# Clean Room Rodless Cylinder

# *Series CYP*

**ø15, ø32**



## How to Order

**CYP 15 — 200 □ — Z73 □**

**Bore size**

| | |
|---|---|
| **15** | 15 mm |
| **32** | 32 mm |

**Standard stroke**

| Bore size (mm) | Standard stroke (mm) |
|---|---|
| 15, 32 | **100, 150, 200, 250, 300, 350 400, 450, 500, 600, 700** |

Note 1) Please consult with SMC if the maximum stroke is exceeded.
Note 2) Intermediate strokes are available as a special order.

**Piping port location**

| | | |
|---|---|---|
| **Nil** | a | Operating direction: Right |
| | b | Operating direction: Left |
| **L** | c | Operating direction: Right |
| | d | Operating direction: Left |
| **R** | e | Operating direction: Right |
| | f | Operating direction: Left |
| **S** | g | Operating direction: Right |
| | h | Operating direction: Left |

**Auto switch**

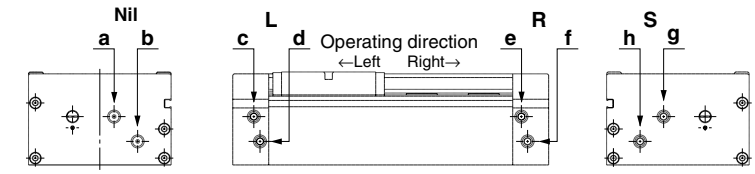
| | |
|---|---|
| **Nil** | Without auto switch |

For the applicable auto switch model, refer to the table below.

**Number of auto switches**

| | |
|---|---|
| **Nil** | 2 pcs. |
| **S** | 1 pc. |
| **n** | "n" pcs. |

### Piping Port Locaition




Note) Plugs are installed in ports other than those indicated for the model.

**Applicable Auto Switch**/Refer to page 8-30-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | | Load voltage AC | Auto switch model: Electrical entry direction Perpendicular | Auto switch model: Electrical entry direction In-line | Lead wire length (mm)* 0.5 (Nil) | 3 (L) | 5 (Z) | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire | — | 5 V | — | — | **Z76** | ● | ● | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | — | **Z73** | ● | ● | ● | — | Relay, PLC |
| | | | No | | | 5 V, 12 V | 100 V or less | — | **Z80** | ● | ● | — | IC circuit | |
| Solid state switch | — | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | **Y69A** | **Y59A** | ● | ● | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | **Y7PV** | **Y7P** | ● | ● | ○ | IC circuit | |
| | | | | 2-wire | | 12 V | | **Y69B** | **Y59B** | ● | ● | ○ | — | |
| | Diagnostic indication (2-color indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **Y7NWV** | **Y7NW** | ● | ● | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **Y7PWV** | **Y7PW** | ● | ● | ○ | | |
| | | | | 2-wire | | 12 V | | **Y7BWV** | **Y7BW** | ● | ● | ○ | — | |

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) Y69B
3 m ····· L Y69BL
5 m ····· Z Y69BZ

∗∗ Auto switches marked with a "○" symbol are produced upon receipt of order.

## Specifications

| Bore size (mm) | 15 | 32 |
|---|---|---|
| Fluid | Air/Inert gas | |
| Action | Double acting | |
| Proof pressure | 0.5MPa | |
| Operating pressure range | 0.05 to 0.3MPa | |
| Ambient and fluid temperature | –10 to 60°C | |
| Piston speed | 50 to 300mm/s | |
| Lubrication | Non-lube | |
| Stroke adjustment | ±1mm on each side (±2mm total) | |
| Cushion | Sine cushion (Air cushion) | |
| Port size | M5 x 0.8 | Rc 1/8 |

