



Operation Manual

PRODUCT NAME

Magnetically Coupled Rodless Cylinder

MODEL / Series / Product Number

Series CY3B-*Z (Basic type)

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.

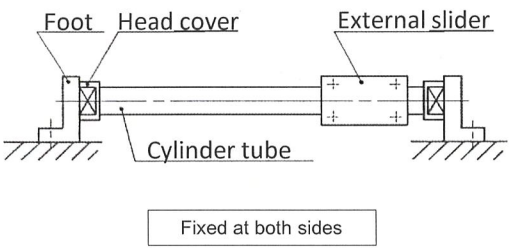
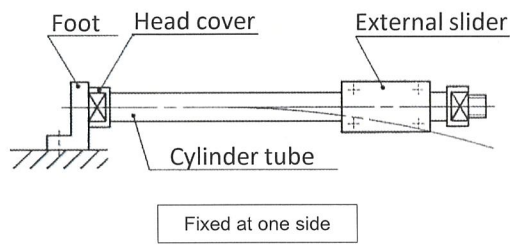
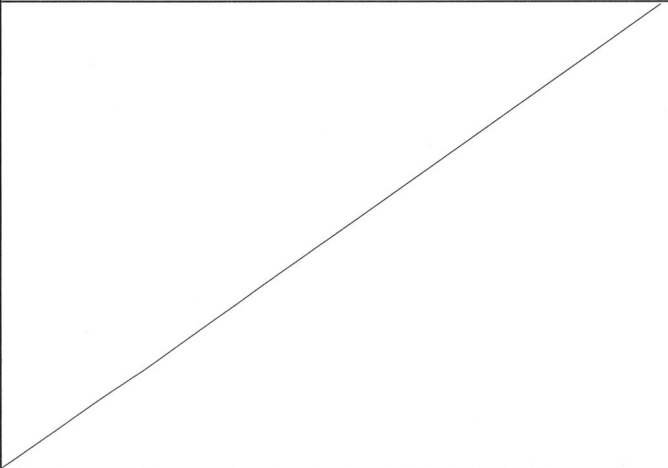
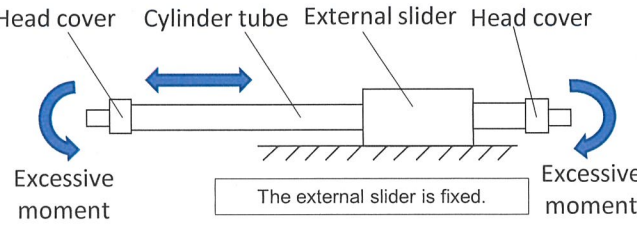
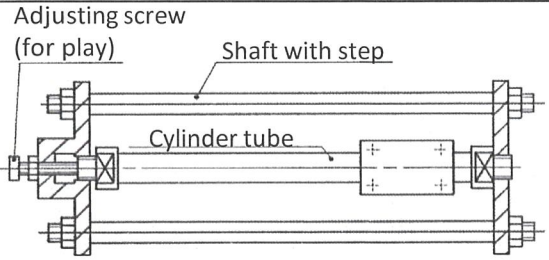
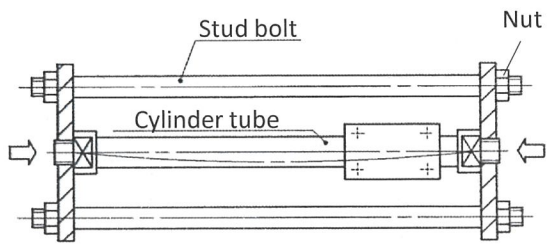
Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

1. Mounting on device

Since this cylinder does not have a rotation stopper mechanism on the external slider, the external slider rotates around the cylinder tube. In addition, as the cylinder has no guiding function, it is used with a load applied to another axis such as linear guide.

1-1) Mounting of cylinder

- Be sure to use the cylinder with both head covers fixed. Otherwise, the center of axis of the cylinder tube will be displaced when the cylinder operates, possibly leading to an operation failure. (Fig. 1-1, Fig. 1-2)
- Never operate the cylinder tube with the external slider fixed. Otherwise, an excessive moment load will be applied to the bearing inside the external slider, possibly leading to abnormal wear of the bearing. (Fig. 2)
- Do not mount the cylinder with compression forces applied from both sides. Otherwise, the cylinder tube will be abnormally bent, which may cause an operation failure. (Fig. 3-1, Fig. 3-2)

Example of correct mounting	Example of incorrect mounting
 <p data-bbox="311 1126 646 1160">Fig. 1-1 Fixing at both sides</p>	 <p data-bbox="829 1041 1412 1097">When only one head cover is fixed, the center of axis will be displaced as the cylinder operates.</p> <p data-bbox="997 1126 1316 1160">Fig. 1-2 Fixing at one side</p>
	 <p data-bbox="901 1478 1428 1556">An excessive moment is applied to the bearing inside the external slider at the stroke end, and abnormal wear is caused.</p> <p data-bbox="957 1579 1316 1612">Fig. 2 Fixing of external slider</p>
 <p data-bbox="167 1926 782 2027">A shaft with step is used to prevent compression force from being applied to the cylinder. Adjustment is made by means of the adjusting screw so that the backlashes in the mounting brackets and cylinder at both ends are eliminated.</p> <p data-bbox="215 2072 750 2105">Fig. 3-1 Mounting without compression force</p>	 <p data-bbox="845 1926 1452 2072">When such a stud bolt or the like whose both ends have continuous threads is tightened with nuts, a compression force is applied to the cylinder and causes the cylinder tube to be bent. As the center of axis of the cylinder is misaligned from the center of axis of the guide, an operation failure may be caused.</p> <p data-bbox="893 2072 1396 2105">Fig. 3-2 Mounting with compression force</p>

1-2) Mounting of load

For mounting of load, it is necessary to consider the following two matters.

- 1: Occurrence of deflection
- 2: Clearance between load and connection

1: Occurrence of deflection

When horizontally mounting a cylinder, a deflection as shown in Fig. 4 occurs due to its own weight. As the stroke increases, the amount of the change of the center of axis increases.

Consider a connection method that absorbs the deflection as shown in Fig. 5.

In order that the external slider does not interfere with the bracket, set such a clearance that allows the external slider to operate smoothly along the whole stroke within the minimum operating pressure range.

