



# Operation Manual

PRODUCT NAME

*STOPPER CYLINDER*

MODEL / Series / Product Number

RS(D)Q \* 12 – \*

RS(D)Q \* 16~50 – \* Z

**SMC Corporation**

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# RSQ/RSQ-Z 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 10218-1992: 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.



# RSQ/RSQ-Z Safety Instructions

## Caution

### **1. 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.\*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.**

\*1. Specifications

1-1. Cylinder specifications

Action	Double acting, double acting with spring, and single acting (spring extended).
Fluid	Air
Proof pressure	1.5MPa
Max. Operating pressure	1.0Mpa
Ambient and operating fluid temperature	Without auto switch: -10°C to 70°C/ with auto switch: -10 °C to 60°C
Lubrication	Not required (non-lube)
Cushion	Rubber bumper
Stroke length tolerance	+1.4 0
Mounting bracket	Through hole or both ends tapped style
Auto switch	Mountable

1-2. Single acting (Spring extended) spring force (N)

Bore size	Extended	Compressed
12	3.9	9.6
16	4.9	14.9
20	3.4	14.9
32	8.8	18.6
40.50	13.7	27.5

※Applicable when the rod end configuration is round bar type, chamfered type, roller type, round bar type with female thread or chamfered type with female thread.

2. Internal diameter and standard stroke

(mm)

Bore size	The rod end configuration		
	Round bar type Chamfered type Round bar type with female thread Chamfered type with female thread	Roller type	Lever type with shock absorber
12	10	10	—
16	10.15	10.15	—
20	10,15,20	10,15,20	—
32			10,15,20
40	20,25,30	20,25,30	20,25,30
50			

3. Operating air

The air supplied to the cylinder should be filtered by SMC AF series air filter and regulated to the specified set pressure by SMC AR series regulator.

4. Speed adjustment

①When the piston speed has to be adjusted, install an SMC AS series speed controller near the air inlet port and adjust it to obtain the specified speed.

②There are two ways to adjust the speed by using speed controller. One is by restricting the air supplied to the cylinder. The other is by restricting the air exhausted from the cylinder. Supply air is restricted for single acting cylinder, and exhaust air is restricted for double acting cylinder.

5. Directional control

To switch the operating direction of the cylinder, mount an applicable solenoid valve selected from SMC's range of solenoid valves. Generally, double acting cylinder is switched by 4 way solenoid valve. Single acting type is switched by 3 way solenoid valve.

6. Selection

6-1 Selection

Select the appropriate cylinder based on mass of transferred object and transfer speed (Fig.1).

Example 1: For roller type with transfer speed of 15m/min. and the mass of transferred object of 30kg. Find the intersection if the speed if 15m/min. on the horizontal axis and the mass of 30kg on the vertical axis in graph, and select RSQ□40-□□RZ that falls in the cylinder operating range.

Example 2: Transfer speed of 15m/min., Mass of transferred object of 60kg, Friction coefficient  $\mu = 0.1$ , Lever type (Lever type with lock mechanism).

Find the intersection if the speed if 15m/min. on the horizontal axis and the mass of 60kg on the vertical axis in graph, and select RSQ□40-□□DZ that falls in the cylinder operating range.

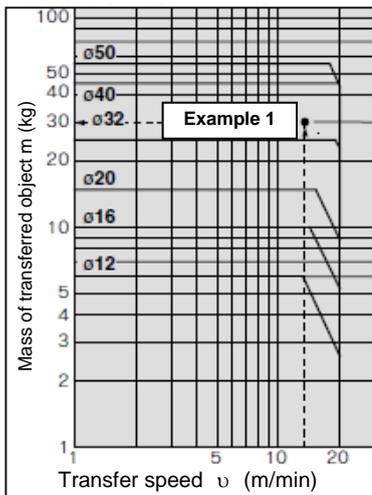
6-2 Precautions on Selection

Use for stopping the pallet on the conveyor. For stopping the load directly mounted to the cylinder, the cylinder pushing force acts as lateral load. Please consult SMC in this case.

6-3. Lateral load and operating pressure

The larger the lateral load, the higher the operating pressure required for the stopper cylinder. Set the operating pressure using the Fig.2. as a guide.

Roller type/Round Bar Type/Chamfered Type/  
Round Bar Type with female thread/  
Chamfered Type with female thread Graph(1)



Lever Type(With shock absorber)  
Friction coefficient  $\mu = 0.1$  Graph(2)