## Weight

(kg)

| Model | Standard stroke (mm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 700 |
| **CYP15** | 1.2 | 1.4 | 1.6 | 1.7 | 1.9 | 2.0 | 2.2 | 2.4 | 2.5 | 2.8 | 3.2 |
| **CYP32** | 4.2 | 4.6 | 5.0 | 5.5 | 5.9 | 6.3 | 6.7 | 7.1 | 7.5 | 8.3 | 9.1 |

## Magnetic Holding Force

| Bore size (mm) | Magnetic holding force (N) |
|---|---|
| **15** | 59 |
| **32** | 268 |

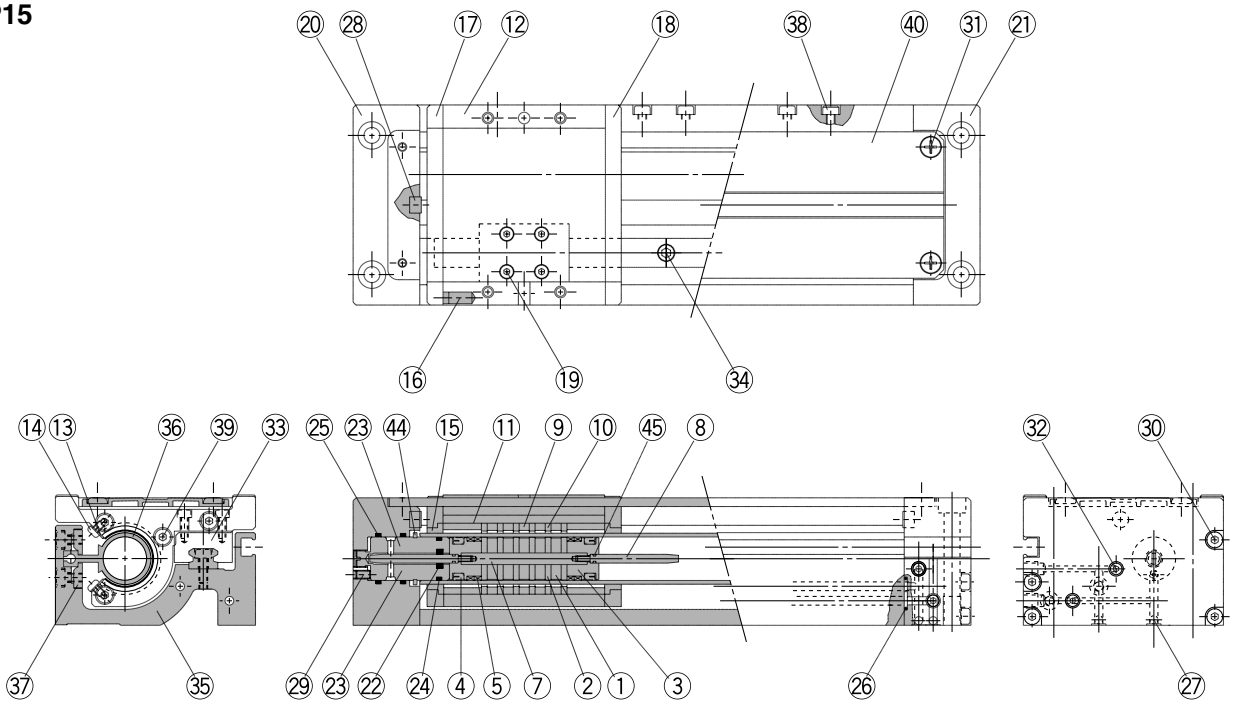
## Theoretical Output

(N)

