SMC

No.	CXSJ-OM0002H	

OPERATION MANUAL

TITLE : Compact Type
Dual-Rod Cylinder

- ○Read this manual thoroughly before mounting and operation.
- ○Especially, carefully read the description concerning safety.
- ○Keep this manual where accessible when necessary.

SMC CORPORATION

FORMAT No.FOM007-2

☆☆☆☆ I N D E X ☆☆☆☆

Series CXSJ
Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of **"Caution"**, **"Warning"** or **"Danger"**. To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

⚠ Caution : Operator error could result in injury or equipment damage.

⚠ Warning : Operator error could result in serious injury or loss of life.

⚠ Danger : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems
Note 2) JIS B 8370: Pneumatic system axiom

⚠ Warning

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

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

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

1. Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

Series CXSJ
Actuator Precautions 1

Be sure to read before handling.

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 get caught in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be designed to prevent 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 impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve impact. In this case, the rigidity of the machinery should also be examined.

5. Consider a possible drop in operating pressure due to a power outage.

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

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.

Take special care when a cylinder is operated by an exhaust center type directional control valve or when it is starting up after residual pressure is exhausted from the circuit. 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 when this occurs, there is a danger of bodily injury, particularly to limbs, and/or damage to equipment.

8. Consider emergency stops.

Design so that human injury and/or damage to machinery and euqipment 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 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 safely equipment.

Selection

⚠Warning

1. Check the specifications.

The products advertised in this catalog are designed according to use in industrial compressed air systems. If the products are used in conditions where pressure, temperature, etc., are out of specification, damage and/or malfunction may be caused. Do not use in these conditions. (Refer to specifications.)
Consult with SMC if you use a fluid other than compressed air.

2. Intermediate stops

When intermediate stopping of a cylinder piston is performed with a 3-position closed center type directional control valve, it is difficult to achieve stopping positions as accurately and precisely as with hydraulic pressure due to the compressibility of air.
Furthermore, since valves and cylinders 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

1. Operate within the limits of the maximum usable stroke.

The piston rod will be damaged if operated beyond the maximum stroke. Refer to the cylinder model selection procedure for the maximum usable stroke.

2. Operate the piston with in 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 cylinder model selection procedure for the maximum usable stroke.

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

Piping

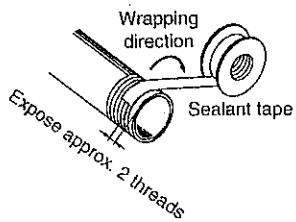
⚠Caution

1. Preparation before piping

Before piping is connected, 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 together pipes and fittings, be certain that 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.



Series CXSJ
Actuator Precautions 2
Be sure to read before handling.

Mounting

⚠Caution

1. Do not scratch or gouge the cylinder tube or the sliding parts of the piston rod by striking or grasping them with other objects.

Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation.
Moreover, scratches or gouges, etc. in the piston rod may lead to damaged seals and cause air leakage.

2. When attaching and tightening a work piece to the end of the plate, the plate should be secured while the piston rod is fully retracted to avoid excessive torque applied to the piston rod.

3. Do not use until you can verify that equipment can operate properly.

Following mounting, repairs, or conversions, verify correct mounting by conducting suitable function and leakage tests after piping and power connections have been made.

4. Instruction manual

The product should be mounted and operated after the instruction manual is thoroughly read and its contents are understood.
Keep the instruction manual where it can be referred to as needed.

Lubrication

⚠Caution

1. Lubrication of non-lube type cylinder

The cylinder is lubricated for life at the factory and can be used without any further lubrication.
However, in the event that additional cylinder lubrication is required, be sure to use ISO VG32 Class 1 turbine oil (with no additives).
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.

Lubrication

⚠Warning

1. Use clean air.

Do not use compressed air that includes chemicals, cynthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

⚠Caution

1. Install air filters.

Install air filters at the upstream side of valves. The filtration degree should be 5 μm or finer.

2. Install an after-cooler air dryer or water separator, etc.

Air that includes much drainage can cause malfunction of valves and other pneumatic equipment. To prevent this, install an after-cooler, air dryer or water separator, etc.

Air Supply

⚠Caution

1. Use the product within the range of specifications for fluid temperature 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.

Refer to SMC's Best Pneumatics catalog Vol. 4 for further details on compressed air quality.

Operating Environment

⚠Warning

1. Do not use in environments where there is a danger of corrosion.

Refer to the construction drawings regarding cylinder materials.

2. In dusty conditions or where water or oil splashing is a regular occurrence, protect the rod by installing a rod cover.

In dusty locations, use a coil scraper type (available through special order). When there is splashing or spraying of liquid, use a water-resistant cylinder (available through special order).

3. When using auto switches, do not operate in an environment where there are strong magnetic fields.

Maintenance

⚠Warning

1. Perform maintenance inspection according to the procedures indicated in the instruction manual.

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

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

Before any machinery or equipment is removed, first ensure that the appropriate measures are in place to prevent the fall 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 sudden movement.

⚠Caution

1. Filter flushing

Remove drainage from air filters regularly.