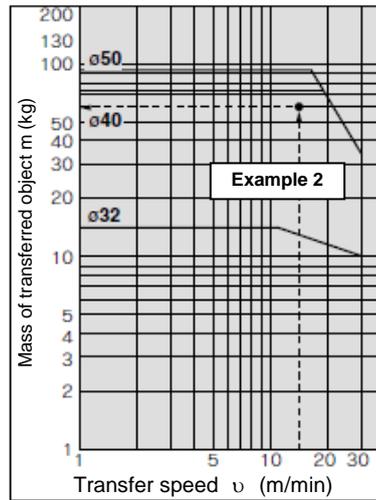


Fig. 1 Operating ranges

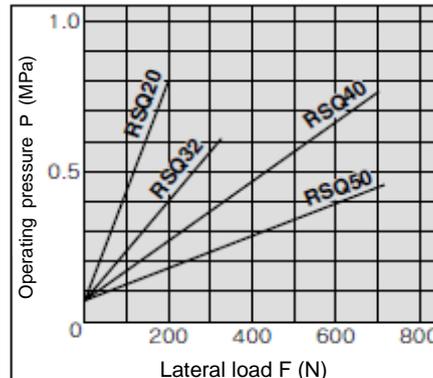
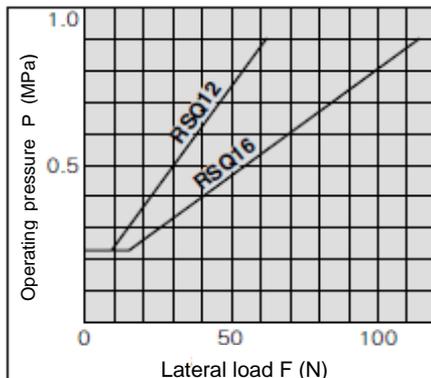


Fig. 2 Relation between Lateral load and operating pressure

7. Installation

7-1. Mounting bracket

Through hole type and both ends tapped style are available.

7-2 Mounting

- ① Align the center of the pallet and the cylinder when mounting.
- ② Make sure to flush inside the piping with air before piping to remove foreign matter. Filter removes foreign matter such as dust and scaling inside the piping before the filter, but not after the filter. Foreign matter after the filter directly enters the solenoid valve and cylinder, reducing the product life.  
In order to prevent rotational torque from acting upon the cylinder rod, mount it so that the contacting surfaces of the pallet and cylinder are parallel to one another.
- ③ When the product is installed on a machine on site, the debris from drilled mounting holes can get in the supply port of the product. Take sufficient care to prevent this.
- ④ Inner diameter of cylinder tube is made with precise clearance. Do not let objects drop onto or deform the inner parts by applying force during mounting. Otherwise, malfunction may result.
- ⑤ Shorten the length of piping. If the cylinder piping is too long, the volume of vapor generated by the adiabatic expansion volume in the piping will become larger than that in the cylinder, and it cannot be exhausted to the air and remains in the piping. With repeated operation, this vapor will accumulate and form water drops. This will wash away the grease inside the product, causing lubrication to deteriorate, which can wear the seals and cause air leakage and increased friction resistance, resulting in operation failure. Take the following measures to prevent air leakage and malfunction.
  - (1) Make the piping tube between the solenoid valve and cylinder as short as possible to ensure that the vapor generated will be exhausted into atmosphere. Refer to Best Pneumatics2-1 P.1904 Technical Data 4: Condensation.
  - (2) Release the exhaust pressure directly into the atmosphere by installing a speed exhaust controller ASV or quick exhaust valve to the cylinder.
  - (3) Set the piping port downwards so that moisture inside the piping does not go back to cylinder easily.
- ⑥ When the lever type with a built-in shock absorber is installed from the direction of the lever side, mounting holes must be machined in accordance with recommended hole diameters in Table 1. When it is installed from the direction of the lever side of the stopper cylinder (Fig. 3), note that the lever's outer diameter is larger than the rod cover boss diameter.

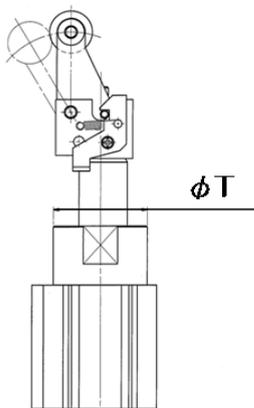
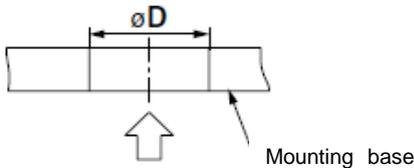


Fig. 3

How to Order - Lever type

- RS(D)Q□32/40/50 – □□LZ
- RS(D)Q□32/40/50 – □□BZ
- RS(D)Q□32/40/50 – □□CZ
- RS(D)Q□32/40/50 – □□DZ
- RS(D)Q□32/40/50 – □□EZ

Table 1. Recommended hole diameter

Model	Rod cover boss O.D.	Recommended hole diameter of the mounting base
	$\phi T$	$\phi D$
RS(D)Q□32	36	38
RS(D)Q□40	44	48
RS(D)Q□50	56	57

### 7-3. Change of the piston rod direction

For roller type and lever type, feed the pallet from the direction shown in Fig.4. Prior to changing the piston rod direction, default factory settings require pallet to feed toward piping port side of cylinder.

#### [ Changing method of the $\phi 12$ bore piston rod direction ](Fig.5)

- ① Remove the rod cover mounting screws (M4 x 2 pcs.) that hold the rod cover to the cylinder tube.
- ② Adjust the rod cover to the desired position. Direction can be adjusted by 90 degrees.
- ③ Apply glue for screw, to the rod cover mounting screws.  
Insert and tighten the rod cover mounting screws (2 pcs) to secure the rod cover to the cylinder tube.  
Tightening torque is  $1.5N \cdot m \pm 10(\%)$ . (Tool: Hexagon wrench: Width across flats 3mm)
- ④ Make sure that the cylinder operates smoothly.