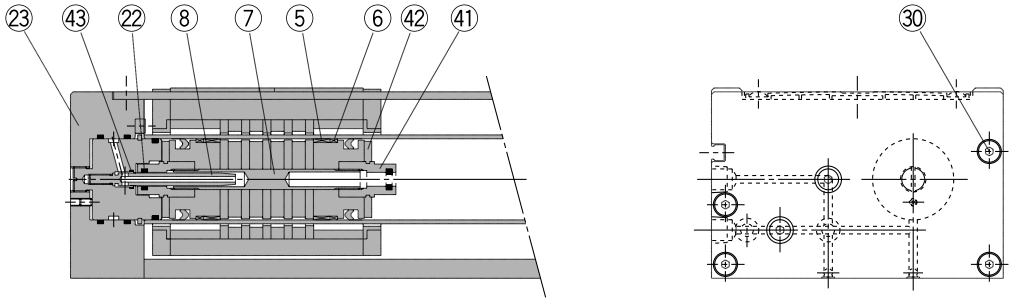
| Bore size (mm) | Piston area (mm) | Operating pressure (MPa) | | |
|---|---|---|---|---|
| | | 0.1 | 0.2 | 0.3 |
| **15** | 176 | 18 | 35 | 53 |
| **32** | 804 | 80 | 161 | 241 |