2 Mounting

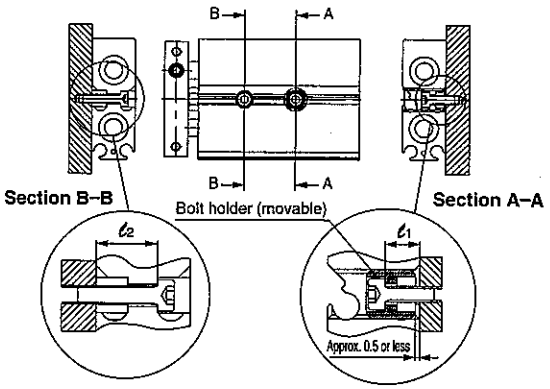
⚠ Caution

①.Make sure that the surface on which the cylinder is to be mounted is flat (reference value for flatness:0.05 or less).Otherwise, the accuracy of the piston rod operation is not achieved, and malfunctioning can occur.

②.The piston rod must be retracted when mounting the cylinder. Scratches or gouges in the piston rod may lead to damaged bearings and seals and cause malfunctions or air leakage.

③.Bolt holder (ϕ 6, ϕ 10)

Adjust the bolt holder using a hexagon wrench 3 mm in width across flats so that it does not protrude from the cylinder surface (approx.0.5 mm depth from the cylinder surface to the top of the holder). If the bolt holder is not properly adjusted, it can interfere with the switch rail, hindering the auto switch mounting. The required length of the mounting bolt for a bolt holder and mounting hole in the rod cover side varies depending on the bearing surface position for the mounting bolt. Refer to dimensions l_1 and l_2 provided below to select the appropriate mounting bolt length.



	ℓ_1 (mm)	ℓ_2 (mm)
CXSJ□6	5	8.4
CXSJ□10	5	9.5

※The size of the bolt is M3×0.5

④. Please use the bolt holder when you install the cylinder. There is a possibility that the dropout of the bolt holder is generated when the bolt holder is not used and the cylinder is operated.

3. Piping

①. For axial piping, the side port of the standard cylinder is plugged. However, a plugged port can be switched according to the operating conditions. When switching the plugged port, check the air leakage. If small air leakage is detected, unplug the port, then check the seat surface, and reassemble it.

4. Stroke Adjustment

⚠ Caution

①. After adjusting the stroke, make sure to tighten the hexagon nut to prevent it from loosening. Dual-rod cylinders have a bolt to adjust 0 to -5 mm stroke on the retracted end (IN). Loosen the hexagon nut to adjust the stroke; however, make sure to tighten the hexagon nut after making an adjustment.

②. Never operate a cylinder with its bumper bolt removed. Also, do not attempt to tighten the bumper bolt without using a nut. If the dumper bolt is removed, the piston hits the head cover causing damage to the cylinder. Therefore, do not use a cylinder without a bumper bolt. Furthermore, if the bumper bolt is tightened without a nut, the piston seal is caught in the leveled part, damageing the seal.

③. A bumper at the end of the bumper bolt is replaceable. In case a missing bumper, or a bumper has a permanent setting, use a following part numbers for ordering.

Bore size (mm)	6	10, 15	20, 25	32
Part no.	CXS06-34 -A5157	CXS10-34A 28747	CXS20-34A 28749	CXS32-34A 28751
Qty.	1			

5. Disassembly and Maintenance

⚠ Caution

①. Never use a cylinder with its plate removed. When removing the hexagon socket head cap screw on the end plate, the piston rod must be secured to prevent from rotating. However, if the sliding parts of the piston rod are scratched and gouged, a malfunction may occur.

②. When disassembling and reassembling the cylinder, contact SMC or refer to the separate instruction manual.

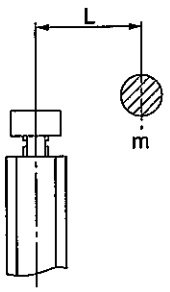
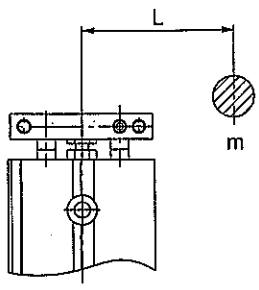
⚠ Warning

①. Take precautions when your hands are near the plate and housing.

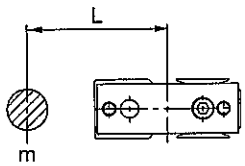
When the cylinder is operated, take extra precautions to avoid getting your Hands and fingers caught between the plate and housing, that can cause a bodily injury.

6. Model Selections

Vertical Mounting

Mounting orientation				
Max. speed (mm/s)	up to 200	up to 400	up to 600	up to 800
Stroke (mm)	All strokes			
Selection graph (ø6, ø10, ø15, ø20, ø25, ø32)	1	2	3	4

Horizontal Mounting

Mounting orientation										
	* Refer to the caution notes below.									
Stroke (mm)	up to 10		up to 30		up to 50		up to 75		up to 100	
Max. speed (mm/s)	up to 400	more than 400	up to 400	more than 400	up to 400	more than 400	up to 400	more than 400	up to 400	more than 400
ø6	5		6		7					
ø10										
Selection graph ø15										
ø20	8	9	10	11	12	13	14		15	
ø25										
ø32										

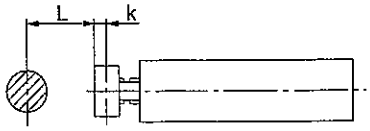
* The maximum speeds for ø6 to ø32 are: ø6, 10: up to 800 mm/s; ø15, 20: up to 700 mm/s; ø25, 32: up to 600 mm/s

⚠ Caution

If the cylinder is horizontally mounted and the plate end does not reach the load's center of gravity, use the formula below to calculate the imaginary stroke L' that includes the distance between the load's center of gravity and the plate end. Select the graph that corresponds to the imaginary stroke L'.