#### [ Changing method of the $\phi 16$ to 50 bore piston rod direction ](Fig. 6)

- ① Loosen the hexagon socket head set screws (M3 x 2 pcs.) that hold the non-rotating guide in place.
- ② Adjust the piston rod to the desired position.  
Note: In order to prevent rotational torque from acting upon the piston rod, mount it so that the contacting surfaces of the pallet and cylinder are parallel to one another.
- ③ Apply glue for screw, to hexagon socket head set screws. Insert and tighten two hexagon socket head set screws to hold the non-rotating guide in place. Tightening torque is  $0.63N \cdot m \pm 10(\%)$ .  
(Tool: Hexagon wrench: Width across flats 1.5mm)  
Note: Non-rotating guide is fixed by two hexagon socket head set screws. If one of the set screws is tightened too much, the non-rotating guide may make contact with the piston rod, causing operation failure. Therefore, tighten the hexagon socket head set screws in turn to make sure that the non-rotating guide does not make contact with the piston rod.
- ④ Make sure that the cylinder operates smoothly.

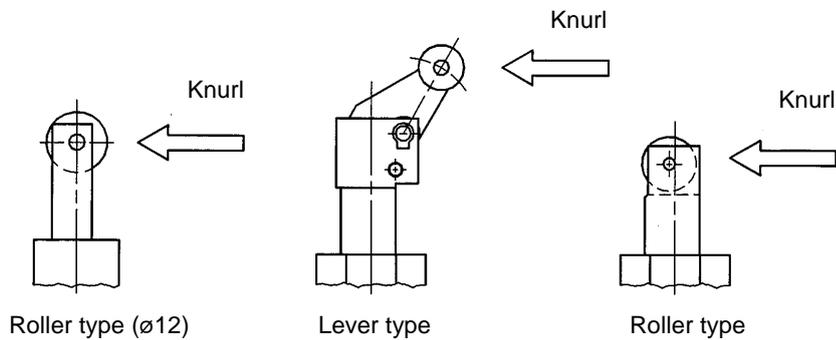


Fig. 4

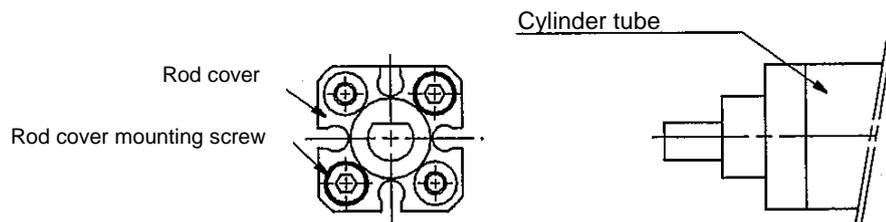


Fig. 5  $\phi 12$

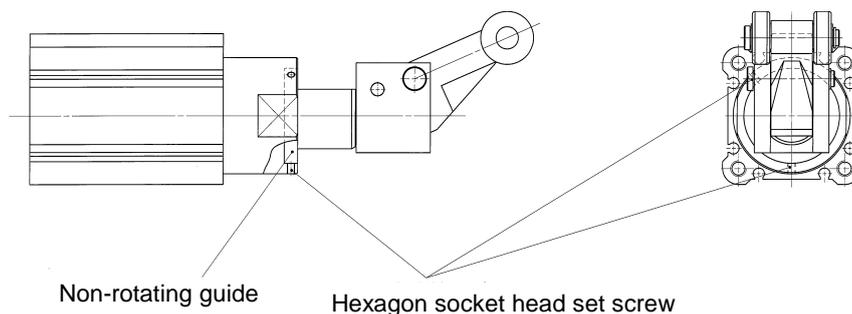


Fig. 6  $\phi 16$  to 50

7-4. Absorbed energy adjustment

Absorbed energy is adjusted by a stroke change using the adjustment bolt.  
 (Cylinder is set for maximum absorbed energy at the time of shipment)

[Adjustment method] (See Fig. 7)

- ① Loosen the set screw holding adjustment bolt in place (M4).
  - ② Turn the adjustment bolt so that the impact is reduced.
  - ③ Tighten set screw to lock adjustment bolt in place.
- (Tightening torque M4: 1.5N·m)

