



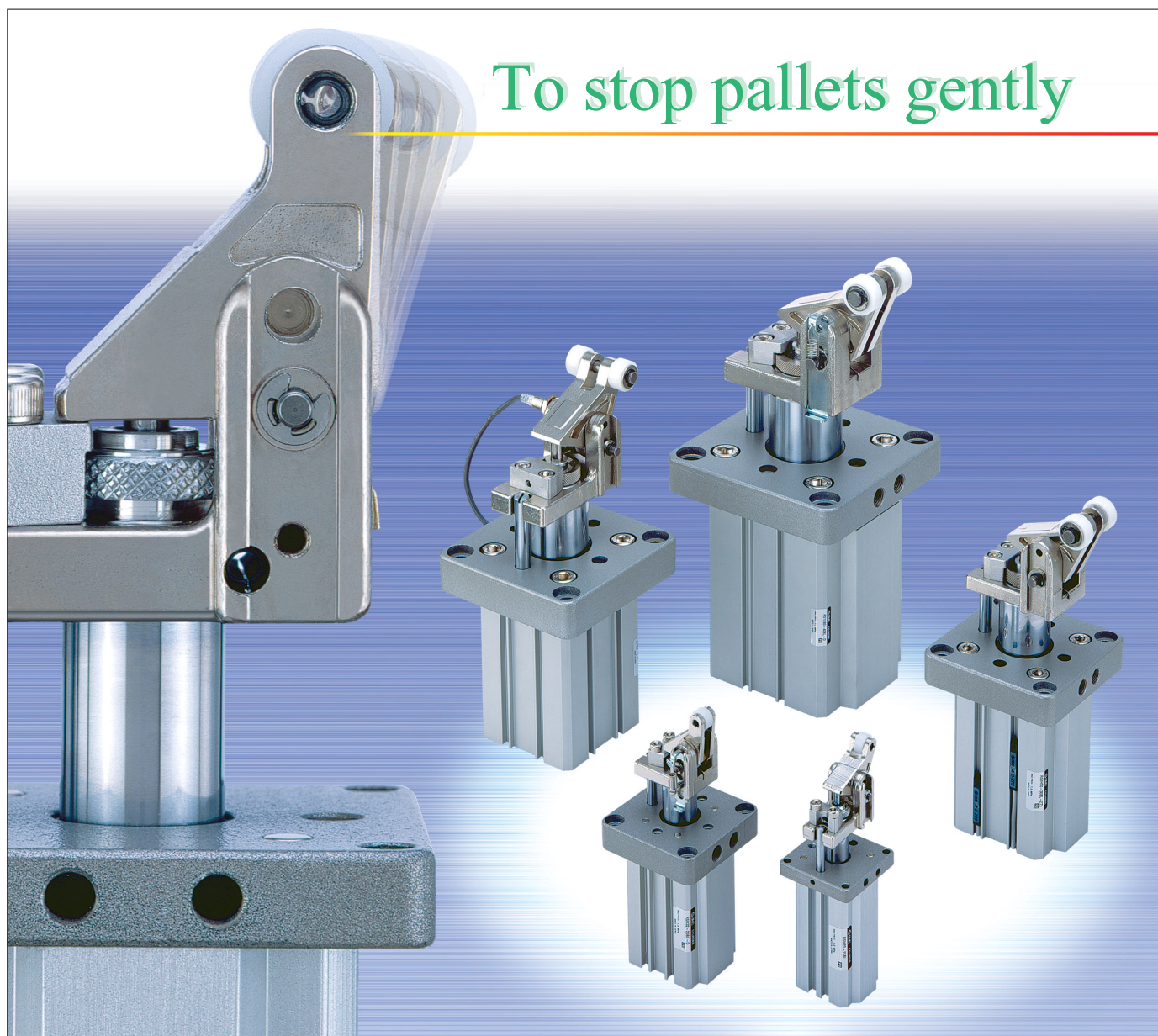
Heavy Duty Stopper Cylinder

# Series *RSH/RS1H*

ø20, ø32

ø50, ø63, ø80

To stop pallets gently



Stopper cylinder with built-in shock absorber

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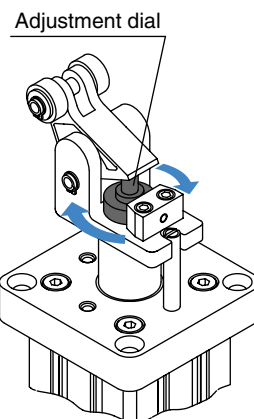
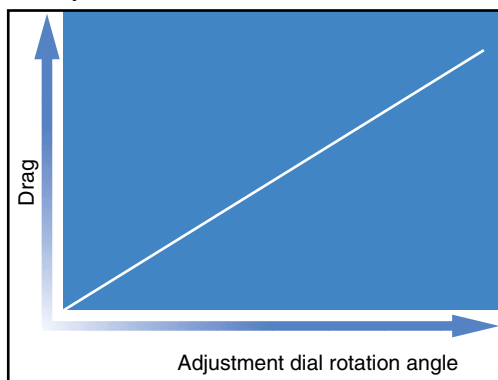
