of driven objects and run-away of equipment, etc. Then, cut off the supply pressure and electric power and exhaust all compressed air from the system.

When machinery is restarted, check that operation is normal with actuators in the proper positions.

3-2. Maintenance

3-2-1. CM2Y Series

Cover and tube cannot be disassembled as they are joined by rolling crimping.

Rod seals can be replaced having the cylinder installed. Replacement procedure is described below. (Refer to Fig. 1)

[Disassembly]

- Disassemble retaining ring 1 by using a tool for installing a C type retaining ring, seal the port on rod cover by finger and pull out the piston rod. Then, seal ground 2 and rod seal 3 can be disassembled.

[Grease application]

- Special grease is used for this cylinder. Please use our grease for smooth cylinders.
- Apply grease to inner and outer surface of new rod seal (replacement part). Also, fill the grease in the groove.

[Installation]

- Mount a rod seal paying attention to the direction. When the rod seal goes through the thread part of the piston rod end and width across flats, push it by rotating slowly and securely install at the housing part of the rod cover.
- Secondly, mount seal ground 2 and then retaining ring 1.

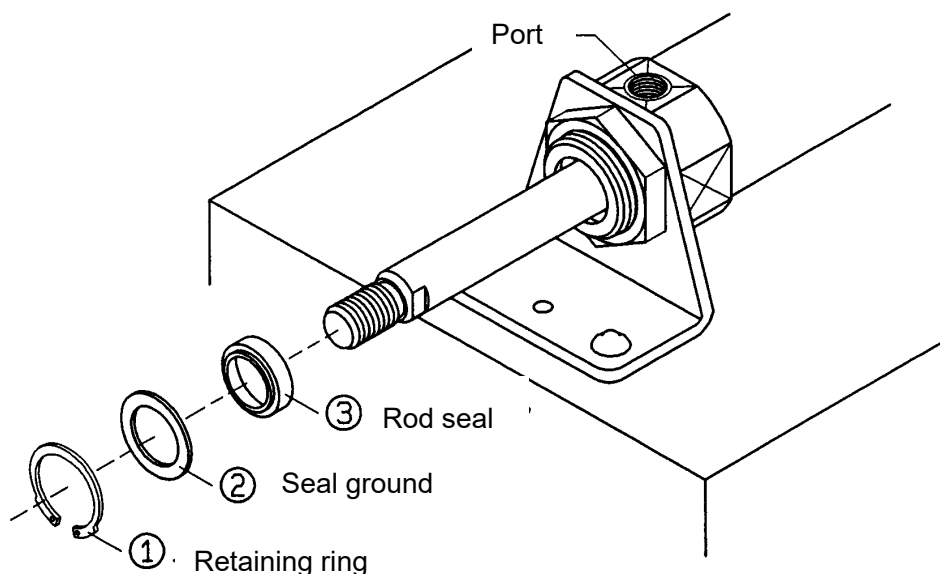


Fig. 1. Replacing method of rod seals

Replacement part: Rod seals

Bore size (mm)	Part No.
20	CM20Z-PS
25	CM25Z-PS
32	CM32Z-PS
40	CM40Z-PS

Grease for maintenance

Net Weight	Part No.
5g	GR-L-005
10g	GR-L-010
150g	GR-L-150

3-2-2. CQSY, CQ2Y Series

When malfunction due to air leakage of a cylinder occur, please replace with the below seal kit.

 **Caution**

For installation and removal, use an appropriate pair of pliers (tool for installing a C type retaining ring).

Exercise caution even when using an appropriate pair of pliers. There is a possibility that the retaining ring might come out from the tip of the pliers and fly away, which could injure humans or damage the peripheral equipment. After installing the retaining ring, make sure that it is placed securely in the ring groove before supplying air.