Adjustment amount

RSQ32	RSQ40,50
1.5mm	2mm

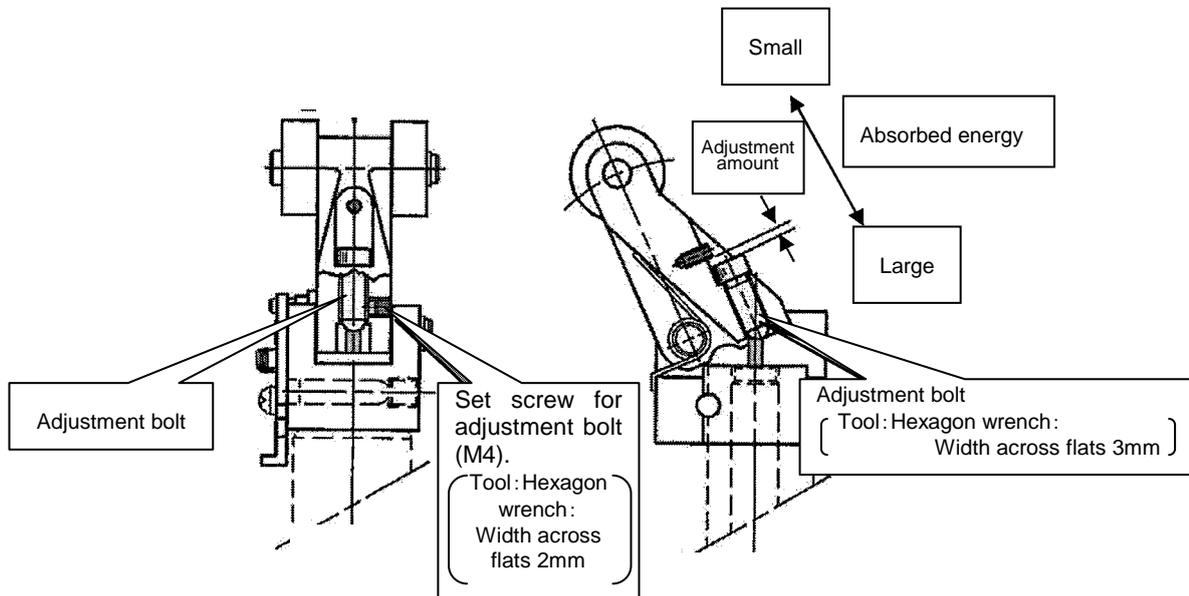


Fig. 7

8. Basic Circuit for Cylinder Operation

The basic circuit for operating the product with air filter, regulator, solenoid valve and speed controller is shown in the Figure 8 and 9.

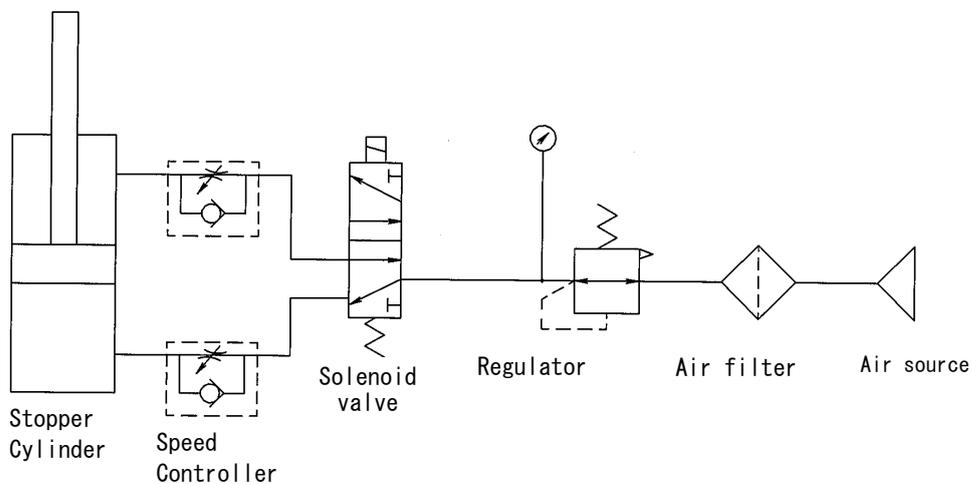


Fig. 8 Basic circuit of stopper cylinder (both double acting and double acting with spring)