## Construction

### CYP15




### CYP32

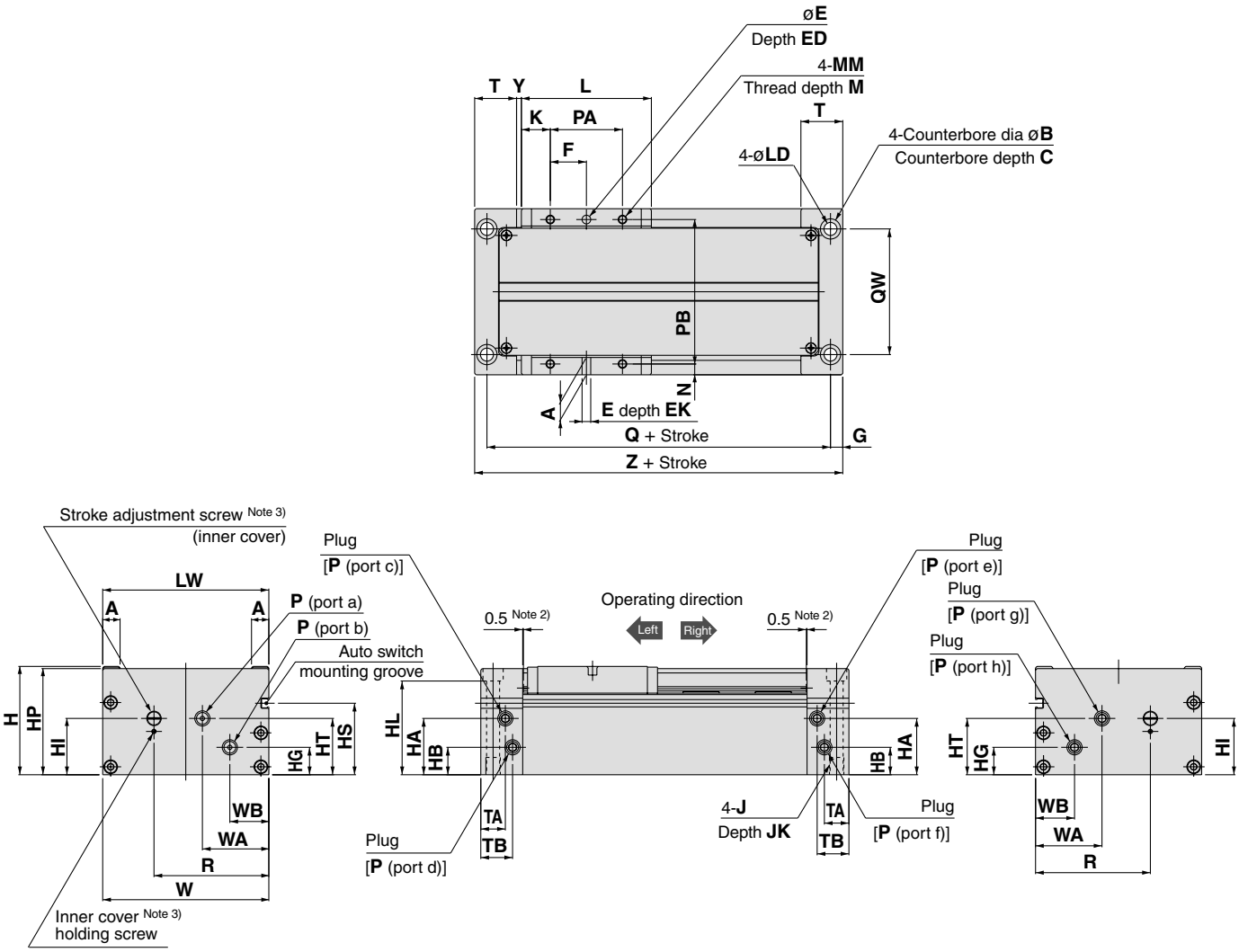



### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Magnet A | Rare earth magnet | |
| ② | Piston side yoke | Rolled steel plate | Zinc chromated |
| ③ | Piston | Brass/Aluminum alloy | ø15: Electroless nickel plated, ø32: Chromated |
| ④ | Piston seal | NBR | |
| ⑤ | Wear ring A | Special resin | |
| ⑥ | Wear ring | Special resin | |
| ⑦ | Shaft | Stainless steel | |
| ⑧ | Cushion ring | Stainless steel/Brass | ø15: Electroless nickel plated |
| ⑨ | Magnet B | Rare earth magnet | |
| ⑩ | External slider side yoke | Rolled steel | Electroless nickel plated |
| ⑪ | External spacer | Aluminum alloy | Electroless nickel plated |
| ⑫ | Slide table | Aluminum alloy | Electroless nickel plated |
| ⑬ | Insertion guide plate | Stainless steel | |
| ⑭ | Round head Phillips screw | Carbon steel | Nickel plated |
| ⑮ | Hold spacer | Aluminum alloy | Electroless nickel plated |
| ⑯ | Magnet | Rare earth magnet | |
| ⑰ | Side plate A | Aluminum alloy | Electroless nickel plated |
| ⑱ | Side plate B | Aluminum alloy | Electroless nickel plated |
| ⑲ | Hexagon socket head cap screw | Chrome molybdenum steel | Nickel plated |
| ⑳ | Plate A | Aluminum alloy | Clear hard anodized |
| ㉑ | Plate B | Aluminum alloy | Clear hard anodized |
| ㉒ | Cushion seal | NBR | |

| No. | Description | Material | Note |
|---|---|---|---|
| ㉓ | Inner cover | Aluminum alloy | Clear hard anodized |
| ㉔ | Cylinder tube gasket | NBR | |
| ㉕ | O-ring | NBR | |
| ㉖ | O-ring | NBR | |
| ㉗ | Steel ball | Carbon steel | |
| ㉘ | Bumper | Polyurethane | |
| ㉙ | Hexagon socket head set screw | Chrome molybdenum steel | Nickel plated |
| ㉚ | Hexagon socket head cap screw | Chrome molybdenum steel | Nickel plated |
| ㉛ | Round head Phillips screw | Stainless steel | Nickel plated |
| ㉜ | Hexagon socket head plug | Chrome molybdenum steel | Nickel plated |
| ㉝ | Linear guide | Stainless steel | |
| ㉞ | Hexagon socket head cap screw | Chrome molybdenum steel | Nickel plated |
| ㉟ | Body | Aluminum alloy | Clear hard anodized |
| ㊱ | Cylinder tube | Aluminum alloy | Hard anodized |
| ㊲ | Tube attaching bracket | Aluminum alloy | Clear hard anodized |
| ㊳ | Hexagon socket head cap screw | Chrome molybdenum steel | Nickel plated |
| ㊴ | Hexagon socket head cap screw | Chrome molybdenum steel | Nickel plated |
| ㊵ | Top cover | Aluminum alloy | Clear hard anodized |
| ㊶ | Cushion seal holder | Aluminum alloy | Chromated |
| ㊷ | Bumper | Urethane | CYP32 only |
| ㊸ | O-ring | NBR | |
| ㊹ | C type snap ring for shaft | Carbon tool steel | |
| ㊺ | O-ring | NBR | |