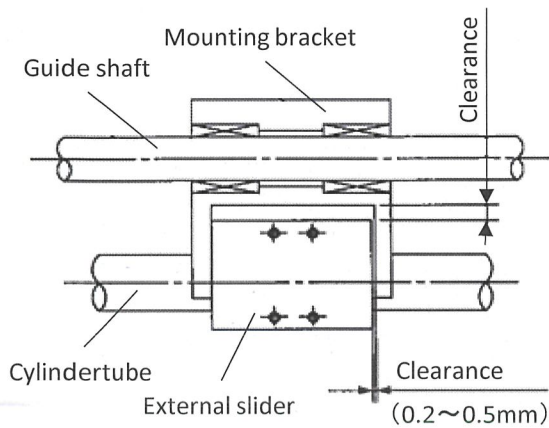
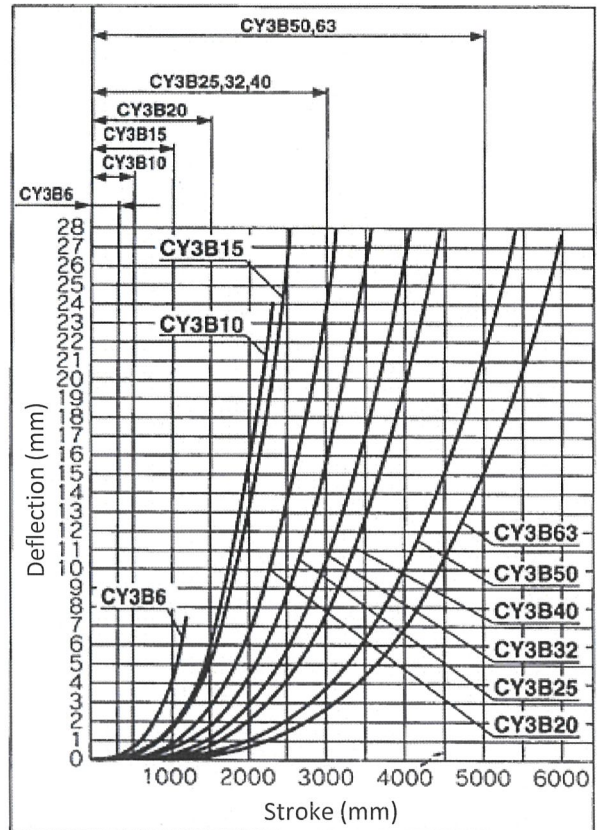
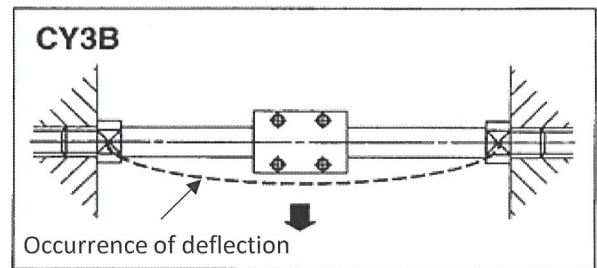


Fig. 5 Connection with load



※ The above deflection data represent values at the time when the external sliding part moves to the middle of the stroke.

Fig. 4 Deflection of cylinder due to its own weight

2: Clearance between load and connection

Depending on the mounting method of the external slider and the external guide, an excessive moment may be applied to the cylinder or it may become impossible to absorb the center misalignment from the external guide, which may possibly lead to an operation failure. Correct and incorrect installation examples are shown below.

1) Example of mounting in which an excessive moment is applied

Fig.6 shows an example of an improperly positioned and configured external slider and external guide, resulting in an excessive moment in the cylinder and malfunctioning operation.

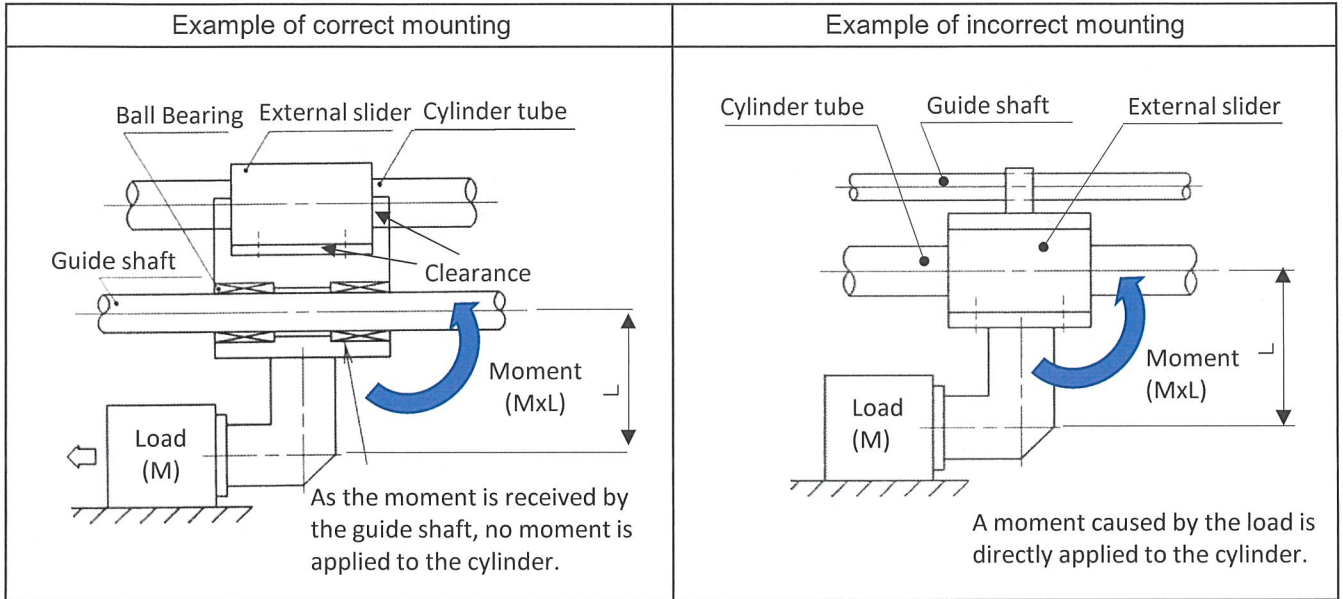


Fig. 6 Example of mounting in which an excessive moment is applied

2) Example of mounting in which it is not possible to absorb the center misalignment between the cylinder and load

When an external slider is directly mounted on a load base, it becomes impossible to absorb the misalignment between the load base and the center of axis of the cylinder, which possibly leads to an operation failure.

Fig. 7 shows an example in which the center misalignment and the deflection of the cylinder due to its own weight are absorbed.