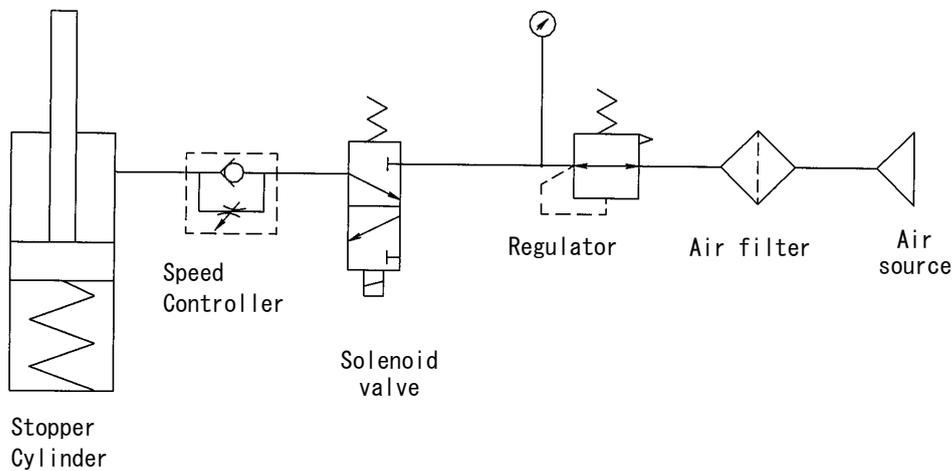


Fig. 9 Basic circuit of Single stopper cylinder

## 9. Handling Precautions

### ⚠ Caution

- ① Do not use oil to the piston rod sliding part.  
Retracting failure of the cylinder may occur.
- ② Protect the shock absorber from water, cutting oil and dust.  
Leaving shock absorber unprotected may result in oil leakage and/or general operation failure.
- ③ Do not scratch or dent the sliding parts of the piston.  
The piston rod has not been hardened. If there is a danger of a pallet scratching or nicking the piston rod due to sharp edges, etc., the pallet should not be used. Damage to the piston rod may lead to improper operation.
- ④ Do not get your hands caught during cylinder operation.  
Since the lever section moves up and down when the cylinder is in operation, take sufficient care to avoid getting your hands caught between the rod cover and the lever holder.
- ⑤ Do not apply pressure from the head side of a single acting cylinder.  
If air is supplied from the head side of a single acting cylinder, blow-by of the air will occur.
- ⑥ Do not allow a pallet to collide with the cylinder when the lever is upright.  
In case of a lever with built-in shock absorber type, do not collide the next pallet against the first one while the lever is standing erect. Otherwise, all energy will be applied to the cylinder body.
- ⑦ In the case of the model with locking mechanism, do not apply an external force from the opposite side when the lever is locked.  
When moving pallets during conveyor adjustment, first lower the cylinder.
- ⑧ Please do not remove the grease applied to Pin B and the lock mechanism bracket on the end lever. If the cylinder is operated without grease, the locking and/or unlocking process may malfunction due to excessive wear on Pin B and the rod cover. Please check periodically the levels of grease present, and apply additional grease as necessary. (See Fig. 10)

Grease part number:GR-S-010(10g)

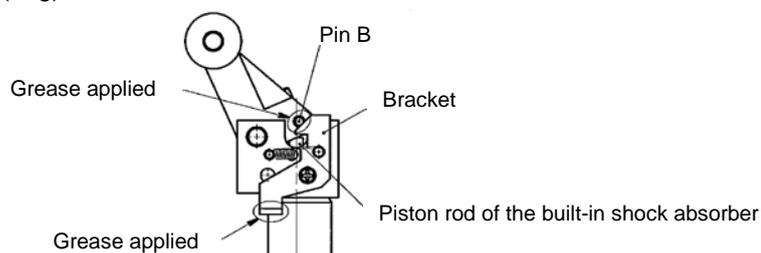


Fig.10

Please do not remove the grease applied to the piston rod end of the built-in shock absorber and periodically check the condition of the grease.

10. Maintenance Service

10-1. Maintenance of cylinder

- ① When cylinder fails to function due to air leakage or breakage of the shock absorber, replace the seal kit and the shock absorber. Refer to the tables below, and Component Parts table, for orderable part numbers.
- ②  $\phi 12$  bore seal kit replacement: Remove two rod cover mounting screws shown in Figure 5. Pull piston rod assembly and rod cover assembly out of cylinder tube. After replacing seals, insert piston rod assembly and rod cover assembly in to cylinder tube. Apply glue for screw to rod cover mounting screws and reinsert in to cylinder assembly.

Tightening torque is  $0.63N \cdot m \pm 10(\%)$ . Tool: Hexagon wrench: Width across flats 3mm

$\phi 16$  to  $50$  bore seal kit replacement: Remove hexagon socket head set screw in cylinder tube near rod end port. Getntly secure the flats of the cylinder tube in a vice with rod cover positioned up. Hold the flats of the rod cover with a spanner or adjustable wrench and turn counter-clockwise to loosen and remove the rod cover. After replacing seals, tighten rod cover to cylinder tube to a point 2 to 3 degrees more than the original position. Apply glue for screw, to hexagon socket head set screw, then fix the rod cover by reinserting and retightening set screw.

- $\phi 16$ : Tightening torque is  $12 N \cdot m \pm 10(\%)$ . Tool: Hexagon wrench: Width across flats 18mm.
- $\phi 20$ : Tightening torque is  $15.3 N \cdot m \pm 10(\%)$ . Tool: Hexagon wrench: Width across flats 22mm.
- $\phi 32$ : Tightening torque is  $33.1 N \cdot m \pm 10(\%)$ . Tool: Hexagon wrench: Width across flats 32mm.
- $\phi 40$ : Tightening torque is  $39.3 N \cdot m \pm 10(\%)$ . Tool: Hexagon wrench: Width across flats 41mm.
- $\phi 50$ : Tightening torque is  $41.4 N \cdot m \pm 10(\%)$ . Tool: Hexagon wrench: Width across flats 50mm

10-2. Replacement procedure of shock absorber

- ① Loosen the hexagon socket head set screw (M3) at the piston rod by approximately one turn, and push down the lever. (See Fig. 11)
- ② While pushing down the lever, remove the shock absorber and replace it with a new shock absorber. Tighten the hexagon socket head set screw (M3 x 0.5) of the piston rod. (See Fig. 12) Stop tightening around 1/4 turn after the set screw comes into contact with the shock absorber. If the hexagon socket head set screw is tightened too much, operation failure of the shock absorber can result.