Imaginary stroke L' = (Stroke) + k + L
k: Distance between the center and end of the plate

ø6	2.75 mm
ø10	4 mm
ø15	5 mm
ø20	6 mm
ø25	
ø32	8 mm

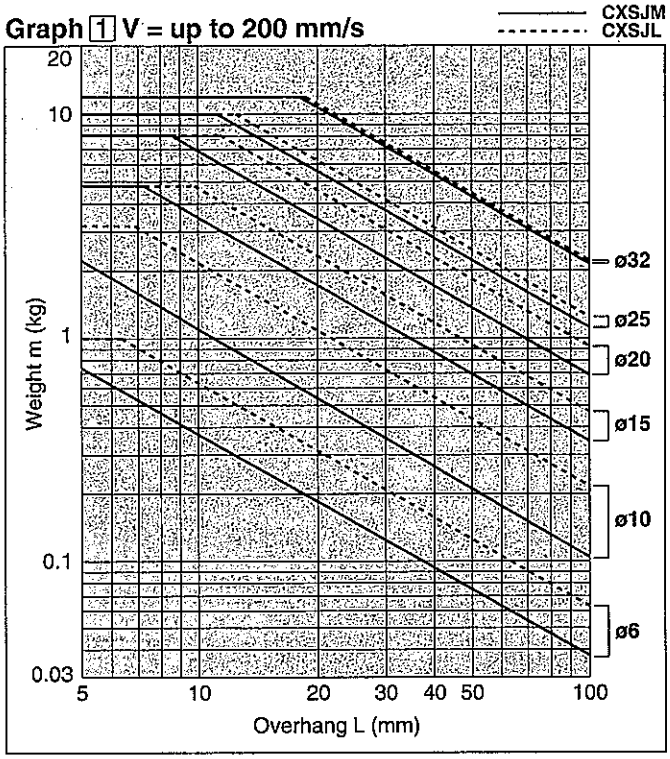


(Example)
① When using CXSJM6-10 and L = 15 mm:
Imaginary stroke L' = 10 + 2.75 + 15 = 27.75
Therefore, the graph used for your model selection should be the one for CXSJM6-30 [6].

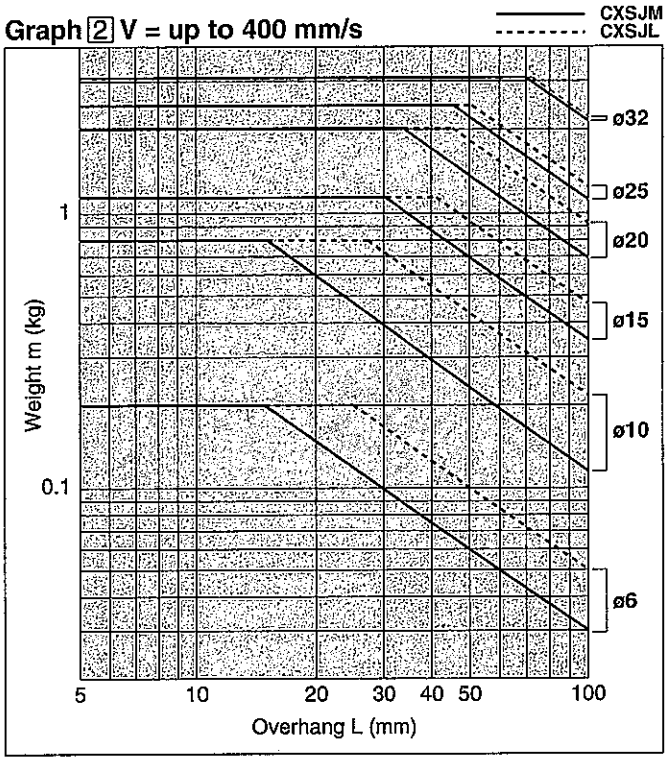
② When using CXSJL25-50 and L = 10 mm:
Imaginary stroke L' = 50 + 6 + 15 = 71
Therefore, the graph used for your model selection should be the one for CXSJL25-75 [14].