## Dimensions




(mm)

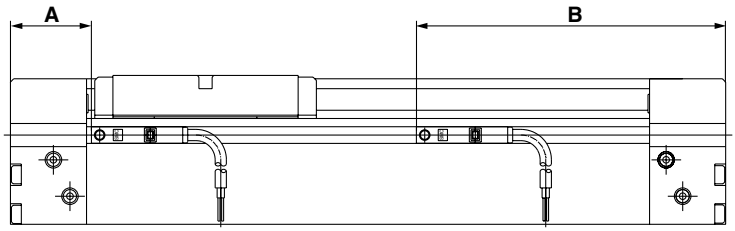
| Model | A | B | C | E | ED | EK | F | G | H | HA | HB | HG | HI | HL | HP | HS | HT | J | JK | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CYP15** | 8 | 9.5 | 5.4 | 4H9 $^{+0.030}_{0}$ | 9.5 | 4 | 12.5 | 6.5 | 45 | 19.5 | 8.5 | 8.5 | 23 | 38.6 | 44 | 27 | 19.5 | M6 x 1 | 10 | 21 |
| **CYP32** | 12 | 14 | 8.6 | 6H9 $^{+0.030}_{0}$ | 13 | 6 | 25 | 8.5 | 75 | 39 | 19 | 19 | 39 | 64.9 | 73.5 | 49.5 | 39 | M10 x 1.5 | 12 | 20 |

| Model | L | LD | LW | MM | M | N | P | PA | PB | Q | QW | R | T | TA | TB | W | WA | WB | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CYP15** | 67 | 5.6 | 69 | M4 x 0.7 | 6 | 4.5 | M5 x 0.8 | 25 | 60 | 105 | 48 | 45 | 23 | 13 | 18 | 69 | 32 | 17 | 2.5 | 118 |
| **CYP32** | 90 | 8.6 | 115 | M6 x 1 | 8 | 7.5 | Rc 1/8 | 50 | 100 | 138 | 87 | 79.5 | 29 | 17 | 22 | 115 | 46 | 27 | 3.5 | 155 |

Note 1) These dimension drawings indicate the case of piping port location “Nil”.
Note 2) These dimensions indicate the protruding portion of the bumper.
Note 3) Refer to “Specific Product Precautions” [Cushion Effect (Sine Cushion) and Stroke Adjustment] on page 8-17-13.

# With Auto Switch

## Proper Auto Switch Mounting Position Detection (Detedtion at stroke end)




## Proper Auto Switch Mounting Position

| Cylinder model \ Auto switch model | A | | | B | | |
|---|---|---|---|---|---|---|
| | D-Z7□<br>D-Z80 | D-Y7□W<br>D-Y7□WV | D-Y5□<br>D-Y6□<br>D-Y7P<br>D-Y7PV | D-Z7□<br>D-Z80 | D-Y7□W<br>D-Y7□WV | D-Y5□<br>D-Y6□<br>D-Y7P<br>D-Y7PV |
| **CYP15** | 24.5 | | | 93.5 | | |
| **CYP32** | 33 | | | 122 | | |