Replacement part: seal kit

Series	Bore size	Part No.	Contents
CQSY	12	CQSY12-PS	Piston seal: 1 pc. Rod seal: 1 pc. Tube gasket: 1 pc. Grease (10g): 1 bag
	16	CQSY16-PS	
	20	CQSY20-PS	
	25	CQSY25-PS	
CQ2Y	32	CQ2Y32-PS	Piston seal: 1 pc. Rod seal: 1 pc. Tube gasket: 1 pc. Grease (10g): 1 bag
	40	CQ2Y40-PS	
	50	CQ2Y50-PS	
	63	CQ2Y63-PS	
	80	CQ2Y80-PS	
	100	CQ2Y100-PS	

When only grease for maintenance is required, order it by the following numbers.

Net weight	Part no.
5g	GR-L-005
10g	GR-L-010
150g	GR-L-150

3-2-3. CA2Y Series

Do not move cushion valves, as they are ineffective in adjusting.

When malfunction due to air leakage of a cylinder occur, please replace with the below seal kit.

How to disassemble

Disassembly can be performed easily by loosening tie rods. As for assembly, fully check that dust is not on it and apply grease to the sliding parts of the tube, piston, piston rod, bushing and seal, etc. Assemble without giving damage to seals, etc. Tighten tie rod nuts for 4 tie rods to have tensile force evenly.

Replacement part: seal kit

Bore size (mm)	Part No.	Contents
40	CA2Y40Z-PS	Piston seal: 1 pc. Rod seal: 1 pc. Tube gasket: 2 pcs. Grease(10g): 1 bag
50	CA2Y50Z-PS	
63	CA2Y63Z-PS	
80	CA2Y80Z-PS	
100	CA2Y100Z-PS	

When only grease for maintenance is required, order it by the following numbers.

Net weight	Part No.
5g	GR-L-005
10g	GR-L-010
150g	GR-L-150

Caution

1) When replacing mounting brackets, use socket wrench.

Using other tools would cause deformation of nuts and inferior workability. Refer to the following table for sockets used.

Bore size (mm)	Nut	Dimension of width across flats	Socket
40, 50	JIS B1181 M8 × 1.25	13	JIS B4636 Dodecagon socket 13
63	JIS B1181 M10 × 1.25	17	JIS B4636 Dodecagon socket 17
80, 100	JIS B1181 M12 × 1.75	19	JIS B4636 Dodecagon socket 19

2) Do not replace bushing.

If it is required to replace bushing, replace by a cover assembly since bushing is pressed in.

3) Do not disassembly trunnion type cylinder

As for trunnion type cylinder, it is difficult to align the axis centers of trunnion and cylinder. Therefore, breakdown or reassembly may cause malfunction as it would not have dimension accuracy.

3-2-4. CG1Y Series

When malfunction due to air leakage of a cylinder occur, please replace with the below seal kit. Also, please pay full attention not to damage piston seal by the thread of cylinder tube when removing the piston rod assembly.

There is the same concern when mounting it back to the cylinder tube after replacing the piston seal.

If the piston seal gets damaged, malfunction and air leakage may occur.

Replacement: seal kit

Bore size (mm)	Part No.	Contents
20	CG1Y20Z-PS	Piston seal: 1 pc.
25	CG1Y25Z-PS	Rod seal: 1 pc.
32	CG1Y32Z-PS	Tube gasket: 1 pcs.
40	CG1Y40Z-PS	Grease(10g): 1 bag

Note:

The seals for bore size 50 and above are not available.

They can not be disassembled.

Please contact our sales for further details.

When only grease for maintenance is required, order it by the following numbers.

Net weight	Part no.
5g	GR-L-005
10g	GR-L-010
150g	GR-L-150

3-3. Consumables

3-3-1. Replacement parts

For replacement parts, refer to the maintenance page for each series.

Seals are not in airtight package at the time of delivery. Use them within a year.

For long-term storage, keep seals airtight (by putting them in a polyethylene bag and additionally in a box) and store them as follows.