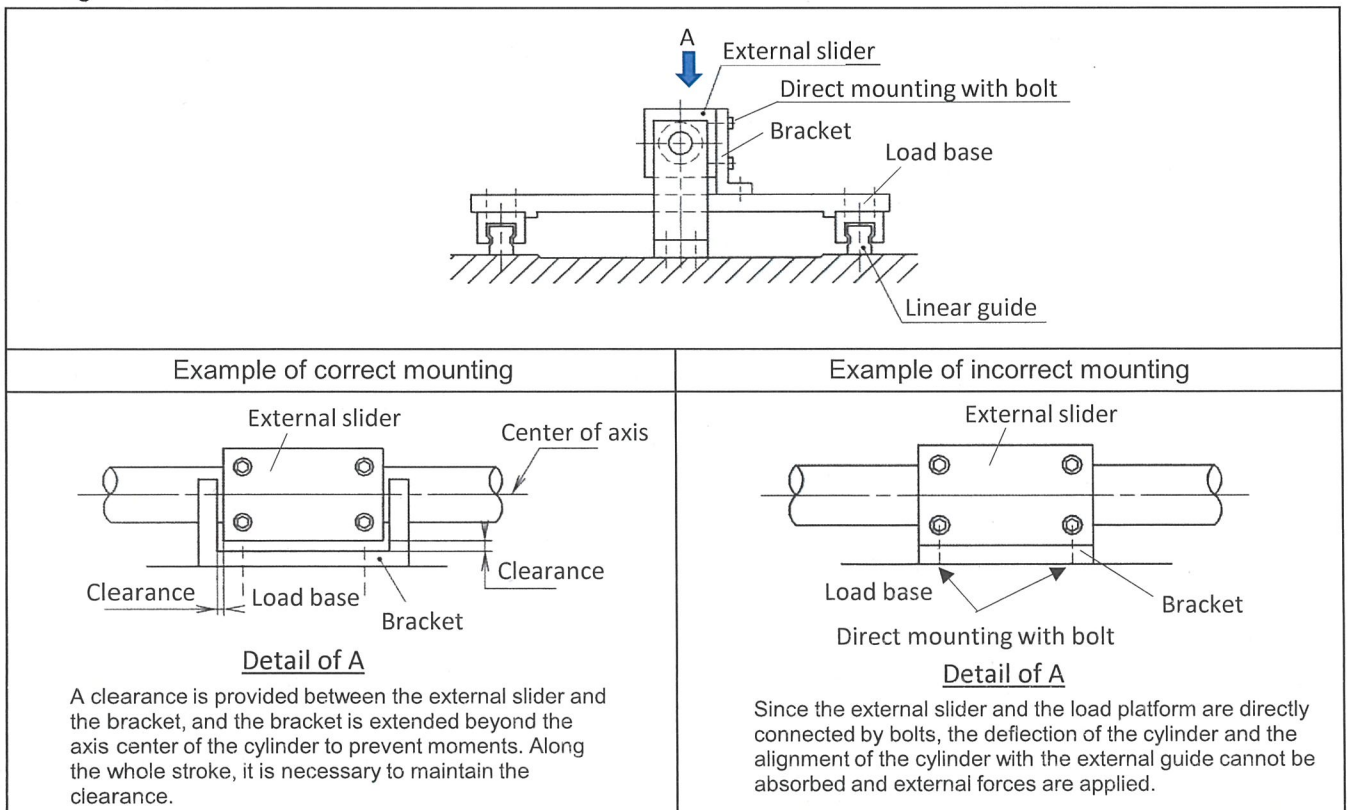
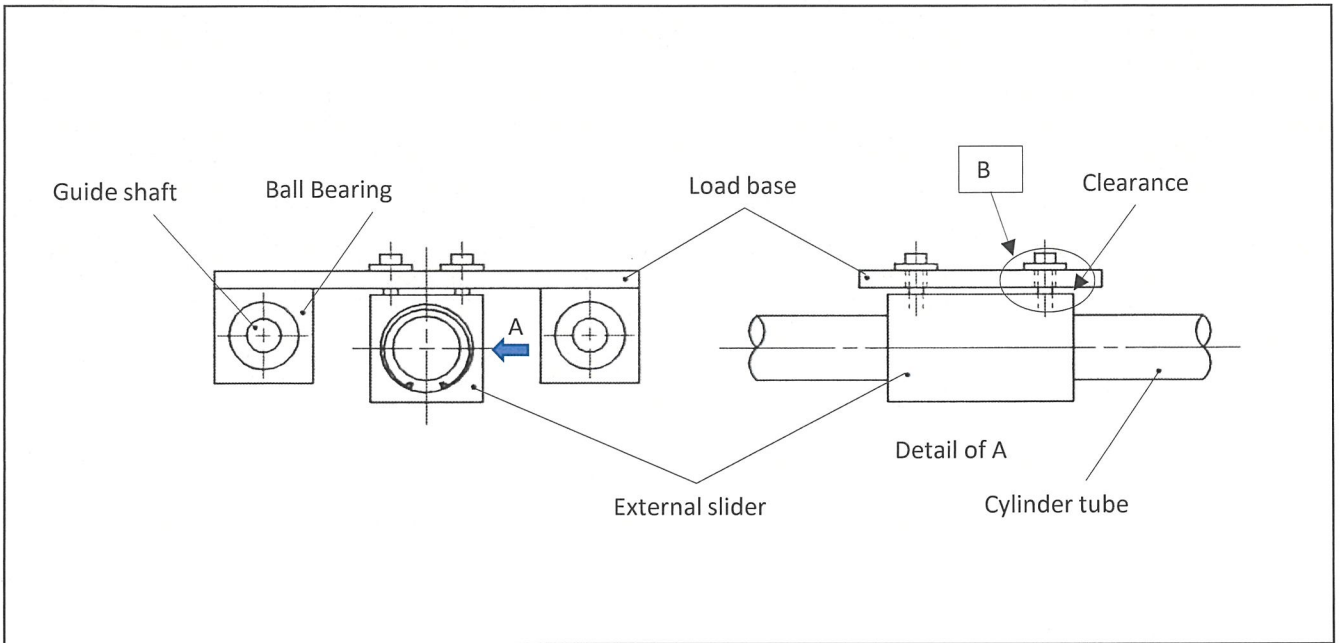


Fig. 7 Installation example 1
Misalignment between cylinder and load cannot be absorbed



Example of correct mounting	Example of incorrect mounting
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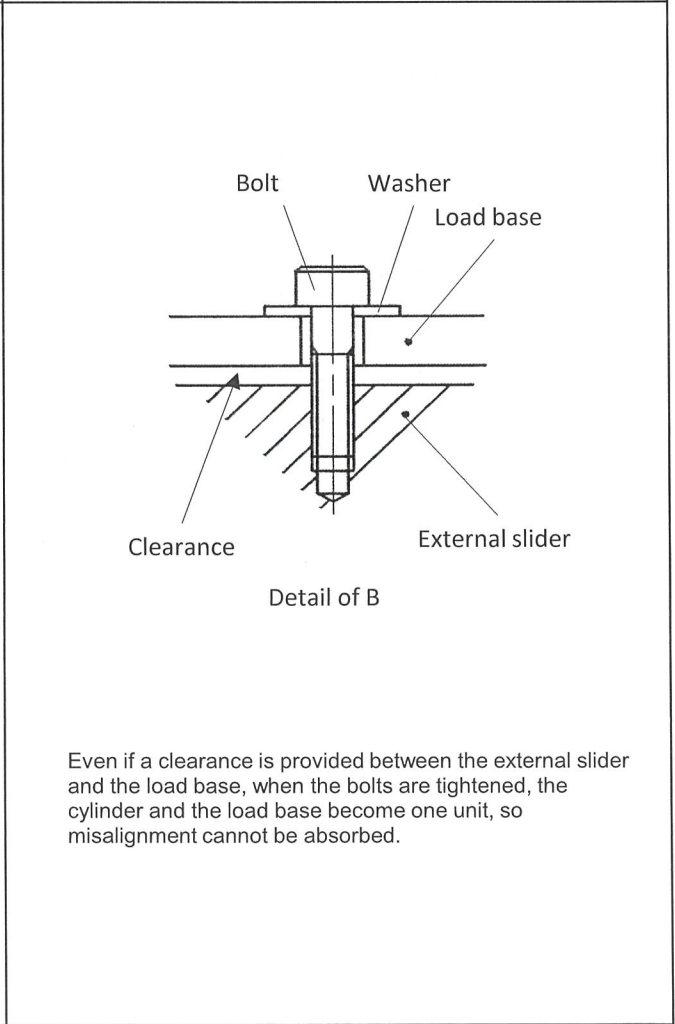
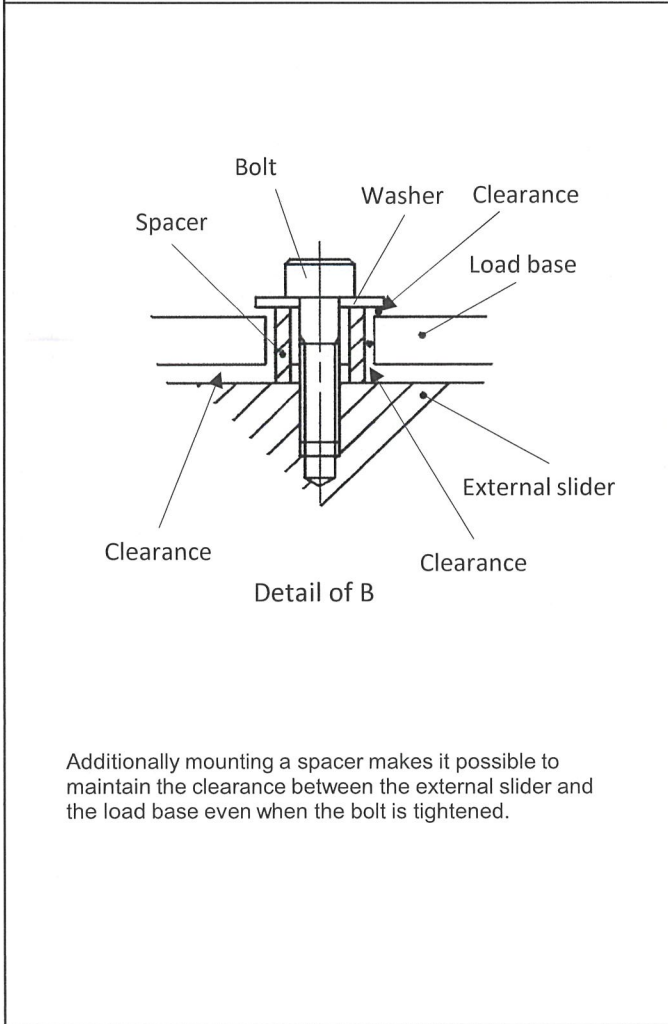