Stopper cylinder with built-in shock absorber

1

#### Amount of energy absorption can be adjusted to suit the load.

Stops the work piece gently with adjustable built-in shock absorber (ø50 to ø80).

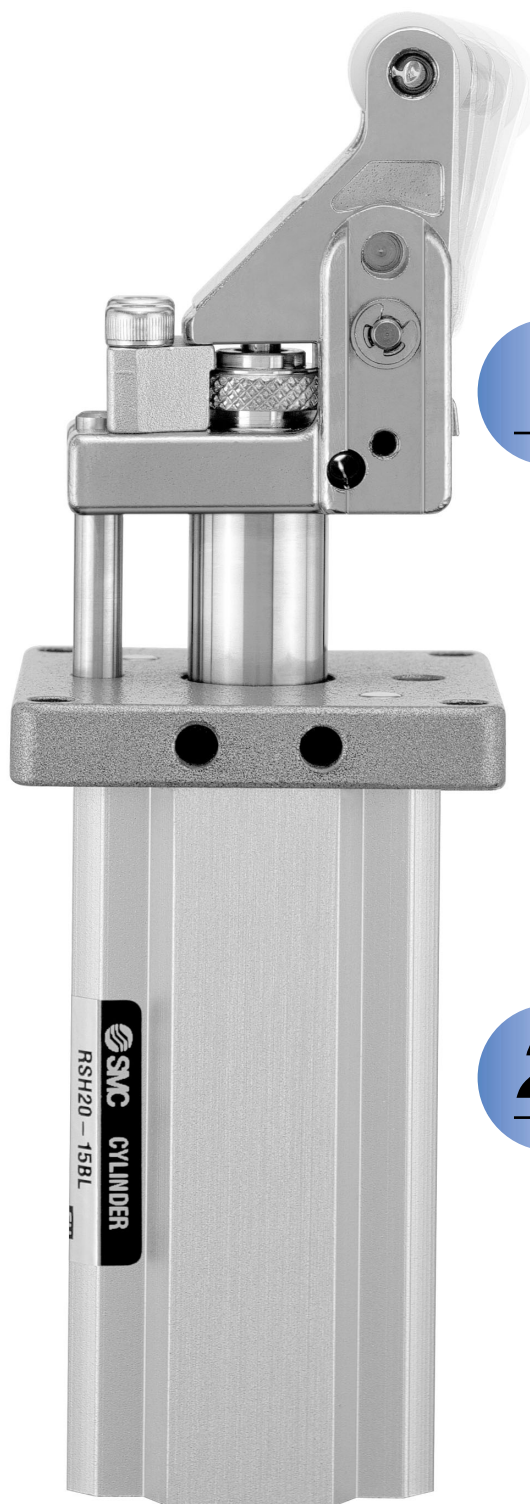
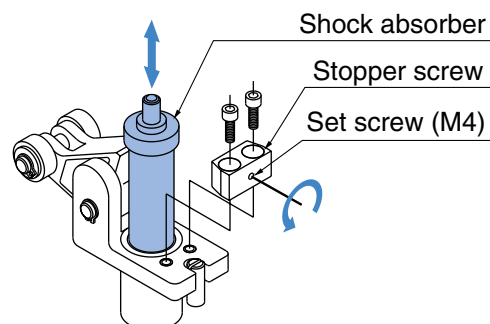
The retardation value can be changed by rotating the adjustment dial.