3-3-2. Storage of seals

- 1) Put seals in airtight packages and store them as they are.
- 2) Avoid direct sunlight and keep temperature and humidity low for storage. Take special care to isolate and shield seals from equipment which is apt to generate heat, radiation and ozone.
- 3) Be careful not to deform and damage seals by piling up a large volume of them or putting weights on them.
- 4) Note that white powder may appear on the surfaces of rubber parts in storage though it does not affect their performance.

4. Basic circuit of cylinder operation

A basic circuit to operate a cylinder with an air filter, regulator, solenoid valve and speed controller is shown in the figure below.

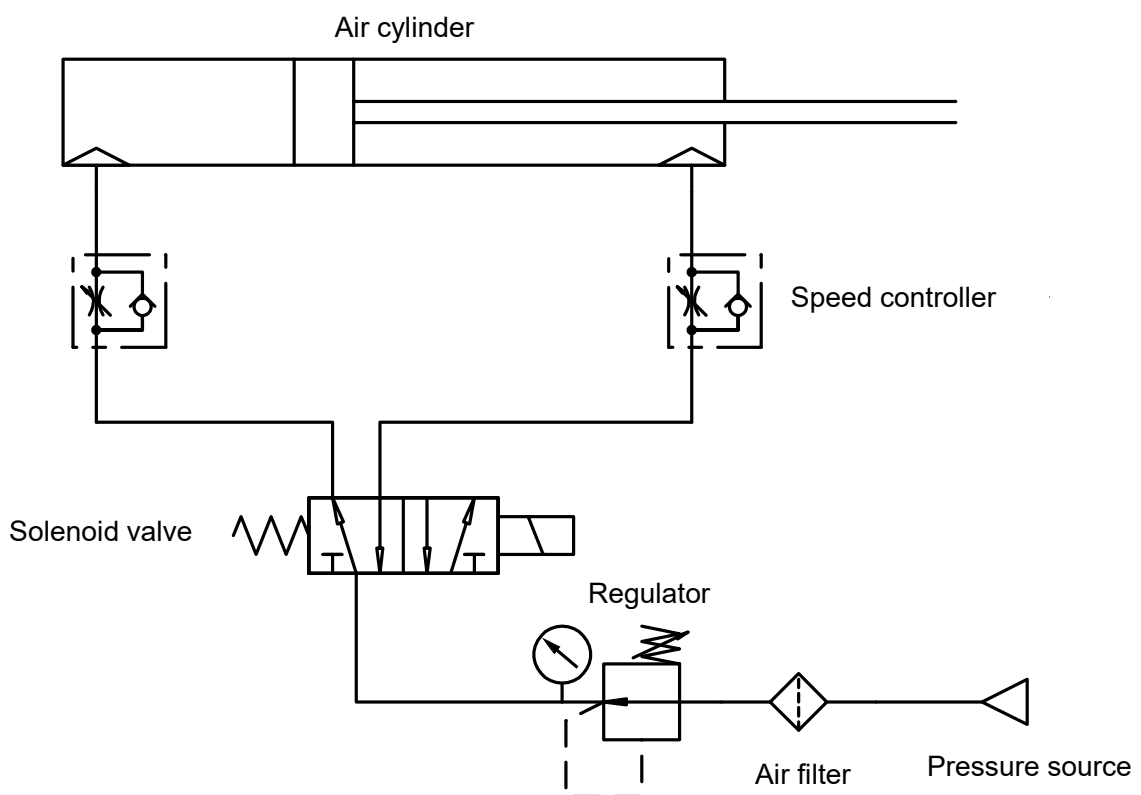


Figure 2 Basic circuit

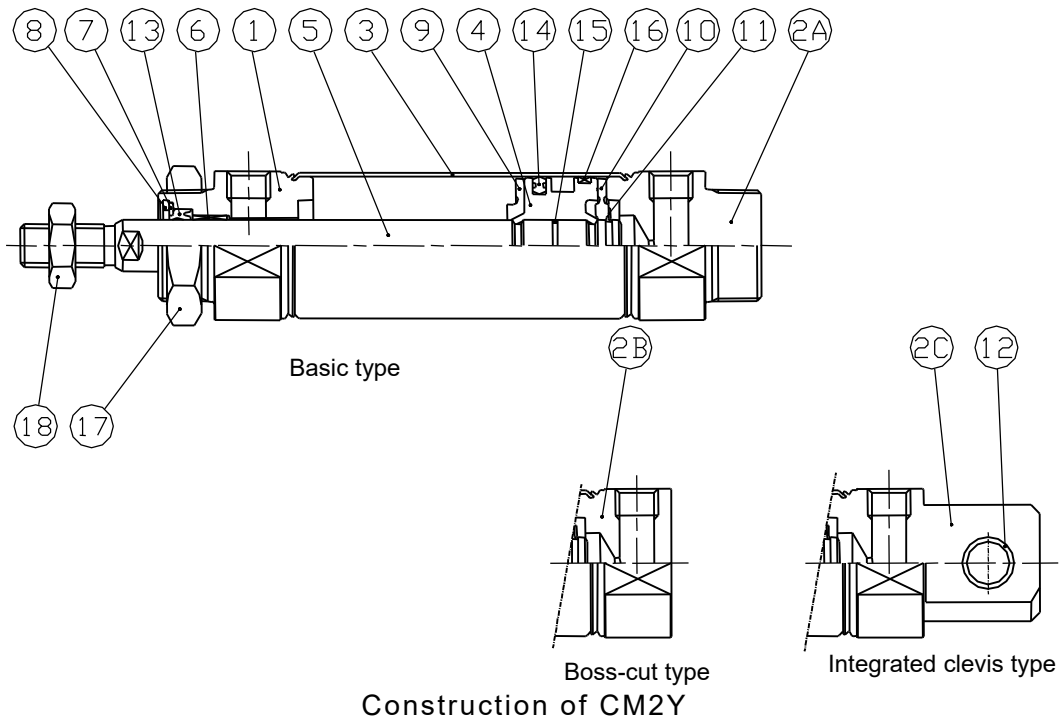
5. Troubleshooting

Failure	Main cause	Measures
Operation is not smooth.	1. Insufficient lubrication	- Drain and other lubricants may wash away grease applied to the inside of cylinder. - Disassemble and clean cylinder to remove oils and drain. Then, apply grease properly.
	2. Improper cylinder mounting position	- Make adjustments to mounting position to avoid misalignment.
	3. Insufficient air pressure	- Supply adequate amount of pressure.
	4. Failure of other system components than cylinder	- Check all the system components one by one in order.
Output is decreasing.	1. Air leak in piston seal	- Replace cylinder. (CM2Y) - Replace piston seal. (CA2Y, CQSY, CQ2Y, CG1Y)
	2. Air leak in rod seal	- Replace rod seal.
	3. Decrease of air pressure	- Secure necessary pressure and review the margin of pressure source.
	4. Insufficient air flow	- Resistance of air passage may have increased due to deformation and foreign matter. Repair and clean the passage.
	5. Improper cylinder mounting position	- Mount cylinder in an unforced position.