Vertical Mounting

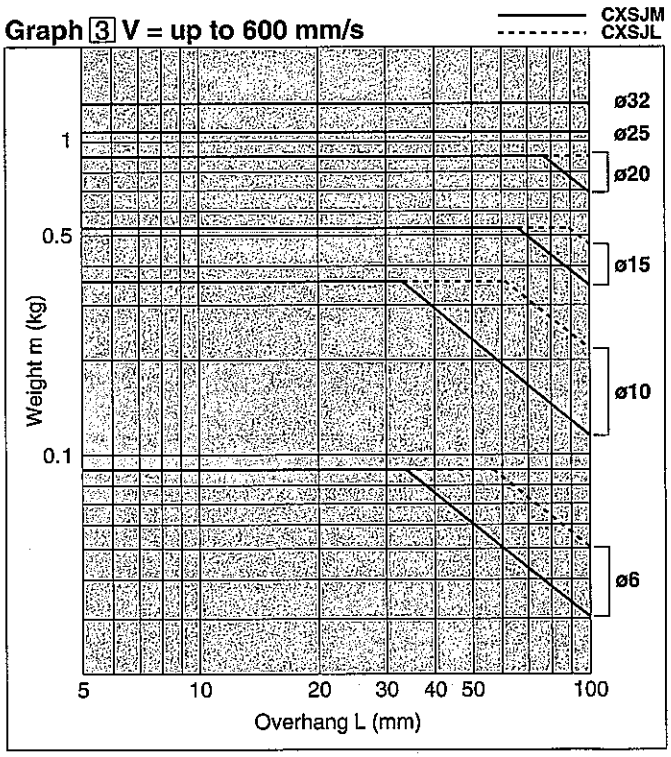
Graph 1 V = up to 200 mm/s



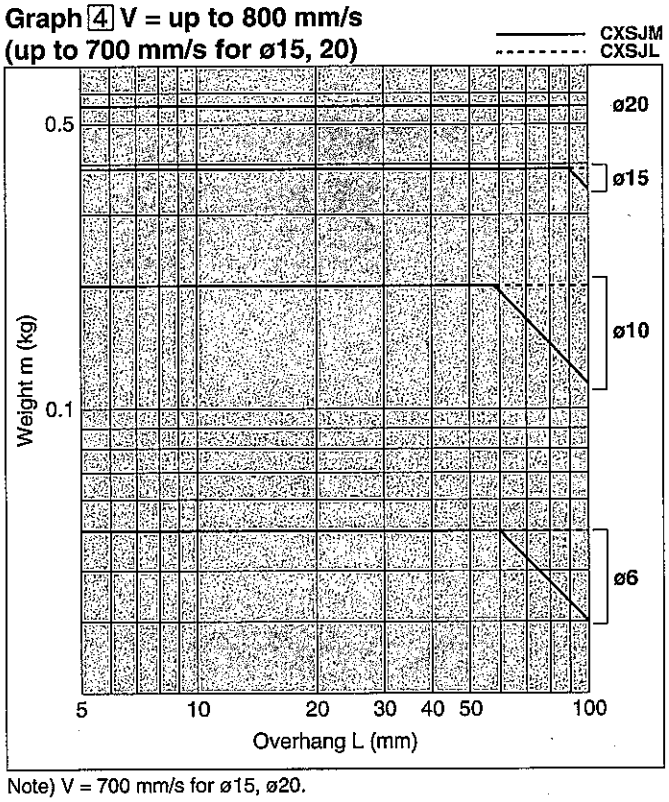
Graph 2 V = up to 400 mm/s



Graph 3 V = up to 600 mm/s



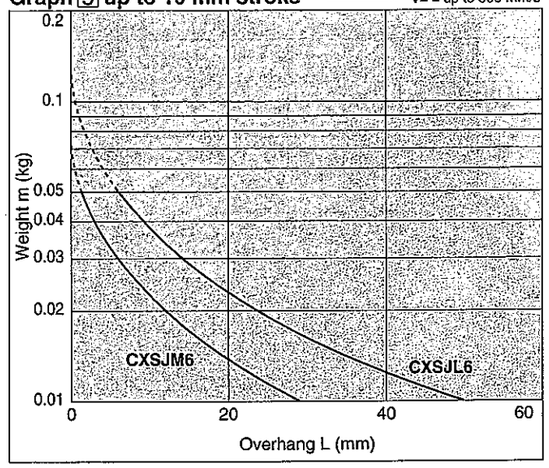
Graph 4 V = up to 800 mm/s (up to 700 mm/s for ø15, 20)



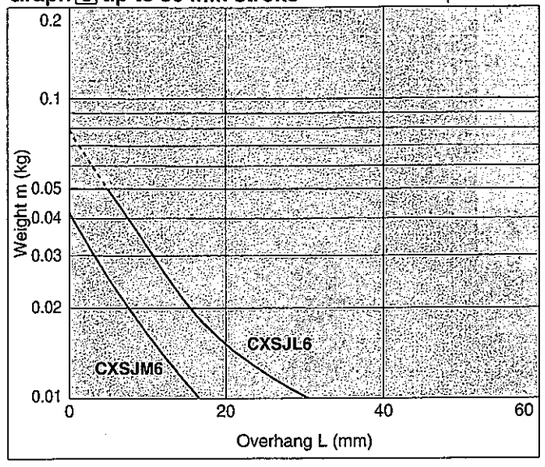
Note) V = 700 mm/s for ø15, ø20.