Fig. 8 Installation example 2
Misalignment between cylinder and load cannot be absorbed

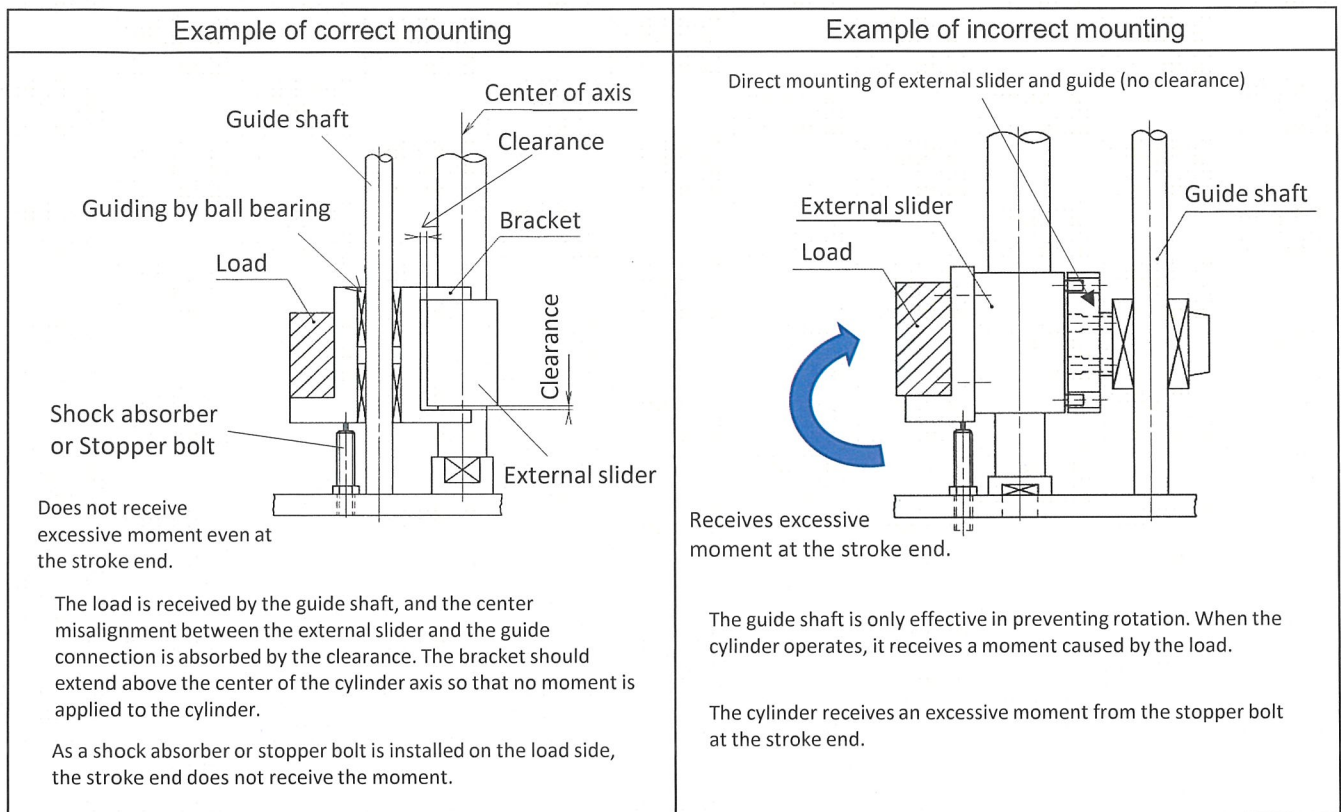


Fig. 9 Installation example 3 Misalignment between cylinder and load cannot be absorbed

In the case of incorrect installation as shown in Figures 6 to 9, the cylinder is subjected to an excessive moment due to misalignment between the cylinder and the guide section, which may cause operation malfunction.

To prevent excessive moment on the cylinder, provide a clearance at the connection between the external slider and the guide section, referring to the correct installation example.

In doing so, please consider the self-weight deflection of the cylinder and ensure that the clearance is maintained throughout the entire stroke. Please consider extending the mounting bracket beyond the center of the cylinder axis as a means of preventing any moment from being applied to the cylinder.

The method to check for misalignment between the cylinder and the load section (guide section) after the cylinder is mounted on the equipment is shown below.

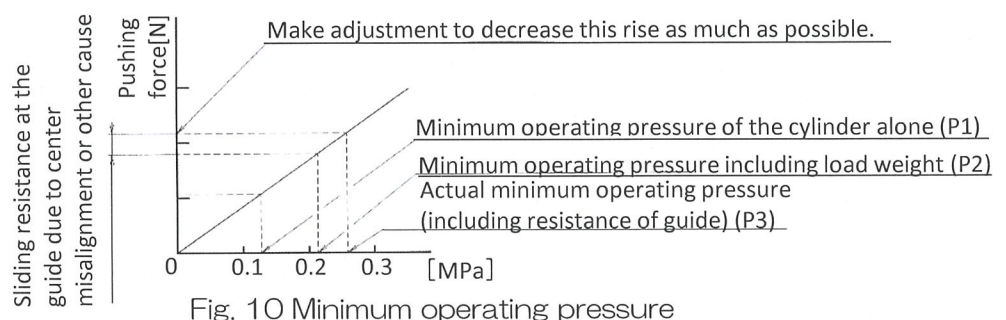


Fig. 10 Minimum operating pressure

1) After the cylinder is mounted on the device, do not immediately operate the cylinder at the operating pressure, but gradually increase the pressure at the pressure regulator and check the minimum operating pressure (P1) at which the cylinder smoothly operates along the whole stroke.