2

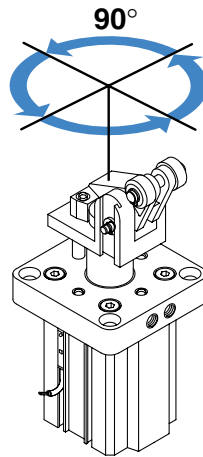
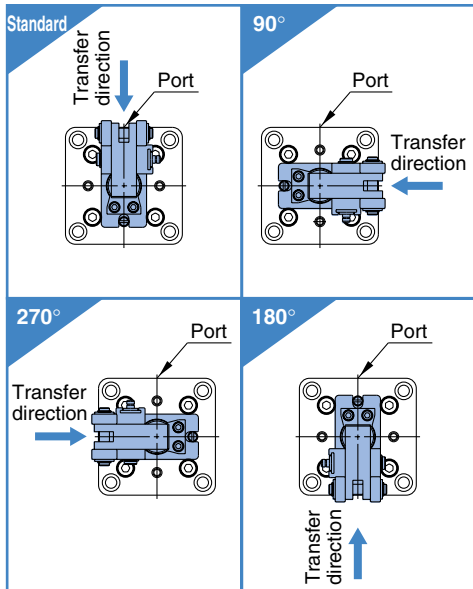
#### Easy replacement of shock absorbers

Easy maintenance is possible with a shock absorber that can be removed simply by loosening the bolts and shock absorber fixing screw from the stopper.



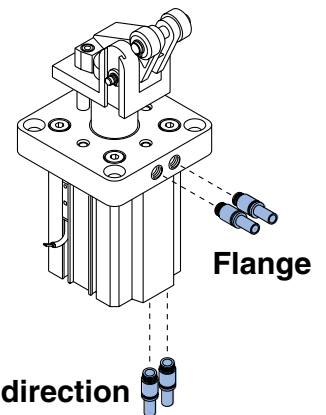
### 3 The roller lever direction can be changed in 90° steps.

To adapt the roller lever of the stopper to the work piece direction the roller lever can be positioned in 4 different directions (or 2 in case ø20) in 90° steps around the piston rod (with ø50 to ø80 the direction of the roller lever is selected in the part number).



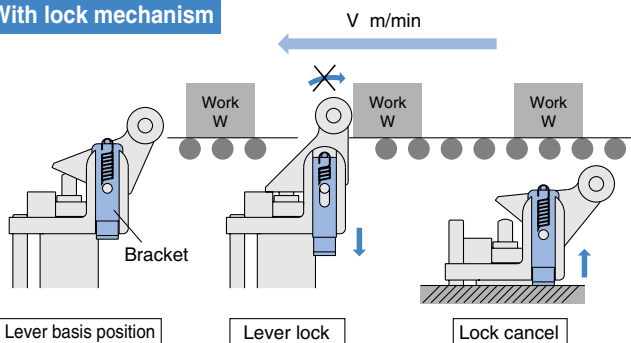
### 4 Piping is available from 2 directions.

\*With ø50 to ø80, the direction of the roller lever is selected in the part number.



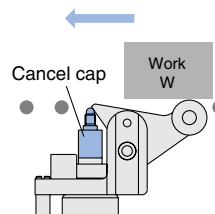
### Option

#### With lock mechanism



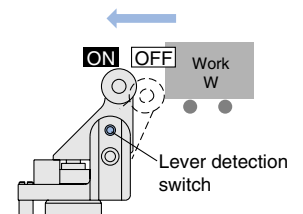
Even in the case of a light pallet, the locking mechanism prevents the pallet from rebounding due to spring.

#### With cancel cap



The cancel cap holds the lever horizontally allowing a pallet to pass.

#### With lever detection switch



When the lever stands erect (when the energy is absorbed), the switch turns on a signal that determines the pallet has reached the stop position. (For more information, please refer to page 9.)

#### ● High power rod

|                |    |    |    |    |    |    |
|----------------|----|----|----|----|----|----|
| Bore size (mm) | 20 | 32 | 50 | 63 | 63 | 80 |
| Rod size (mm)  | 14 | 20 | 32 | 40 | 40 | 50 |

#### ● 3 types of operation

1. Single acting
2. Double acting
3. With double acting spring

#### ● Auto switch mounting available

Auto switches can be mounted without protruding from the body surface.