Horizontal Mounting

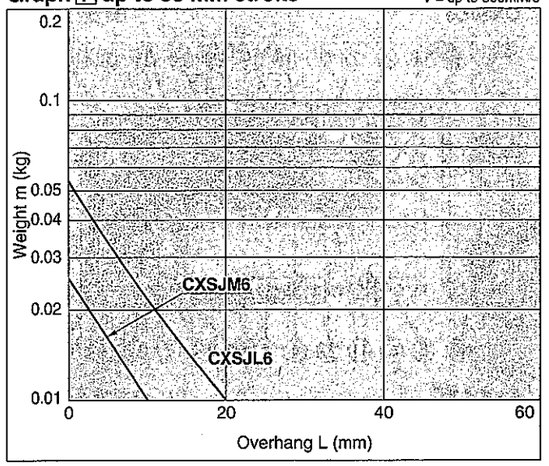
Graph 5 up to 10 mm stroke — V = up to 400 mm/s; V= = up to 800 mm/s



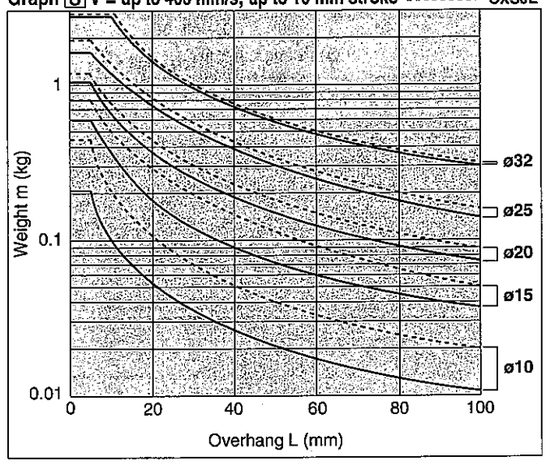
Graph 6 up to 30 mm stroke — V = up to 400 mm/s; V= = up to 800 mm/s



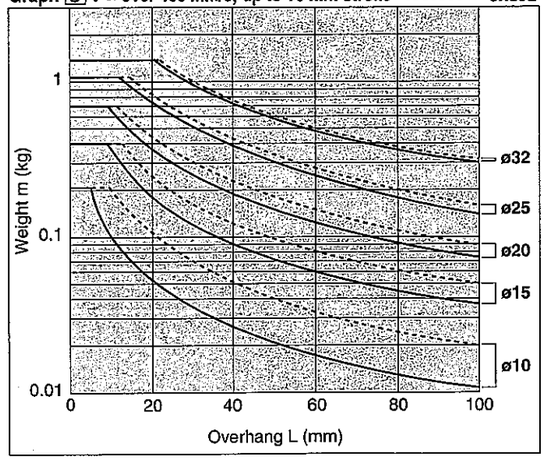
Graph 7 up to 50 mm stroke — V = up to 800mm/s



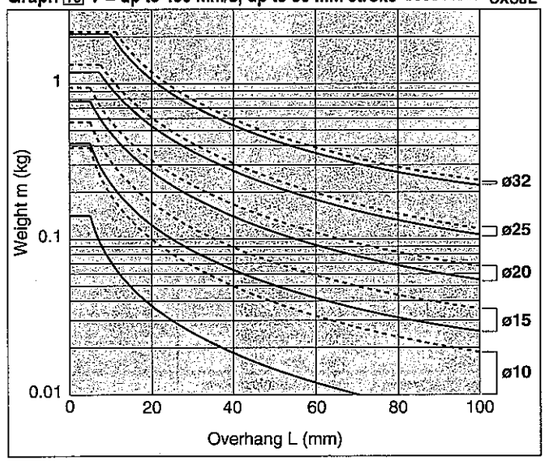
Graph 8 V = up to 400 mm/s; up to 10 mm stroke — CXSJM; CXSJL



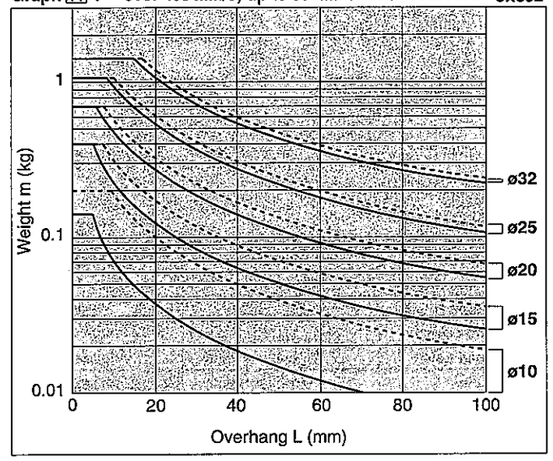
Graph 9 V = over 400 mm/s; up to 10 mm stroke — CXSJM; CXSJL



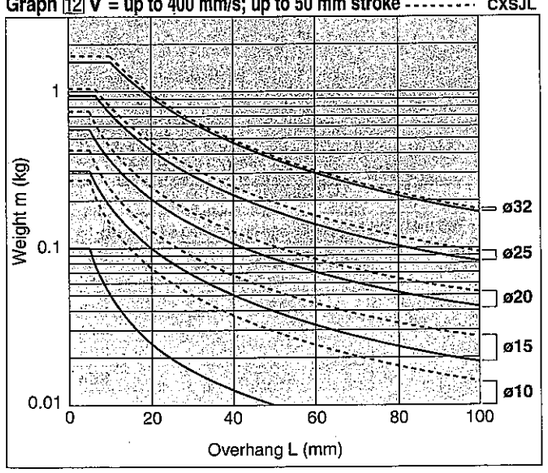
Graph 10 V = up to 400 mm/s; up to 30 mm stroke — CXSJM; CXSJL