2) In addition, a difference is produced between the minimum operating pressure at the time of mounting of load (e.g. bracket) on the cylinder (P2) and the minimum operating pressure as of after connection with the guide (P3). Set the clearance so as to decrease this difference as much as possible.

The actual minimum operating pressure (P3) is the sum of the three pressures of “minimum operating pressure for sole cylinder,” “pressure to operate the load,” and “pressure equivalent to the sliding resistance of the guide” (refer to Fig. 10). Note that if the center misalignment is not sufficiently absorbed, the sliding resistance of the guide becomes extremely large, which may cause early wear of the bearing in the external slider or other defects.

2. Driving force and moment

2-1) Driving force

Ideally, the cylinder should extract thrust at the center of the piston axis, but usually the driving force of $F_n(N)$ is extracted at a distance of $L_o(cm)$ from the center of the cylinder axis, as shown in Figure 11.

Selection procedure

1. Find the drive resisting force $F_n(N)$ when moving the load horizontally.
2. Find the distance $L_o(cm)$ from the point of the load where driving force is applied, to the center of the cylinder shaft.
3. Select the bore size from L_o and F_n , based on Fig.12.

Selection example

Given a load drive resisting force of $F_n = 100(N)$ and a distance from the cylinder shaft center to the load application point of $L_o = 8 cm$, find the intersection point by extending upward from the horizontal axis of Fig.12 where the distance from the shaft center is 8 cm, and then extending to the side, find the allowable driving force on the vertical axis.

Models suitable in satisfying the requirement of 100 (N) are CY3B32 or CY3B40.

* The L_o point from the cylinder shaft center is the moment working point between the cylinder and the load section.

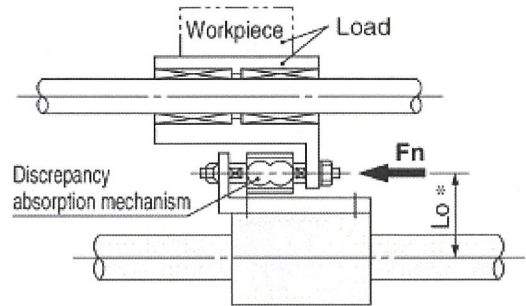


Fig. 11 The driving force and the moment

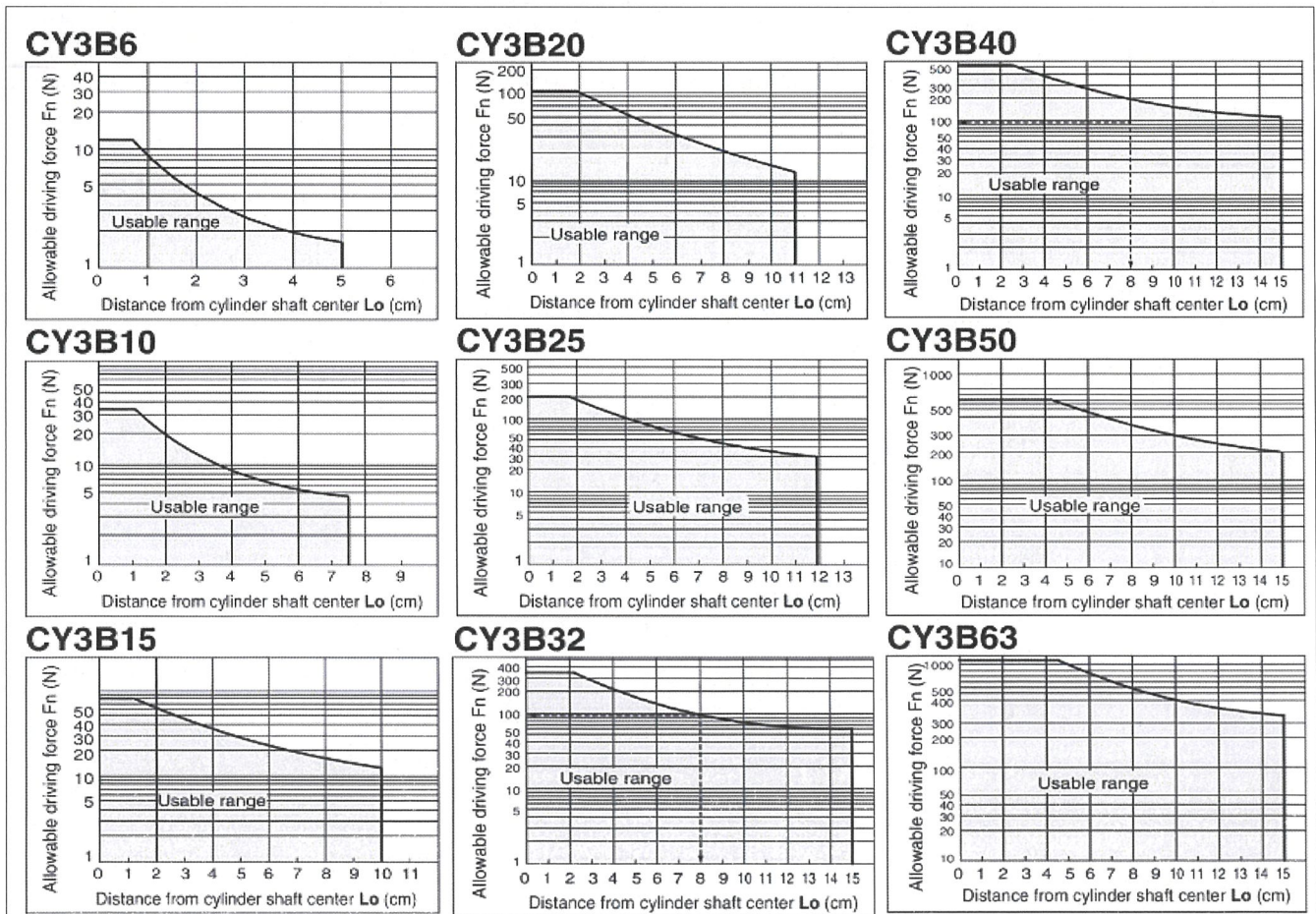


Fig. 12 Relationship between the distance from the center of axis of the cylinder and the allowable driving force

2-2) Moment at stroke end, inertial force

Stopping a load with high inertia at the end of its stroke in the manner shown in Fig.13 may damage the bearings and cylinder tube.

The external slider stops at the stroke end, but the load tries to go straight ahead because there is no stopper at the stroke end, and an excessive moment is applied to the external slider. Repeated operation in this condition causes abnormal wear of the bearings in the external mover, damaging the cylinder tube and resulting in malfunction.