	6. Deformed moving part of cylinder	- Replace cylinder. Make adjustments to correct abnormal load and position at the time of reinstallation.
	7. Insufficient lubrication	- See the descriptions of non-smooth operation above.
Piston runs too fast.	1. No use of speed controller	- Use a speed controller appropriate to the size of cylinder.
	2. Lack of fine adjustability of speed controller	- Choose an adjustable speed controller to secure required operation speed referring to the graph of flow rate characteristics, etc.
Piston runs too slow.	1. Excessively small direction control valve	- Replace directional control valve with larger one.
	2. High resistant system component	- Make sure to use valve and other components of appropriate sizes. Be careful not to overlook the sizes of tubing and fittings. Use proper size components and piping at exhaust side.
Cylinder occasionally stops operating.	1. Very low speed operation (5mm/s or slower)	- Very low speed operation results in malfunction as it reduces the difference in pressure between supply and exhaust sides of cylinder to almost none and reduces a sealing effect. Use cylinder within the specified range of operating speed.
	2. Failure of other system components than cylinder	- Check all the system components one by one in order.
Cylinder stops operating.	1. Damaged piston seal	- Replace cylinder. (CM2Y) - Replace piston seal. (CA2Y, CQSY, CQ2Y, CG1Y)
	2. Failure of other system components than cylinder	- Check all the system components one by one in order.
	3. Insufficient air pressure	- Supply adequate amount of pressure.
Piston rod is deformed/damaged.	1. High speed operation	- High speed operation may cause deformation due to impact force. Use cylinder within the specified range of operating speed.
	2. Influence of abnormal external force	- Mechanical interference, offset load and excessive load cause a deformation and damage to cylinder. Eliminate these factors.