#### ● 2 types of roller materials are available depending on the application.

(Resin, Carbon steel)

### Series Variations

| Series | Bore size (mm) | Standard stroke (mm) |    |    |    | Mounting type | Actuation system | Rod end shape | Standard variations |                     |             |                       | Option |   |  |
|--------|----------------|----------------------|----|----|----|---------------|------------------|---------------|---------------------|---------------------|-------------|-----------------------|--------|---|--|
|        |                | 15                   | 20 | 30 | 40 |               |                  |               | Built-in magnet     | With lock mechanism | With cancel | With proximity sensor |        |   |  |
| RSH    | 20             | ●                    |    |    |    | Flange        | Double acting    | Adjustable    | ●                   | ●                   | ●           | ●                     |        |   |  |
|        | 32             |                      | ●  |    |    |               |                  |               | ●                   | ●                   | ●           | ●                     |        |   |  |
| RS1H   | 50             |                      |    | ●  |    |               |                  |               | ●                   | ●                   | ●           | ●                     | ●      | ● |  |
|        | 63             |                      |    | ●  |    |               |                  |               | ●                   | ●                   | ●           | ●                     | ●      | ● |  |
|        | 80             |                      |    |    | ●  |               |                  |               | ●                   | ●                   | ●           | ●                     | ●      | ● |  |

# Heavy Duty Stopper Cylinder

# Series *RSH/RS1H*

ø20, ø32

ø50, ø63, ø80

## How to Order

**Bore size**

|    |      |
|----|------|
| 20 | 20mm |
| 32 | 32mm |

**Cylinder stroke**

|    |              |
|----|--------------|
| 15 | 15mm (RSH20) |
| 20 | 20mm (RSH32) |

**Port thread type**

|     |     |
|-----|-----|
| Nil | M*  |
|     | Rc  |
| TN  | NPT |
| TF  | G   |

\*The tube I.D. of 20 is only available to port size M screws.

**Piping direction**

Flange side: Nil

Axial direction (tube): A

**Cylinder stroke**

|    |                   |
|----|-------------------|
| 30 | 30mm (RS1H50, 63) |
| 40 | 40mm (RS1H80)     |

**Action**

|   |                               |
|---|-------------------------------|
| D | Double acting type            |
| B | Double acting spring type     |
| T | Single acting/Spring extended |

**Roller material**

|   |              |
|---|--------------|
| L | Resin        |
| M | Carbon steel |

**Option** Note 1)

|                          |                             |
|--------------------------|-----------------------------|
| Nil                      | Without option              |
| D                        | With lock mechanism         |
| C                        | With cancel cap             |
| S <small>Note 2)</small> | With lever detection switch |

Note 1) Options can be combined. Indicate the part No. according to the priority order of D.C.S.

Note 2) Lever detection switch type

| Type       | Applicable model  |
|------------|-------------------|
| E2E-X1C1   | RSH 20 · 30       |
| E2E-X2D1-N | RS1H 50 · 63 · 80 |

**Positional relationship of lever and port**

RSH20: Direction of transfer → Port

RSH32: Direction of transfer ↓ Port

**Number of auto switches (auto switch number mounted)**

|     |        |
|-----|--------|
| Nil | 2 pcs. |
| S   | 1 pc.  |

**Auto switch**

|     |  |
|-----|--|
| Nil | Without auto switch (Built-in magnet cylinder) |
|-----|--|

\*Refer to page 2 for auto switch model numbers.  
\*The auto switch is included in the package (not assembled.)