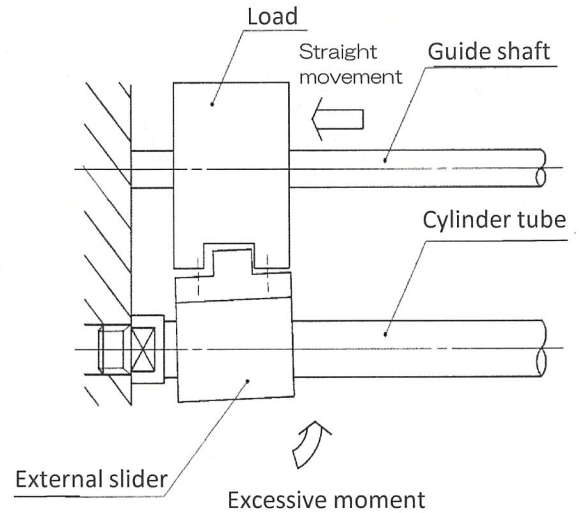
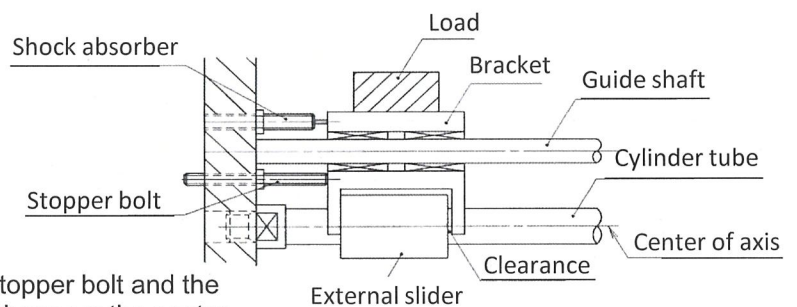


Fig. 13 Moment generated at the stroke end

Attach a shock absorber and a stopper bolt so that they make contact with the bracket surface as shown in Fig. 14, and extend the bracket to the center of axis of the external slider or further to prevent application of the moment.



*) Install the stopper bolt and the shock absorber near the center of gravity of the bracket.

Fig.14 Example of moment countermeasure at stroke end

3. Intermediate stop

3-1) Stop by external stopper

If the load is stopped in the middle of the stroke by an external stopper, etc., use the load at or below the operating limit pressure shown in Table 1. Note that the magnet coupling may detach if used at a pressure exceeding the operating pressure limit.

Table 1. Operating pressure limit for intermediate stop

Model	Operating pressure limit [MPa]
CY3B6	0.55
CY3B10	0.55
CY3B15	0.65
CY3B20	0.65
CY3B25	0.65
CY3B32	0.65
CY3B40	0.65
CY3B50	0.65
CY3B63	0.65

3-2) Stop by pneumatic circuit

If the load is stopped mid-stroke in a pneumatic circuit, use less than the kinetic energy available for intermediate stop in Table 2.

Note that if the pneumatic circuit is used with a kinetic energy exceeding the allowable value, the magnetic coupling may come off.

When the cylinder is operated full stroke without the external stopper, a similar condition may result. Therefore, use the pneumatic circuit with the kinetic energy in Table 2 or below.

Table 2.

Allowable kinetic energy for intermediate stop

Model	Allowable kinetic energy for intermediate stop. [J]
CY3B6	0.007
CY3B10	0.030
CY3B15	0.130
CY3B20	0.240
CY3B25	0.450
CY3B32	0.880
CY3B40	1.530
CY3B50	3.120
CY3B63	5.070

When the intermediate stop is performed by means of a pneumatic circuit, the cylinder stopping accuracy is not high.

If a high stopping accuracy is required, consider positioning with an external stopper.

For vertical actuation, intermediate stop by means of a pneumatic circuit is not possible. Consider the intermediate stop method using an external stopper.

4. Vertical actuation

Also when performing a vertical actuation, it is necessary to give the same consideration as that for the intermediate stop method.

4-1) Installation

We recommend that you guide the load by means of a bearing of ball bearing type (e.g. linear guide).

When a sliding bearing is used, the sliding resistance may be large due to the load weight and load moment, which may cause an operation failure.

If the cylinder is mounted in a vertical or inclined position, it is necessary to consider the possibility of the external mover falling for some reason.

Therefore, please consider measures to prevent the external slider from falling by means of a pneumatic system or external stopper.

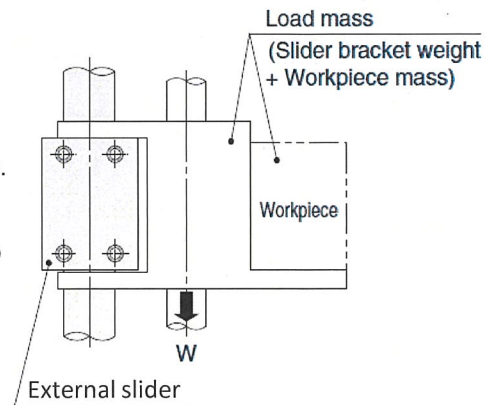


Fig.15 vertical actuation

At the stroke end, the weight and load of the internal and external mobile units may cause them to displace downward. If stopping accuracy is required, positioning with stopper bolts, etc., is effective.

4-2) Allowable load mass and maximum operating pressure

When the cylinder installation orientation is vertical or oblique, use the cylinder with the allowable load weight and the maximum operating pressure as shown in Table 3 or below.

Never use the cylinder with load weight and operating pressure exceeding them because doing so may cause the magnetic coupling to come off.

Table 3. Allowable load weight and maximum operating pressure during vertical actuation

Model	Allowable load mass [kg]	maximum operating pressure [MPa]
CY3B6	1.0	0.55
CY3B10	2.7	0.55
CY3B15	7.0	0.65
CY3B20	11.0	0.65
CY3B25	18.5	0.65
CY3B32	30.0	0.65
CY3B40	47.0	0.65
CY3B50	75.0	0.65
CY3B63	115.0	0.65

5. Air supply

5-1) Install an air filter.

The cylinder is lubrication free. Install an air filter upstream of the valve and use the air pressure set at the specified pressure with a pressure reducing valve.

5-2) Lubrication to compressed air

Since it is initially lubricated, it can be used without lubrication. If lubrication is required due to equipment specifications, use turbine oil type 1 (no additives) (ISO VG32). If lubrication is stopped in the middle of use and the product is used without it afterwards, please ask our factory to repair the product. We will apply appropriate grease to it again.

5-3) Use of air with low dew point

If you use air with low dew point on this product, the product service life may be significantly shortened. Use ordinary air for compressed air. If you use air with low dew point for the reason of the system, please contact SMC.

6. Other precautions

6-1) Handling precautions

1. Do not put your hand in the cylinder while it is operating.

Do not put your hand inside the cylinder during operation.

There is a risk of injury from being caught in the cylinder.

2. To the cylinder, do not apply a load above the allowable value.

Load exceeding allowable value may cause operation failure.

3. Avoid using the product in an environment where water, cutting fluid, or other liquids are splashed, or where water vapor, sticky foreign matter, or dust exists. The lubricity of the sliding parts of the cylinder will deteriorate.

If the cylinder is used in an environment that deteriorates the lubricity of sliding parts, please contact us.

We will consider the appropriate measures on a case-by-case basis.

4. When applying grease to the cylinder, use the same grease as that applied on the product.

For the product number of the grease pack, refer to "3. Replacement parts (seal kits)" on page 14.

6-2) Precautions to observe during mounting

1. Be careful not to dent or damage the external surface of the cylinder tube.

Failure to follow this precaution may lead to damage of lube-retainer and wear ring, possibly causing an operation failure.

2. Pay attention to connection with other axis.

As the external slider rotates, pay attention not to obstruct the floating at the time of connection with another axis.

3. Do not use the cylinder with the magnetic coupling detached.

If the operation of the cylinder is continued with the magnetic coupling detached, the piston slider may be broken. Be sure to return the cylinder to the normal condition before operating it. It is possible to return the cylinder to the correct position by strongly pushing the external slider by hand at the stroke end (or pressing the piston slider by means of pneumatics pressure).