Failure	Main cause	Measures
Speed controller cannot control cylinder speed.	1. Inappropriate selection of speed controller	- Use a speed controller appropriate to desired cylinder speed.
	2. Failure of speed controller	- Replace speed controller.
Cylinder operation has a stick-slip.	1. Slow-moving cylinder	- See the descriptions of occasional stops of cylinder operation above.
	2. No margin of cylinder capacity	- Increase operating pressure. - Replace cylinder with the one of larger bore size.
Cylinder starts operating at high speed right after a long suspension.	1. Difference in cylinder residual pressure between continuous operation and the first operation right after a long suspension	- Consider using a valve that prevents quick extension of cylinder.
Switch does not turn on. (Switch sometimes does not turn on.)	1. Power supply failure and improper connection	- Repair power supply and correct wiring.
	2. Misaligned switch mounting position	- Slide switch over the cylinder to confirm switch-on position and set it again in position.
	3. Weakened magnetic force	- If magnetic power source is located near the cylinder, separate them at a distance or install a shielding board between them. - When cylinder is at a high temperature, keep it below 60°C by controlling operating frequency, etc. - Replace cylinder if switch still does not turn on after taking these measures.
	4. Lowering of switch sensitivity	- Eliminate abnormalities in ambient temperature, vibration and impact. Replace switch if problems still cannot be solved.
Switch does not turn off. (Switch sometimes does not turn off.)	1. Melting adhesion of reed switch contact	- Replace auto switch after confirming that voltage and load do not exceed rated values.
	2. Retention of switch-on state due to external magnetic field	- If magnetic power source is located near the cylinder, separate them at a distance or install a shielding board between them. - When cylinder is at a high temperature, keep it below 60°C by controlling operating frequency, etc. - Replace cylinder if switch still does not turn on after taking these measures.