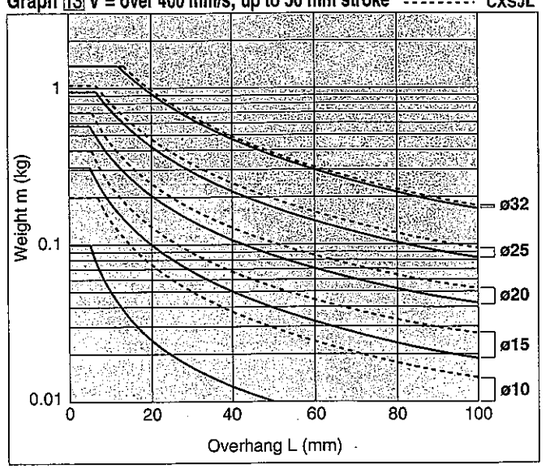
Graph 11 V = over 400 mm/s; up to 30 mm stroke — CXSJM; CXSJL



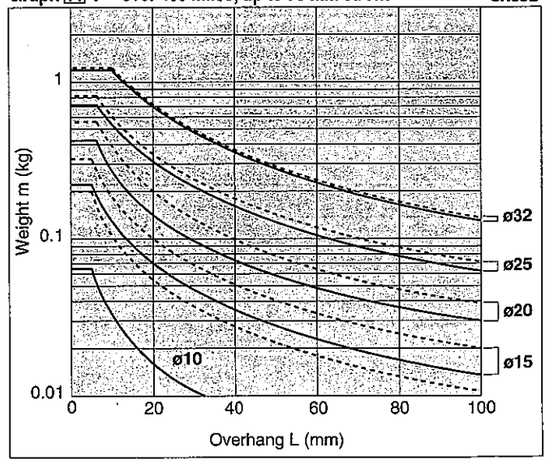
Graph 12 V = up to 400 mm/s; up to 50 mm stroke — CXSJM; CXSJL



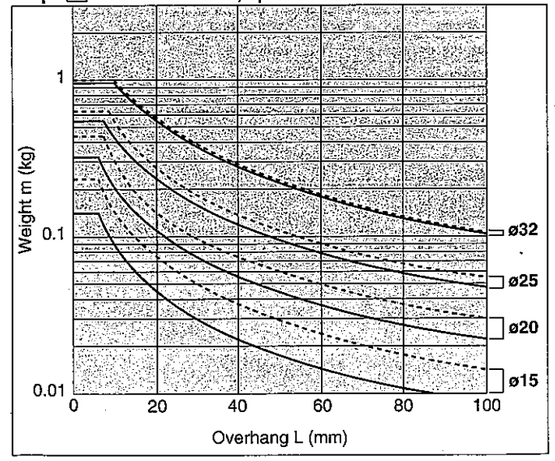
Graph 13 V = over 400 mm/s; up to 50 mm stroke — CXSJM; CXSJL



Graph 14 V = over 400 mm/s; up to 75 mm stroke — CXSJM; CXSJL



Graph 15 V = over 400 mm/s; up to 100 mm stroke — CXSJM; CXSJL



7. Exchanging packing

⚠ Caution

It decomposes and it is necessary to assemble the cylinder in a clean place.
Please begin working after it wipes off with beautiful waste etc.

1) Loosen and remove the Hexagon socket head cap screw ⑬ and set screw ⑭ which fix Plate ⑥, rod ② and ③. Then the plate out of the rod.
At this occasion, screws are sometime hard to unscrew because they are applied rock-tight. Pay attention not to damage the hexagon head.
As plates are sometime hard to unscrew as well, use a gear-puller not to damage rods.

2) Detach snap rings ⑮ on the side of head cover ⑤ using C-crimp pliers.

3) Hit rods lightly with a plastic hammer, then pull them out from head cover side. At this occasion, they go through bearing part, so make sure there are no burrs or deformation. Burrs or deformations have to be removed by a file or sandpaper.

4) Detach the snap rings 22 on the side of rod cover ④ by using C-crimp pliers, then the rod cover (See the table below) away in the same method of 7-3).

	φ 6	φ 10	φ 15	φ 20	φ 25	φ 32
CXSJM type	④	⑱	⑲	④	⑯ ⑱	⑲
CXSJL type	④ ⑱ ⑲ 24 25			④ ⑯ ⑱ ⑲ 25 30		

5) Reusing of packing is not possible. They have to be replaced by the new one at the occasion of reassembling.
At this time, grease (Multi purpose 2) has to be applied to packings and kept away from the dust.

6) It assembles it again in decomposition and order of the inverted hand.