4. When mounting, be sure to thoroughly flush the connecting piping and pay attention not to allow dust, chips, or foreign matter to enter the cylinder.

Otherwise, operation failure may occur.

7. Maintenance



Warning



1) Follow the steps below to perform maintenance.

Instruction

Incorrect handling can cause damage to equipment and device, and operation failure.



2) When removing equipment or removing compressed air supply/exhaust components, first confirm

Instruction

that measures such as drop prevention and safe lock out of the driven object are in place. Then, cut off the air supply and power supply to the equipment, and discharge all compressed air from the system. Before restarting the equipment, confirm that measures are taken to prevent sudden action.

7-1) Inspection

7-1-1) Daily inspection

- 1) Smoothness of the operation
- 2) Changes in piston speed and cycle time
- 3) Smooth movement of the entire stroke

7-1-2) Regular inspection (about once a month)

- 1) Looseness of cylinder mounting bolts, workpiece mounting bolts, etc.
- 2) Smooth operation
- 3) Changes in the piston speed and cycle time
- 4) Smooth movement of the entire stroke
- 5) Blow-by of the air
- 6) Any abnormalities such as scratches or damages to the cylinder
- 7) No accumulation of drain in the air filter or piping
- 8) Increase in the play of the external slider

When any abnormality in the cylinder was observed through the inspection above, take necessary countermeasures referring to section 7-2) Troubleshooting (Quick Reference).

7-1-3) Grease lubrication (about once a month)

Regular application (once a month) of grease to the bearing, sliding parts, and the guide (when with a guide) are recommended for extending the life.

7-2) Troubleshooting (Quick Reference: For all series)

* Refer to the seal replacement procedure or other references when disassembling the cylinder.

Any scratch on the seal during disassembling may cause an air leak or other abnormalities.

Disassembling will void the product's warranty. The repair work can be handled at the SMC factory when it is difficult to be handled by the customer.

Reported failure	Possible causes	Countermeasures
<ul style="list-style-type: none"> • Operation is not smooth • The speed or cycle is delaying • Does not operate 	1) The cylinder axis and workpiece (external guide) are misaligned. [CY3B/CY3R]	<ul style="list-style-type: none"> • Align the cylinder to allow operation of the cylinder with appropriate minimum operating pressure through the whole stroke. • Provide clearance at the connection part between the cylinder and the external guide.
	2) Operation with the minimum operating speed or less [All series]	<ul style="list-style-type: none"> • Operate with a speed at the minimum operating speed or more. • When necessary to operate at a speed less than the minimum operating speed, consider using the low-speed specification model (XB13/XB9).
	3) The configuration of the pneumatic circuit is not appropriate [All series]	<ul style="list-style-type: none"> • Use appropriate piping tube, fitting, directional control valve, speed controller, etc.
	4) Insufficient grease due to life or environmental factor [All series]	<ul style="list-style-type: none"> • Lubricate grease. In general, it is recommended to lubricate once a month. Application section: [All series] Cylinder tube surface [CY1S/CY1L] Guide rod surface [CY1H/CY1F] Linear guide rail surface
	5) Grease discharge due to exposure to splashing water or cutting liquid, exposure to moisture, immersion in water, etc.[All series]	<ul style="list-style-type: none"> • Install a protective cover to protect the cylinder. • Lubricate grease on the tube and guide. • Consider using the non-lubricant exterior specification (X210/X324).
	6) Evaporation of grease due to exposure to high-temperature air or air flow [All series]	
	7) Loosing or solidification of grease due to adhesion of minute powder like paper powder, lint, or flour.	<ul style="list-style-type: none"> • Install a protective cover to protect the cylinder. • Consider using the non-lubricant exterior specification (X210/X324). • Consider installing a coil scraper (special product).
	8) Foreign matter caught at the sliding part [All series]	
	9) Discharge of grease inside the tube due to drain in air pressure. [All series]	<ul style="list-style-type: none"> • Remove the drain with an appropriate filter.
	10) Change from air for lubrication to air for no lubrication [All series]	<ul style="list-style-type: none"> • Continue using air for lubrication because the initially applied grease is flowing out. • Contact the SMC sales representative when changing to no lubrication.
	11) Insufficient air pressure [All series]	<ul style="list-style-type: none"> • Supply appropriate pressure. • Take necessary countermeasures if any of the following applies. <ol style="list-style-type: none"> (1) Decrease of source pressure (including insufficient flow rate) (2) Incorrect setting of the regulator (3) Clogging, disconnection, bending, etc. of the piping

Reported failure	Possible causes	Countermeasures
<ul style="list-style-type: none"> • Operation is not smooth • The speed or cycle is delaying • Does not operate 	12) Insufficient cylinder output [All series]	<ul style="list-style-type: none"> • Increase the pressure or change to a larger bore size. Select to obtain a sufficient load factor (about 50%) taking the resistance of the cylinder and peripheral devices into consideration.
	13) Failure of equipment other than the cylinder [All series]	<ul style="list-style-type: none"> • Investigate system components in concern one by one. • Take necessary countermeasures if any of the following applies. <ol style="list-style-type: none"> (1) Failure of the directional control valve (2) Insufficient adjustment or malfunction of the speed controller (3) Clogging, disconnection, or bending of the piping (4) Clogging, etc. of the filter
<ul style="list-style-type: none"> • Abnormal stroke 	1) Jamming of foreign matter [All series]	<ul style="list-style-type: none"> • Remove foreign matter caught in the sliding part or the slider.
	2) Entry of foreign matter inside the cylinder [All series]	<ul style="list-style-type: none"> • Check if there is any foreign matter such as drain inside the cylinder. Remove foreign matter, if any.
	3) Detachment of the magnetic coupling [All series]	<ul style="list-style-type: none"> • Correct the magnetic coupling to the normal position. (See seal kit replacement procedure)
<ul style="list-style-type: none"> • Air leakage 	1) Wear or damage of the seals [All series]	<ul style="list-style-type: none"> • When caused due to reaching its life period, replace the seal kit and lubricate the grease. • Take necessary countermeasures and replace the seal kit if any of the following applies. <ol style="list-style-type: none"> (1) Application of a load or lateral load exceeding the allowable load → Load reduction, improvement in misalignment with the external guide, etc. (2) High-temperature environment exceeding the ambient temperature range → Decrease temperature to be within the allowable temperature (3) Mixture of foreign matter entering inside the tube and damage in seal parts → Remove foreign matter
<ul style="list-style-type: none"> • Decoupling of the magnetic coupling 	1) High-pressure air is supplied to the cylinder (intermediate stop by external stopper) [All series]	<ul style="list-style-type: none"> • Adjust the air pressure to be within the allowable range.
	2) Pressure increase in the tube (application of excessive external force from the opposite direction of the operating direction) [All series]	<ul style="list-style-type: none"> • Do not push the external slider in the direction opposite to the pressurizing direction.
	3) Application of excessive kinetic energy (intermediate stop by pneumatic circuit) [All series]	<ul style="list-style-type: none"> • Keep kinetic energy within the allowable range.
	4) The magnetic force dropped because of the high-temperature environment around the cylinder [All series]	<ul style="list-style-type: none"> • Reduce the peripheral environment temperature to 60°C or less. • Reduce the air pressure.
	5) The magnetic force dropped because of corrosion of the magnet or yoke [All series]	<ul style="list-style-type: none"> • Handle corrosion countermeasures (adoption of coating for preventing corrosion (special product)).
The parts are damaged. (1) Damage in the external slider yoke (2) Damage to the piston slider (3) Damage in the plate on the stroke end (4) Scratches on cylinder tube or guide shaft	1) Operation at high speed [X160]	<ul style="list-style-type: none"> • Make sure to install a shock-absorbing device on the stroke end.
	2) Excessive impact at the stroke end [All series]	<ul style="list-style-type: none"> • Make sure to install a shock-absorbing device on the stroke end.
	3) Overload or excessive moment [All series]	<ul style="list-style-type: none"> • Adjust the load weight and moment to be within the allowable range.
	4) Separation of magnetic coupling (When stopped at the intermediate stop position by an external stopper) [All series]	<ul style="list-style-type: none"> • However, adjust the magnetic coupling to the normal position. (See seal kit replacement procedure)
	5) Contact of the yoke to the tube during operation due to excessive wear of the wear ring [All series]	<ul style="list-style-type: none"> • Cylinder replacement is recommended.
<ul style="list-style-type: none"> • Increase in play of the external slider 	1) Worn wear ring [All series]	<ul style="list-style-type: none"> • When excessive wear is observed, take countermeasures against the root cause (excessive external force, insufficient lubrication by external factors, etc.). • Replace the seal kit.
	2) Worn bushing [CY1S]	<ul style="list-style-type: none"> • When excessive wear is observed, take countermeasures against the root cause (excessive external force, insufficient lubrication by external factors, etc.). • Request for repair at SMC factory.
	3) Worn or damaged ball bushing [CY1L]	
	4) Loose tightening bolt of the slide table and linear guide or other loose tightening bolts [CY1H/CY1F]	<ul style="list-style-type: none"> • Change the load weight and moment to be within the allowable range. • Re-tighten the bolt.