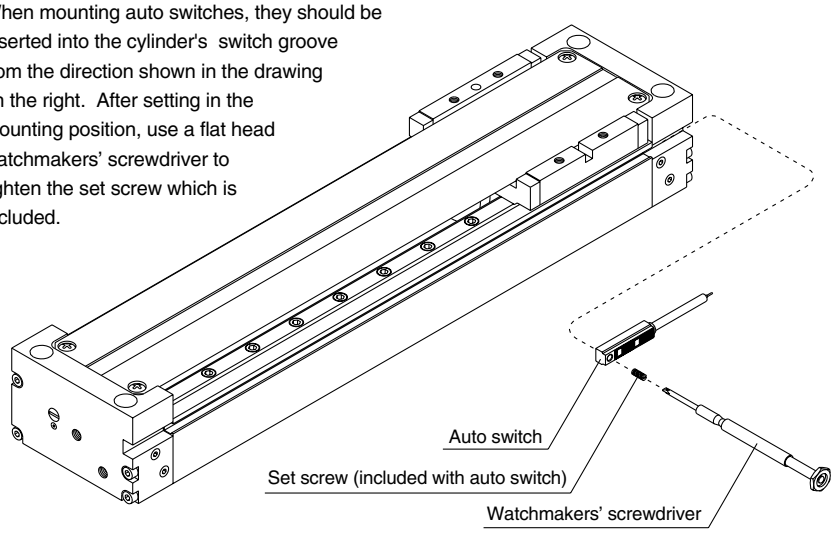
## Operating Range

| Cylinder model \ Auto switch model | D-Z7□<br>D-Z80 | D-Y7□W<br>D-Y7□WV<br>D-Y5□<br>D-Y6□<br>D-Y7P<br>D-Y7PV |
|---|---|---|
| **CYP15** | 6.5 | 2.5 |
| **CYP32** | 9.5 | 3 |

Note) Operating ranges are standards including hysteresis, and are not guaranteed. (variations on the order of ±30%)
Large variations may occur depending on the surrounding environment.

## Mounting of Auto Switch

When mounting auto switches, they should be inserted into the cylinder's switch groove from the direction shown in the drawing on the right. After setting in the mounting position, use a flat head watchmakers' screwdriver to tighten the set screw which is included.




Note) When tightening the auto switch set screw (included with the auto switch), use a watchmakers' screwdriver with a handle about 5 to 6 mm in diameter. The tightening torque should be approximately 0.05 to 0.1 N·m.

# Specific Product Precautions 1

**Be sure to read before handing.**

## Handling

### ⚠ Caution

**1. Open the inner package of the double packaged clean series inside a clean room or other clean environment.**

**2. Perform parts replacement and disassembly work in a clean room after exhausting compressed air in the piping outside the clean room.**

## Mounting

### ⚠ Caution

**1. Take care to avoid striking the cylinder tube with other objects or handling it in a way that could cause deformation.**

The cylinder tube and slider units have a non-contact construction. For this reason, even a slight deformation or slippage of position can cause malfunction and loss of durability, as well as a danger of degrading the particulate generation characteristics.

**2. Do not scratch or gouge the linear guide by striking it with other objects.**

Since the linear guide is specially treated for maximum suppression of particulate generation due to sliding, even a slight scratch can cause malfunction and loss of durability, as well as a danger of degrading the particulate generation characteristics.

**3. Since the slide table is supported by precision bearings, do not apply strong impacts or excessive moment when mounting workpieces.**

**4. Be sure to operate the cylinder with the plates on both sides secured.**

Avoid applications in which the slide table or only one plate is secured.

**5. When changing the ports to be used, be sure that unused ports are securely sealed.**

Take sufficient care in sealing unused ports, because if ports are not properly sealed air can leak from the ports and particulate generation characteristics can be degraded.

## Operation

### ⚠ Caution

**1. The maximum operating pressure for the clean rodless cylinder is 0.3 MPa.**

If the maximum operating pressure of 0.3 MPa for the clean rodless cylinder is exceeded, the magnetic coupling can be broken, causing a danger of malfunction or degradation of particulate generation characteristics, etc.