**Positional relationship of lever and port**

Nil: Direction of transfer ↓ Port

P: Direction of transfer ← Port

Q: Direction of transfer ↑ Port

R: Direction of transfer → Port

**Heavy Duty Stopper Cylinder ø20, ø32**    RSH 32    20 D L    Z73

**Heavy Duty Stopper Cylinder ø50, ø63, ø80**    RS1H 50    30 D L    Z73



Applicable auto switches/Refer to pages 10 through 15 for detailed auto switch specifications.

| Type               | Special function                        | Electrical entry | Indicator light | Wiring (output)    | Load voltage |           | Auto switch models         |         | Lead wire length (m) * |       |       | Applicable load |            |
|--------------------|---|------------------|-----------------|--------------------|--------------|-----------|----------------------------|---------|------------------------|-------|-------|-----------------|------------|
|                    |   |                  |                 |                    | DC           | AC        | Electrical entry direction |         | 0.5 (Nil)              | 3 (L) | 5 (Z) |                 |            |
|                    |   |                  |                 |                    |              |           | Perpendicular              | In-line |                        |       |       |                 |            |
| Reed switch        | —                                       | Grommet          | Yes             | 3-wire (NPN equiv) | —            | 5V        | —                          | Z76     | ●                      | ●     | —     | IC circuit      | Relay, PLC |
|                    |   |                  |                 | 2-wire             | 24V          | 12V, 100V | —                          | Z73     | ●                      | ●     | ●     | —               |            |
| Solid state switch | —                                       | Grommet          | Yes             | 3-wire (NPN)       | 24V          | 5V, 12V   | —                          | Y69A    | Y59A                   | ●     | ●     | ○               | Relay, PLC |
|                    |   |                  |                 | 3-wire (PNP)       |              |           |                            | Y7PV    | Y7P                    | ●     | ●     | ○               |            |
| Solid state switch | Diagnostic indication (2-color display) | Grommet          | Yes             | 2-wire             | 24V          | 12V       | —                          | Y69B    | Y59B                   | ●     | ●     | ○               | Relay, PLC |
|                    |   |                  |                 | 3-wire (NPN)       |              |           |                            | Y7NWV   | Y7NW                   | ●     | ●     | ○               |            |
|                    | Water resistance (2-color display)      |                  |                 | 3-wire (PNP)       | 24V          | 5V, 12V   | —                          | Y7PWV   | Y7PW                   | ●     | ●     | ○               | IC circuit |
|                    |   |                  |                 | 2-wire             |              |           |                            | 12V     | —                      | Y7BWV | Y7BW  | ●               |            |
|                    |   |                  |                 |                    |              |           |                            | —       | Y7BA                   | —     | ●     | ○               |            |

\*Lead wire length symbols: 0.5m.....Nil (Example) Y69B  
 3m.....L (Example) Y69BL  
 5m.....Z (Example) Y69BZ  
 \*\*Solid state switches marked with a "○" symbol are produced upon receipt of order.

### Specifications



| Model                         | RSH  |          | RS1H    |         |         |         |
|-------------------------------|--|----------|---------|---------|---------|---------|
| Bore size (mm)                | 20   | 32       | 50      | 63      | 80      |         |
| Action                        | Double acting, Double acting spring, Single acting (Spring extended) |          |         |         |         |         |
| Style of rod end              | Lever with built-in shock absorber type                              |          |         |         |         |         |
| Fluid                         | Air  |          |         |         |         |         |
| Proof pressure                | 1.5MPa   |          |         |         |         |         |
| Max. operating pressure       | 1.0MPa   |          |         |         |         |         |
| Ambient and fluid temperature | -10 to 60°C (with no condensation)                                   |          |         |         |         |         |
| Lubrication                   | Not required (non-lube)  |          |         |         |         |         |
| Cushion                       | Rubber bumper  |          |         |         |         |         |
| Stroke length tolerance       | +1.4<br>0  |          |         |         |         |         |
| Mounting                      | Flange   |          |         |         |         |         |
| Port size                     | For use in Japan   | M5 x 0.8 | Rc 1/8  | Rc 1/8  | Rc 1/4  | Rc 1/4  |
|                               | For use in U.S.A.  | —        | NPT 1/8 | NPT 1/8 | NPT 1/4 | NPT 1/4 |
|                               | For use in Europe  | —        | G 1/8   | G 1/8   | G 1/4   | G 1/4   |
| Auto switch                   | Can be installed   |          |         |         |         |         |

### Bore size, Standard strokes

(mm)

| Model | Bore size (mm) | Standard stroke |
|-------|----------------|-----------------|
| RSH   | 20             | 15              |
|       | 32             | 20              |
| RS1H  | 50             | 30              |
|       | 63             | 30              |
|       | 80             | 40              |