6. Construction and material

Series CM2Y

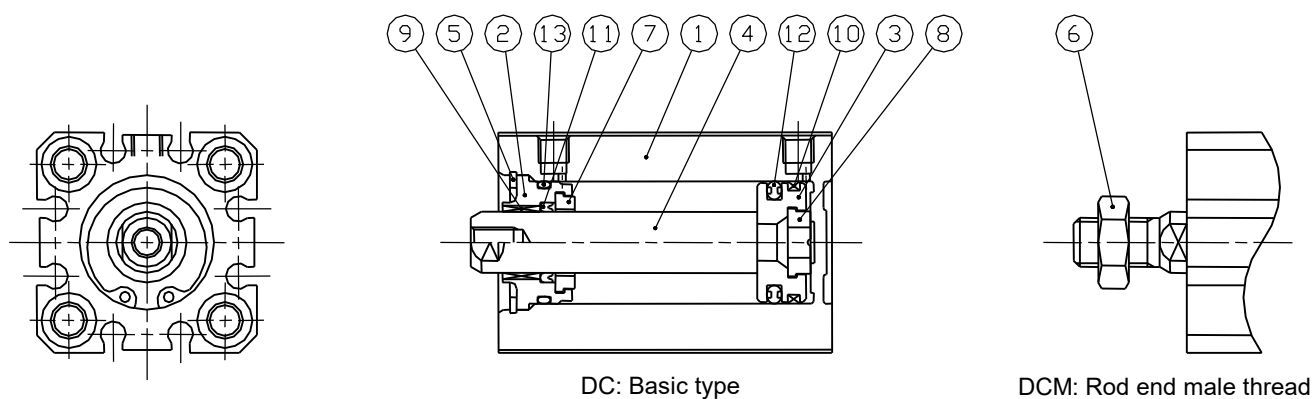


Construction of CM2Y

Parts list

No.	Description	Material	Qty.	Surface treatment
1	Rod cover	Aluminum alloy	1	Anodized
2A	Head cover A	Aluminum alloy	1	Anodized
2B	Head cover B	Aluminum alloy	1	Anodized
2C	Head cover C	Aluminum alloy	1	Anodized
3	Cylinder tube	Stainless steel	1	
4	Piston	Aluminum alloy	1	
5	Piston rod	Carbon steel	1	Hard chrome plated
6	Bushing	Bearing alloy	1	
7	Seal retainer	Rolled steel plate	1	
8	Retaining ring	Carbon steel	1	Phosphate coated
9	Bumper A	Resin	1	
10	Bumper B	Resin	1	
11	Retaining ring	Stainless steel	1	
12	Bushing for clevis	Bearing alloy	1	
13	Rod seal	NBR	1	
14	Piston seal	NBR	1	
15	Piston gasket	NBR	1	
16	Wear ring	Resin	1	
17	Nut	Carbon steel	1	Nickel plated
18	Rod end nut	Carbon steel	1	Zinc chromated

Series CQSY

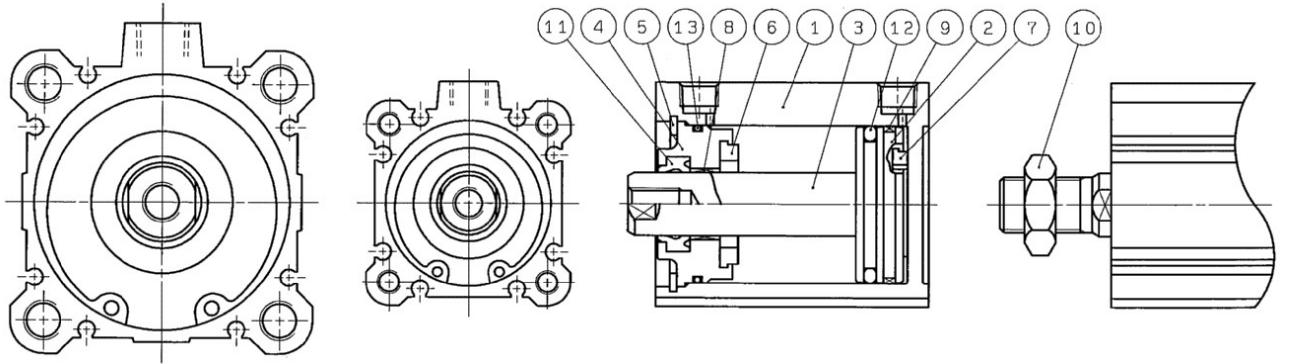


Construction of CQSY12 to 25

Parts list

No.	Description	Material	Qty.	Surface treatment
1	Cylinder tube	Aluminum alloy	1	Hard anodized
2	Collar	Aluminum alloy	1	Anodized
3	Piston	Aluminum alloy	1	
4	Piston rod	Stainless steel	1	
5	Retaining ring	Carbon tool steel	1	Phosphate coated
6	Rod end nut	Carbon steel	1	Zinc chromated
7	Bumper A	Urethane	1	
8	Bumper B	Urethane	1	
9	Bushing	Oil-impregnated sintered metal	1	
10	Wear ring	Resin	1	
11	Rod seal	NBR	1	
12	Piston seal	NBR	1	
13	Tube gasket	NBR	1	