**2. The product can be used with a direct load applied within the allowable range, but careful alignment is necessary when connecting to a load having an external guide mechanism.**

Since alignment variations increase as the stroke gets longer, use a connection method which can absorb these variations and consider measures to control particulate generation.

## Operation

### ⚠ Caution

**3. When used for vertical operation, use caution regarding possible dropping due to separation of the magnetic coupling.**

When used for vertical operation, use caution as there is a possibility of dropping due to separation of the magnetic coupling if a load (pressure) greater than the allowable value is applied.

**4. Do not operate with the magnetic coupling out of position.**

If the magnetic coupling is out of position, push the external slider by hand (or the piston slider with air pressure) back to the proper position at the stroke end.

**5. Do not supply lubrication, as this is a non-lube product.**

The interior of the cylinder is lubricated at the factory, and lubrication with turbine oil, etc., will not satisfy the product's specifications.

**6. Never reapply lubricant.**

Never reapply lubricant, as there may be a degradation of particulate generation or operation characteristics.

## Speed Adjustment

### ⚠ Caution

**1. A throttle valve for clean room use is recommended for speed adjustment. (Please consult with SMC regarding equipment and methods to be used.)**

Speed adjustment can also be performed with a meter-in or meter-out type speed controller for clean room use, but it may not be possible to obtain smooth starting and stopping operation.

**Throttle Valves and Dual Speed Controllers for Recommended Speed Adjustment of CYP Cylinders**

| Throttle valve \ Series | | Model | |
|---|---|---|---|
| | | **CYP15** | **CYP32** |
| Metal body piping type | Elbow type | 10-AS1200-M5-X216 | 10-AS2200-01-X214 |
| | In-line type | 10-AS1000-M5-X214 | 10-AS2000-01-X209 |
| Resin body with One-touch fitting | Elbow type (throttle valve) | 10-AS1201F-M5-04-X214 | 10-AS2201F-01-04-X214 |
| | | 10-AS1201F-M5-06-X214 | 10-AS2201F-01-06-X214 |
| | | | 10-AS2201F-01-06-X214 |
| | Universal type (throttle valve) | 10-AS1301F-M5-04-X214 | 10-AS2301F-01-04-X214 |
| | | 10-AS1301F-M5-06-X214 | 10-AS2301F-01-06-X214 |
| | | | 10-AS2301F-01-06-X214 |
| | In-line type (throttle valve) | 10-AS1001F-04-X214 | 10-AS2001F-04-X214 |
| | | 10-AS1001F-06-X214 | 10-AS2001F-06-X214 |
| | Dual type (speed controller) | 10-ASD230F-M5-04 | 10-ASD330F-01-06 |
| | | 10-ASD230F-M5-06 | 10-ASD330F-01-08 |

**2. In the case of vertical mounting, a system with a reduced pressure supply circuit installed on the down side is recommended. (This is effective against upward starting delays and for conservation of air.)**

# Specific Product Precautions 2

**Be sure to read before handing.**

## Cushion Effect (Sine Cushion) and Stroke Adjustment

### ⚠ Caution

**1. A sine cushion (smooth start, soft stop) function is included in the standard specifications.**

Due to the nature of a sine cushion, adjustment of the cushion effect is not possible. There is no cushion needle adjustment as in the case of conventional cushion mechanisms.

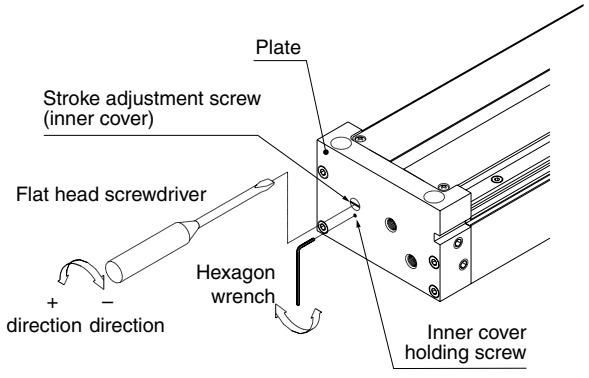
**2. The stroke end adjustment is a mechanism to adapt the slide table's stroke end position to a mechanical stopper on other equipment, etc.**