7) Finally, assemble the plate to the rod. At this point, as the rod has to be revealed, pressure [more than 0.2MPa] has to come from supply port of head cover side. Under this consition, press plate against rod ③ and tighten

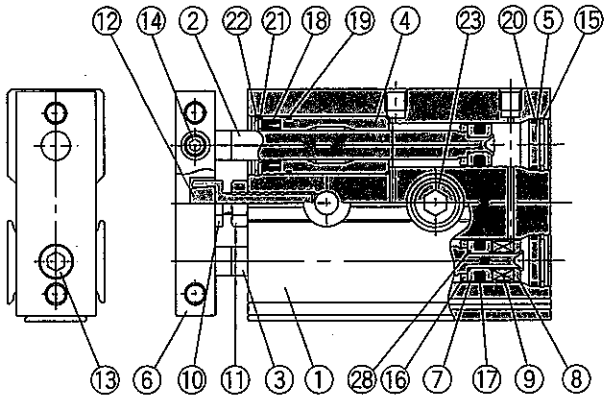
the Hexagon socket head cap screw ⑬, then tighten set screw ⑭.
Rock-tight has to be applied to thread.
After tightening of ⑬ and ⑭, make sure there is no problem when it is operated in minimum operation pressure (See below). (It has to be move smoothly by hand).

Tube bore size(mm)	6	10	15	20	25	32
Minimum operating pressure(MPa)	0.15	0.1		0.05		

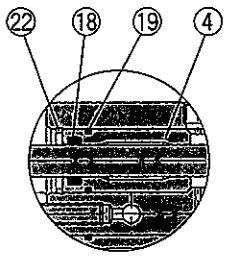
Construction

CXSJM (Slide bearing)

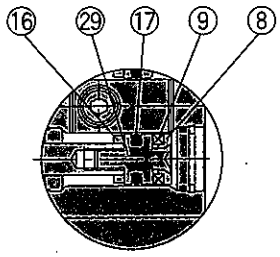
CXSJM6



CXSJM10



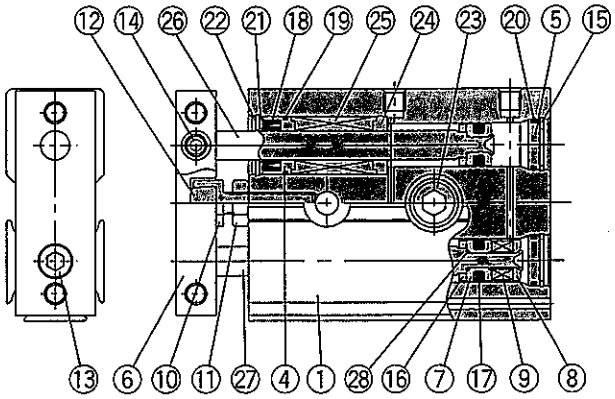
Rod cover



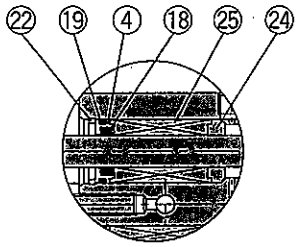
Piston rod B-side piston

CXSJL (Ball bushing bearing)

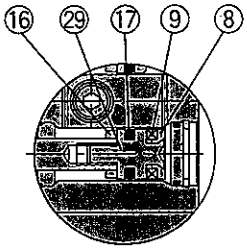
CXSJL6



CXSJL10



Rod cover



Piston rod B-side piston

Parts List: Standard Piping

No.	Description	Material	Note
1	**Housing**	Aluminum alloy	Hard anodized
2	**Piston rod A**	Carbon steel Note 1)	Hard chromium electroplated
3	**Piston rod B**	Carbon steel Note 1)	Hard chromium electroplated
4	**Rod cover**	Aluminum bearing alloy	
5	**Head cover**	Aluminum alloy	Anodized
6	**Plate**	Aluminum alloy	Glossy, self-coloring hard anodized
7	**Piston A**	Aluminum alloy	Chromated
8	**Piston B**	Aluminum alloy	Chromated
9	**Magnet**	Magnetic material	
10	**Bumper bolt**	Carbon steel	Nickel plated
11	**Hexagon nut**	Carbon steel	Nickel plated
12	**Bumper**	Polyurethane	
13	Hexagon socket head cap screw	Chromium steel	Nickel plated
14	Hexagon socket head set screw	Chromium steel	Nickel plated
15	**Snap ring**	Special steel	Nickel plated

Note 1) Stainless steel for CXSJM6.

No.	Description	Material	Note
16	**Bumper B**	Polyurethane	
17	**Piston seal**	NBR	
18	**Rod seal**	NBR	
19	**O-ring**	NBR	
20	**O-ring**	NBR	
21	**Seal retainer**	Stainless steel	
22	**Snap ring B**	Special steel	Nickel plated
23	**Bolt holder**	Stainless steel	
24	**Bearing spacer**	Aluminum bearing alloy	
25	**Ball bushing**	—	
26	**Piston rod A**	Special steel	Hard chromium electroplated
27	**Piston rod B**	Special steel	Hard chromium electroplated
28	**O-ring**	NBR	
29	**Piston C**	Stainless steel	
30	**Bumper holder**	Resin	