Series CQ2Y



Ø50 to Ø100 cylinder tube

Ø32 to Ø40 cylinder tube

DCZ: Basic type

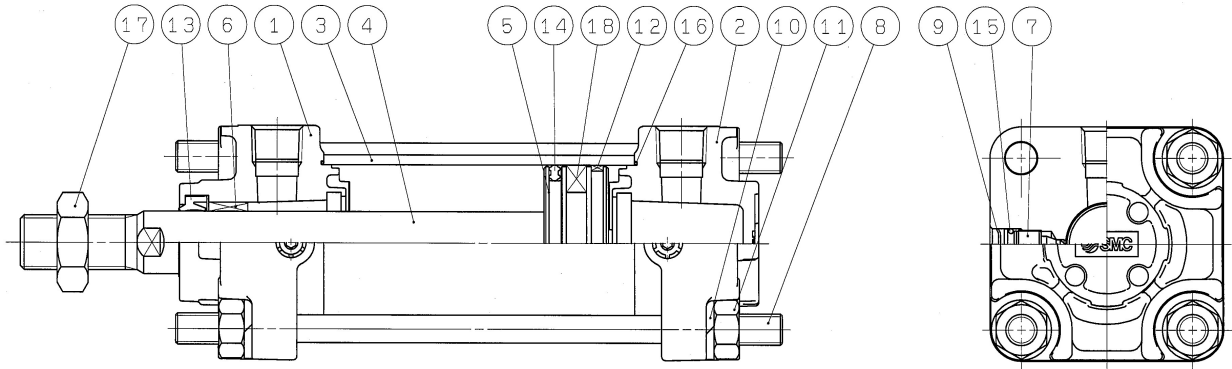
DCMZ: Rod end male thread

Construction of CQ2Y32 to 100

Parts list

No.	Description	Material	Qty.	Surface treatment
1	Cylinder tube	Aluminum alloy	1	Hard anodized
2	Piston	Aluminum alloy	1	
3	Piston rod	Carbon steel	1	Hard chrome plated
4	Collar	Aluminum alloy	1	Anodized
5	Retaining ring	Carbon tool steel	1	Phosphate coated
6	Bumper A	Urethane	1	
7	Bumper B	Urethane	1	
8	Bushing	Bearing alloy	1	
9	Wear ring	Resin	1	
10	Rod end nut	Carbon steel	1	Zinc chromated
11	Rod seal	NBR	1	
12	Piston seal	NBR	1	
13	Tube gasket	NBR	1	