Tightening torque:  $0.29N \cdot m$   
 Tool: Hexagon wrench: Width across flats 1.5mm

- ③ After replacing the shock absorber, apply grease to the piston rod end of the shock absorber.(See Fig.13)

Replacement part: Shock absorber

Bore size	Part no.
32	RB1007-X225
40·50	RB1407-X552

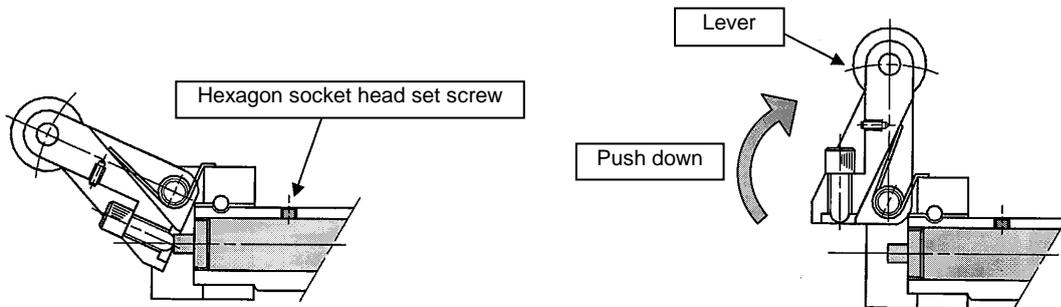


Fig. 11

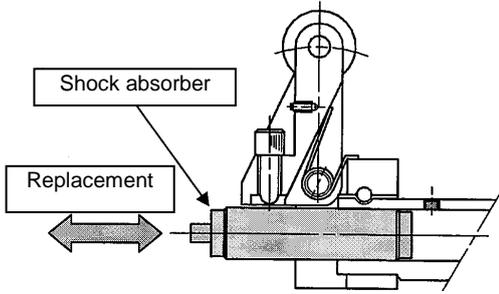


Fig. 12

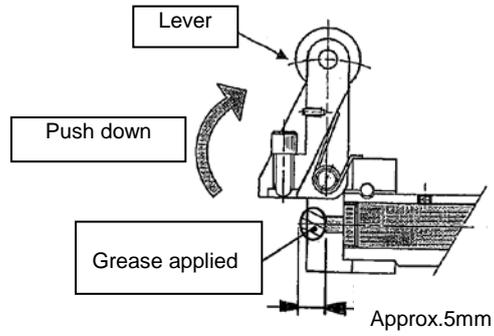
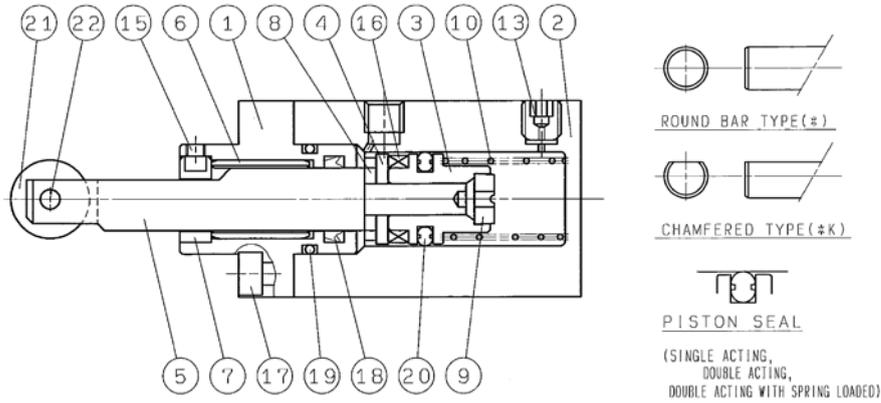