**(Adjustment range: Total of both sides ±2 mm) To ensure safety, perform adjustment after shutting off the drive air, releasing the residual pressure and implementing drop prevention measures, etc.**

1) Loosen the inner cover holding screw with a hexagon wrench, etc.
2) To match the position with a mechanical stopper on other equipment, etc., rotate the stroke adjustment screw (inner cover) to the left or right with a flat head screwdriver to move the inner stopper back and forth. Approximately 1 mm of adjustment is possible with one rotation.
3) The maximum adjustment on one side is ±1 mm. A total adjustment of approximately ±2 mm is possible using both sides.
4) After completing the stroke end adjustment, tighten the inner cover holding screw with a hexagon wrench, etc.

**Inner Cover Holding Screw Tightening Torque [N·m]**

| Model | Screw size | Tightening torque |
|---|---|---|
| **CYP15** | M3 x 0.5 | 0.3 |
| **CYP32** | M6 x 1 | 2.45 |




## Maintenance

### ⚠ Caution

**1. Never disassemble the cylinder tube or linear guide, etc.**

If disassembled, the slide table may touch the outside surface of the cylinder tube resulting in a degradation of particulate generation characteristics.

**2. Please consult with SMC when replacing seals and bearings (wear rings).**

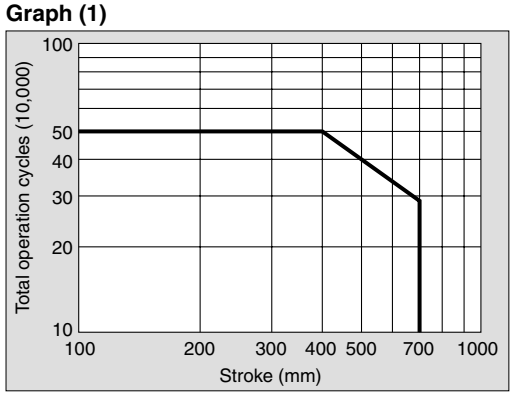
## Particulate Generation Characteristics

### ⚠ Caution

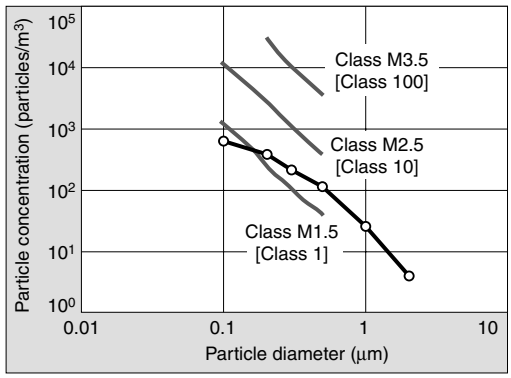
**1. In order to maintain the particulate generation grade, use operation of 500 thousand cycles or travel distance of about 400 km as a standard. (Graph (1) below)**

If operation is continued beyond the recommended values, lubrication failure of the linear guide and loss of particulate generation characteristics may occur.

**Graph (1)**




**Graph (2)**




Note 1) This chart indicates the level of cleanliness inside the measurement chamber.

Note 2) The vertical axis shows the number of particles per unit volume (1 $m^3$) of air which are no smaller than the particle size shown on the horizontal axis.

Note 3) The gray lines show the upper concentration limit of the cleanliness class based on Fed. Std. 209E-1992.

Note 4) The plots indicate the 95% upper reliability limit value for time series data up to 500 thousand operation cycles.
(Cylinder: CYP32-200, Workpiece weight: 5 kg, Average speed: 200 mm/s)

Note 5) The data above provides a guide for selection but is not guaranteed.