Series CA2Y

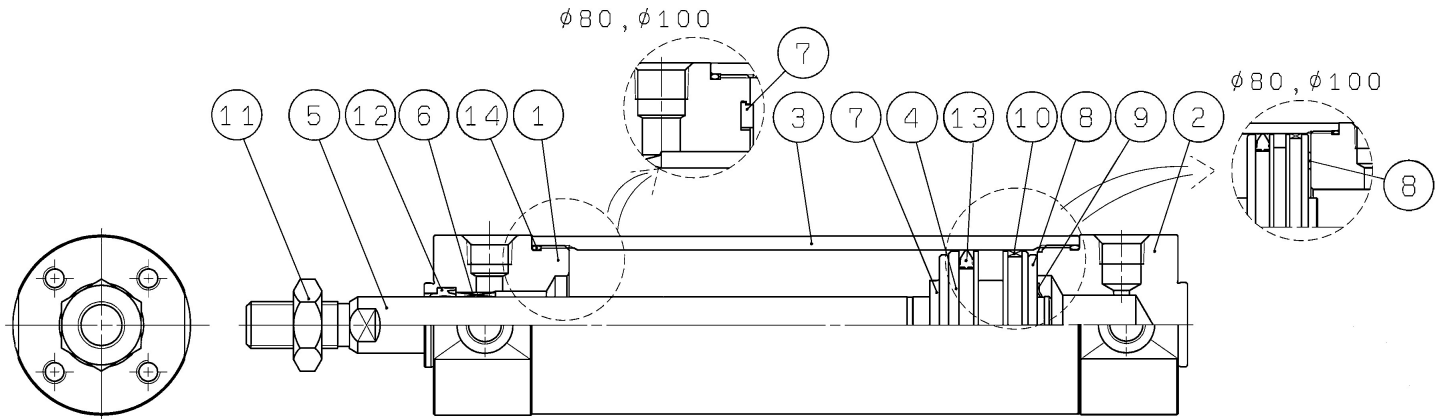


Construction of CA2Y40 to 100

Parts list

No.	Description	Material	Qty.	Surface treatment
1	Rod cover	Aluminum alloy	1	Chromated
2	Head cover	Aluminum alloy	1	Chromated
3	Cylinder tube	Aluminum alloy	1	Hard anodized
4	Piston rod	Carbon steel	1	Hard chrome plated
5	Piston	Aluminum alloy	1	Chromated
6	Bushing	Bearing alloy	1	
7	Cushion valve	Rolled steel	2	Zinc chromated
8	Tie rod	Carbon steel	4	Zinc chromated
9	Retaining ring	Spring steel	2	Phosphate coated
10	Spring washer	Steel wire	8	Zinc chromated
11	Tie rod nut	Rolled steel	8	Zinc chromated
12	Wear ring	Resin	1	
13	Rod seal	NBR	2	
14	Piston seal	NBR	1	
15	Cushion valve seal	NBR	1	
16	Cylinder tube gasket	NBR	2	
17	Rod end nut	Rolled steel	1	Zinc chromated

Series CG1



Construction of CG1Y20 to 100

Parts list

No.	Description	Material	Qty.	Surface treatment
1	Rod cover	Aluminum alloy	1	Anodized
2	Head cover	Aluminum alloy	1	Anodized
3	Cylinder tube	Aluminum alloy	1	Hard anodized
4	Piston	Aluminum alloy	1	
5	Piston rod	Carbon steel	1	Hard chrome plated
6	Bushing	Sintered metal	1	
7	Bumper A	Urethane	1	
8	Bumper B	Urethane	1	Shared with damper A for $\phi 40$ or larger
9	Retaining ring	Stainless steel	1	No retaining ring for $\phi 80$ and $\phi 100$
10	Wear ring	Resin	1	
11	Rod end nut	Rolled steel	1	Zinc chromated
12	Rod seal	NBR	1	
13	Piston seal	NBR	1	
14	Tube gasket	NBR	2	

Replacement part

Series	Bore size	Part number	Contents
CQSY	12	CQSY12-PS	Piston seal: 1 pc. Rod seal: 1 pc. Tube gasket: 1 pc. Grease (10g): 1 bag
	16	CQSY16-PS	
	20	CQSY20-PS	
	25	CQSY25-PS	
CQ2Y	32	CA2Y32-PS	Piston seal: 1 pc. Rod seal: 1 pc. Tube gasket: 1 pc. Grease (10g): 1 bag
	40	CA2Y40-PS	
	50	CA2Y50-PS	
	63	CA2Y63-PS	
	80	CA2Y80-PS	
	100	CA2Y100-PS	
CA2Y	40	CA2Y40Z-PS	Piston seal: 1 pc. Rod seal: 1 pc. Tube gasket: 2 pc. Grease (10g): 1 bag
	50	CA2Y50Z-PS	
	63	CA2Y63Z-PS	
	80	CA2Y80Z-PS	
	100	CA2Y100Z-PS	
CM2Y	20	CM20Z-PS	Rod seal
	25	CM25Z-PS	
	32	CM32Z-PS	
	40	CM40Z-PS	
CG1Y	20	CG1Y20Z-PS	Piston seal: 1 pc. Rod seal: 1 pc. Tube gasket: 1pc. Grease (10g): 1 bag
	25	CG1Y25Z-PS	
	32	CG1Y32Z-PS	
	40	CG1Y40Z-PS	

When only grease for maintenance is required, order it by the following numbers.

Net weight	Part no.
5g	GR-L-005
10g	GR-L-010
150g	GR-L-150

Revision history

– A : Revised by reviewing the description.

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