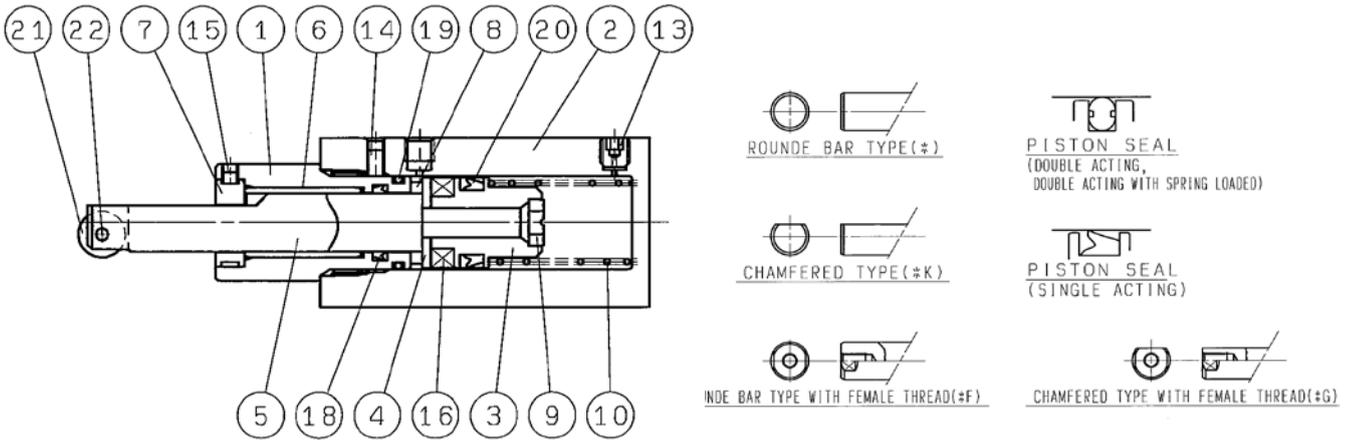
Fig. 13

11. Internal construction

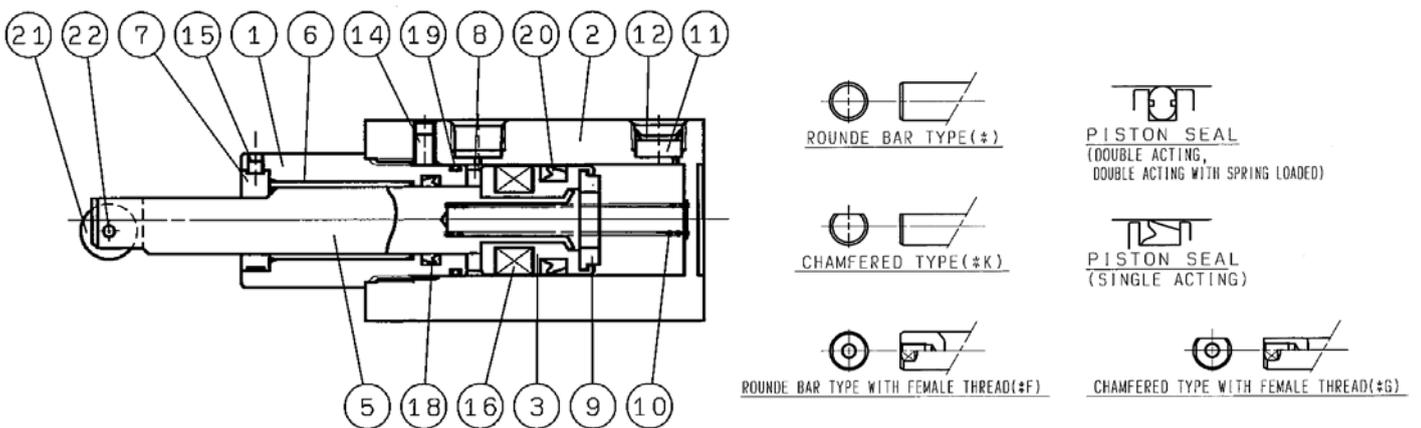
$\phi 12$



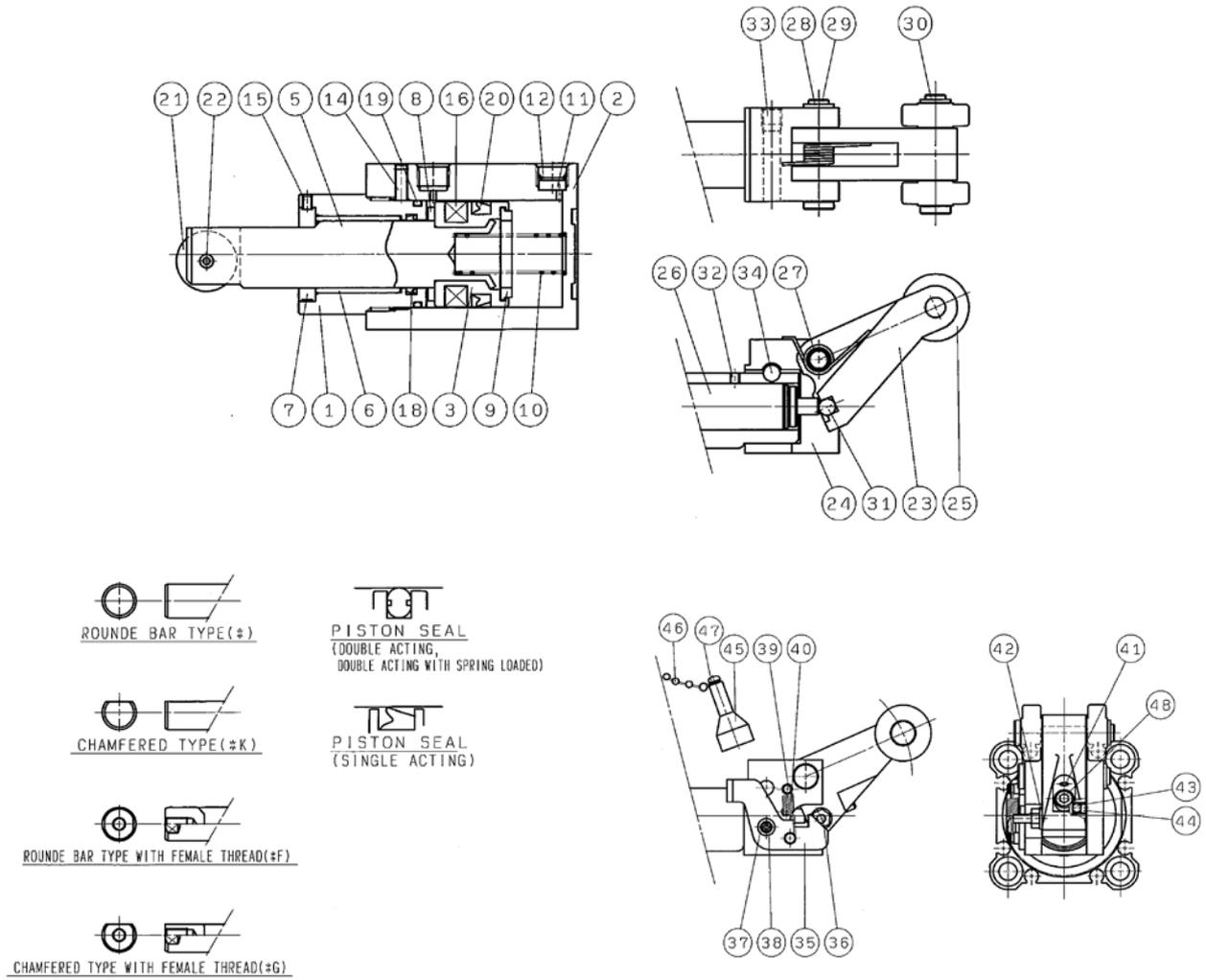
$\phi 16$



$\phi 20$



φ32&φ50



Component Parts (φ12&50)

ITEM	PART NAME	MATERIAL	QTY	REMARKS	ITEM	PART NAME	MATERIAL	QTY	REMARKS
1	ROD COVER	ALUMINUM ALLOY	1	ANODIZED	24	LEVER HOLDER	ROLLED STEEL	1	
2	CYLINDER TUBE	ALUMINUM ALLOY	1	HARD ANODIZED	25	ROLLER B	RESIN	1 or 2	φ32:1PC., φ40-φ50:2PC.
3	PISTON	ALUMINUM ALLOY	1		26	SHOCK ABSORBER	-	1	
4	SPEACER FOR SWITCH	ALUMINUM ALLOY	1	φ12, φ16 ONLY	27	LEVER SPRING	STAINLESS STEEL WIRE	1	
5	PISTON ROD	φ12, φ16, φ20-STAINLESS STEEL φ32, φ40, φ50-CARBON STEEL	1	HARD CHROME PLATED	28	TYPE C RETAINING RING FOR AXIS	CARBON TOOL STEEL	2	
6	BUSHING	BEARING ALLOY	1		29	LEVER PIN	CARBON STEEL	1	
7	NON-ROTATING GUIDE	ROLLED STEEL	1	NON-ROTATING TYPE ONLY EXCLUDING THE ROUND BAR TYPE ROD END	30	ROLLER PIN	CARBON STEEL	1	
8	BUMPER A	URETHANE	1		31	STEEL BALL	HIGH CARBON CHROME BEARING STEEL	1	
9	BUMPER B	URETHANE	1		32	HEXAGON SOCKET HEAD SET SCREW	CHROMIUM MOLYBDENUM STEEL	1	
10	RETURN SPRING	STEEL WIRE	1	ZINC CHROMATED(EXCEPT DOUBLE ACTING)	33	HEXAGON SOCKET HEAD SET SCREW	CHROMIUM MOLYBDENUM STEEL	1	