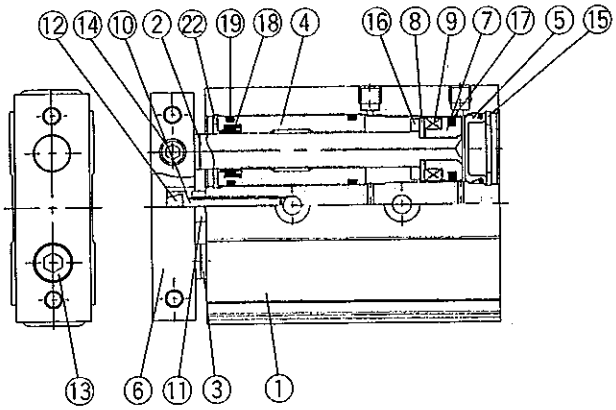
Replacement Parts: Seal Kits

Model	Seal kit No.	Content
CXSJ□6	CXSJ6-PS	Items ⑰, ⑱, and ⑳ from the chart above
CXSJ□10	CXSJ10-PS	

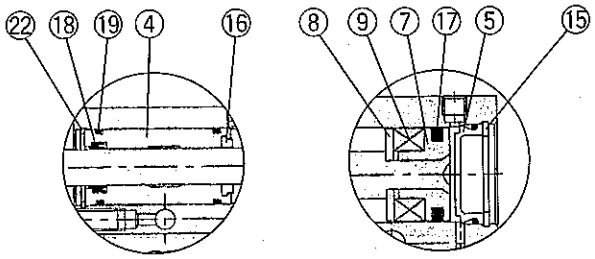
Construction:

CXSJM (Slide bearing)

CXSJM15



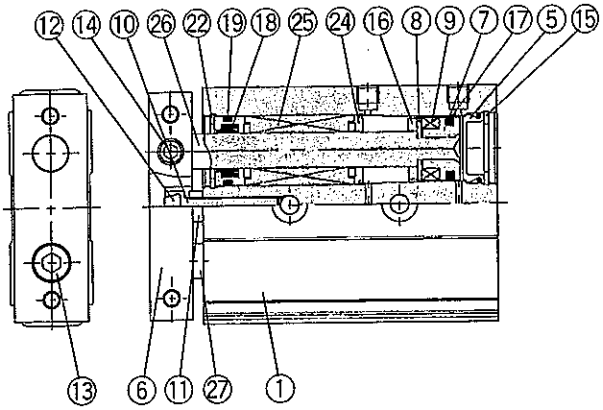
CXSJM20 to 32



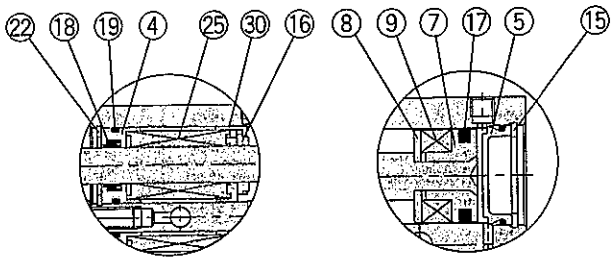
Rod cover　　Head cover

CXSJL (Ball bushing bearing)

CXSJL15



CXSJL20 to 32



Rod cover　　Head cover

Parts List: Standard Piping

No.	Description	Material	Note
1	**Housing**	Aluminum alloy	Hard anodized
2	**Piston rod A**	Carbon steel	Hard chromium electroplated
3	**Piston rod B**	Carbon steel	Hard chromium electroplated
4	**Rod cover**	Aluminum bearing alloy	
5	**Head cover**	Special steel	
6	**Plate**	Aluminum alloy	Glossy, self-coloring hard anodized
7	**Piston A**	Aluminum alloy	Chromated
8	**Piston B**	Stainless steel	
9	**Magnet**	Magnetic material	
10	**Bumper bolt**	Carbon steel	Nickel plated
11	**Hexagon nut**	Carbon steel	Nickel plated
12	**Bumper**	Polyurethane	
13	Hexagon socket head cap screw	Chromium steel	Nickel plated
14	Hexagon socket head set screw	Chromium steel	Nickel plated
15	**Snap ring**	Special steel	Nickel plated
16	**Bumper B**	Polyurethane	
17	**Piston seal**	NBR	
18	**Rod seal**	NBR	
19	**O-ring**	NBR	
20	**O-ring**	NBR	
21	**Seal retainer**	Stainless steel	
22	**Snap ring B**	Special steel	Nickel plated
23	**Bolt holder**	Stainless steel	
24	**Bearing spacer**	Resin	
25	**Ball bushing**	—	
26	**Piston rod A**	Special steel	Hard chromium electroplated
27	**Piston rod B**	Special steel	Hard chromium electroplated
28	**O-ring**	NBR	
29	**Piston C**	Stainless steel	
30	**Bumper holder**	Resin	

Replacement Parts: Seal Kits

Model	Seal kit No.	Content
CXSJM15	CXSM15-PS	Items ⑰, ⑱, and ⑲ from the chart above
CXSJM20	CXSM20-PS	
CXSJM25	CXSM25-PS	
CXSJM32	CXSM32-PS	
CXSJL15	CXSL15APS	
CXSJL20	CXSL20APS	
CXSJL25	CXSL25APS	
CXSJL32	CXSL32APS	