*) Consider replacing the cylinder when excessive scratches or excessive damaged conditions are observed.

8. Disassembly and maintenance

1. Refer to the seal replacement procedure or other references when replacing the cylinder.

2. The adsorption force of the magnet is very strong. Care should be taken.

The adsorption force of the magnet is very strong. When removing the external slider and piston slider from the cylinder tube for maintenance, etc., please handle them with care.

3. Do not remove the external slider from the cylinder tube while it is magnetically coupled to the piston slider.

The external slider and the piston slider are magnetically attached and cannot be disengaged.

To remove the external slider from the cylinder tube, shift its position with the piston slider and break the magnetic coupling.

4. Do not remove the piston or nut from the piston slider.

The replacement parts are piston seal and wear ring A only. It is not necessary to remove the piston and nut.

5. Never take out the yoke and magnet inside the external slider.

Failure to follow this precaution may decrease the magnet holding force and cause an operation failure.

The replacement parts are wear ring B and lube-retainer only. It is not necessary to remove the yoke and magnet from the external slider. Remove the retaining rings one by one from the external sliders, and then replace the replacement parts only.

6. Be sure to install the piston seal in the groove where the packing was previously installed ($\phi 20$ to $\phi 63$).

Attaching a piston seal to the piston groove on the opposite side has no sealing effect (causing internal leakage).

Be sure to install the packing in the groove (unthreaded side of shaft end) where it was installed.

7. When inserting the external slider and piston slider into the cylinder tube, insert them in the correct orientation (the orientation is not defined in $\phi 6$).

1) Place the piston slider on the external slider.

2) Figure 16 shows the wrong combination. The piston slider is magnetically adsorbed off center of the external slider. In this case, turn the piston slider by 180° to make the correct combination as shown in Fig. 17 and then insert them to the cylinder tube.

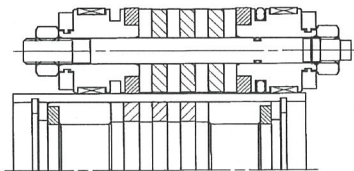


Fig. 16 Incorrect combination

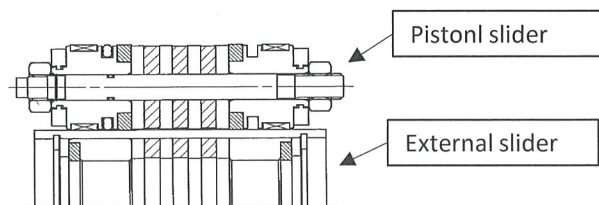


Fig. 17 Correct combination

8. When reassembling the cylinder after replacing the seal kit, follow the disassembly steps in the reverse order.

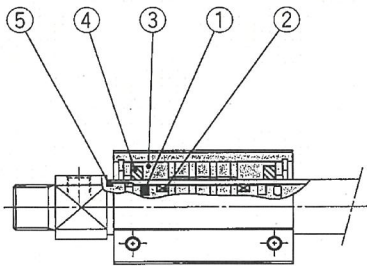
9. During reassembly, additionally tighten the head covers.

To disassemble, place the two chamfered portions of the head cover in a vise, then use a wrench or monkey wrench to clamp the two chamfered portions of the other head cover and remove the cover.

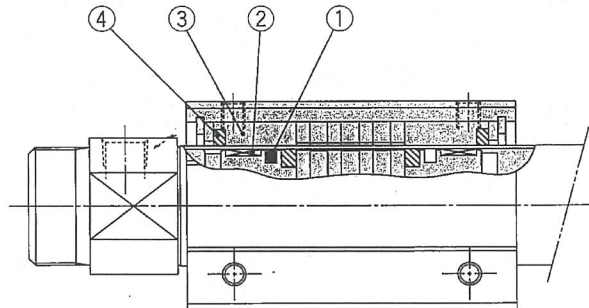
When reassembling, apply adhesive (Loctite: 542 red) (not required for $\phi 6$ and $\phi 10$) and tighten 3° to 5° more than the position before disassembly.

9. Replacement parts (seal kits)

CY3B6, 10-□Z



CY3B15~40-□Z



Component parts

No.	Description
①	Piston seal
②	Wear ring A
③	Wear ring B
④	Lube-retainer B
⑤	Cylinder tube gasket

Seal kit order number

Model	Kit number	Contents
CY3B6	CY3B6-Z-PS	① (2pcs), ② (4pcs), ③ (2pcs), ⑤ (2pcs)
CY3B10	CY3B10-Z-PS	① (1pc), ③ (2pcs), ④ (2pcs), ⑤ (2pcs)
CY3B15	CY3B15-Z-PS	① (1pc), ② (4pcs), ③ (2pcs), ④ (2pcs)
CY3B20	CY3B20-Z-PS	① (1pc), ② (2pcs), ③ (2pcs), ④ (2pcs)
CY3B25	CY3B25-Z-PS	
CY3B32	CY3B32-Z-PS	
CY3B40	CY3B40-Z-PS	

Note 1) For the $\phi 50$ and $\phi 63$ models, no seal kits are available because they cannot be disassembled.

Note 2) The $\phi 6$ model does not include the lube-retainer B.

Note 3) The $\phi 10$ model does not include the wear ring A.

Note 4) The $\phi 15$ to $\phi 40$ models do not include the cylinder tube gasket.

Note 5) The seal kit is supplied with a grease pack (10 g).

If the grease pack only is required, order it by using the following product number.

Grease pack product number: GR-S-010

Revision history

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