11	ELEMENT	SINTERED METALLIC BC	1	φ20~φ50ONLY(SINGLE ACTING ONLY)	34	ONE-SIDE TAPERED PIN	CARBON STEEL	1	
12	RETAINING RING	CARBON TOOL STEEL	1	φ20~φ50ONLY(SINGLE ACTING ONLY)	35	BRACKET	CARBON STEEL	1	
13	PLUG WITH FIXED DRIFICE	ALLOY STEEL	1	φ12, φ16ONLY(SINGLE ACTING ONLY)	36	PIN B	CARBON STEEL	1	
14	HEXAGON SOCKET HEAD SET SCREW	CHROMIUM MOLYBDENUM STEEL	1	EXCEPT φ12	37	SPACER	CARBON STEEL	1	
15	HEXAGON SOCKET HEAD SET SCREW	CHROMIUM MOLYBDENUM STEEL	2	NON-ROTATING TYPE ONLY EXCLUDING THE ROUND BAR TYPE ROD END	38	ROUND HEAD PHILLIPS SCREW	ROLLED STEEL	1	
16	MAGNET	-	1		39	PIN A	ROLLED STEEL	1	
17	HEXAGON SOCKET HEAD CAP SCREW	ALLOY STEEL	1	φ12 ONLY	40	BRACKET SPRING	STEEL WIRE	1	
18	ROD SEAL	NBR	1		41	HEXAGON SOCKET HEAD SET SCREW	CHROMIUM MOLYBDENUM STEEL	1	
19	GASKET	NBR	1		42	SPRING WASHER	STEEL WIRE	1	
20	PISTON SEAL	NBR	1		43	URETHANE BALL	URETHANE	1	
21	ROLLER A	RESIN	1		44	HEXAGON SOCKET HEAD SET SCREW	CHROMIUM MOLYBDENUM STEEL	1	
22	SPRING PIN	CARBON TOOL STEEL	1		45	CANCEL CAP	ALUMINUM ALLOY	1	
23	LEVER	CAST IRON	1		46	BALL CHAIN ASS'Y	BRASS	1	
					47	ROUND HEAD PHILLIPS SCREW	ALLOY STEEL	2	
					48	ADJUSTMENT BOLT	BEARING STEEL	1	

Revision history

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