### Weights

(kg)

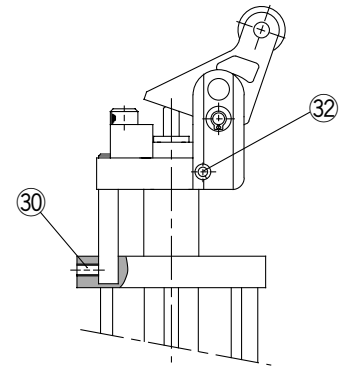
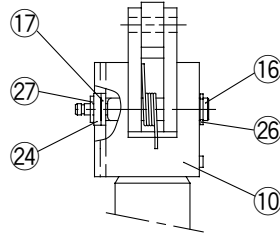
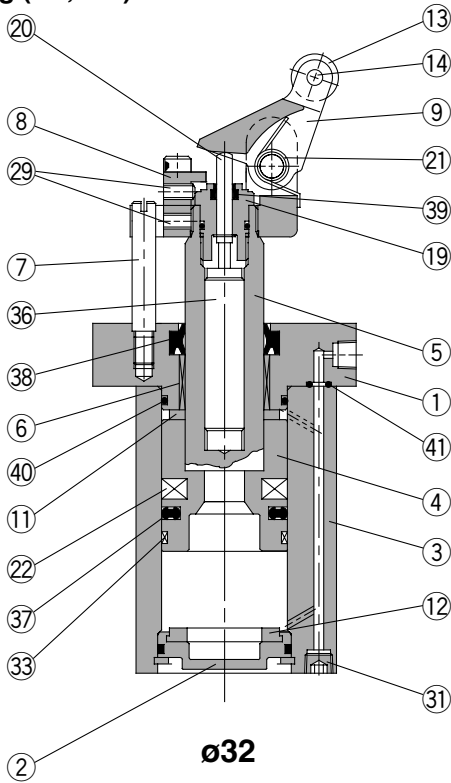
| Action   | Rod end configuration                   | Bore size (mm) | Weight |
|--|---|----------------|--------|
| Double acting type<br>Double acting spring type<br>Single acting spring extended | Lever with built-in shock absorber type | 20             | 0.41   |
|  |   | 32             | 0.75   |
|  |   | 50             | 2.03   |
|  |   | 63             | 3.56   |
|  |   | 80             | 6.33   |

# Series RSH/RS1H

## Construction

### ø20, ø32

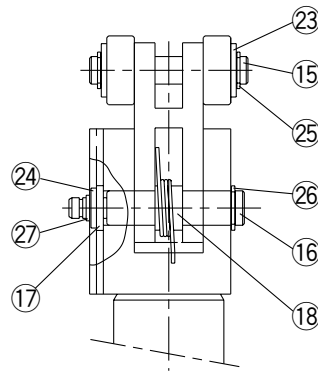
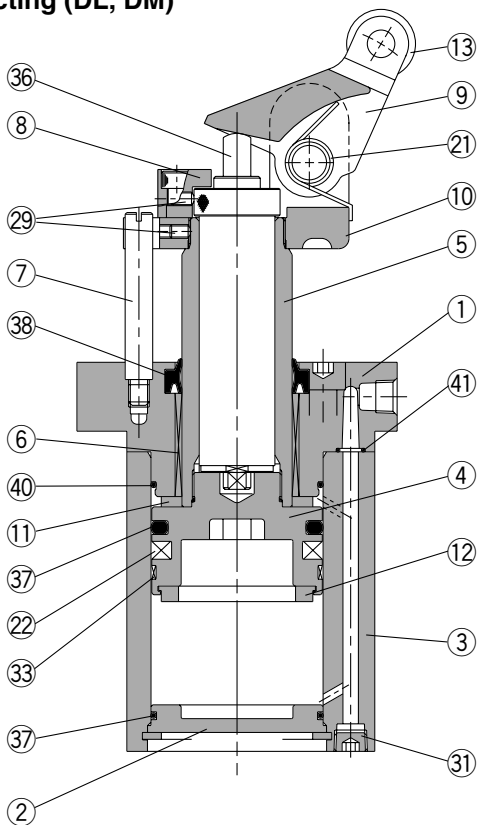
Double acting (DL, DM)



ø20

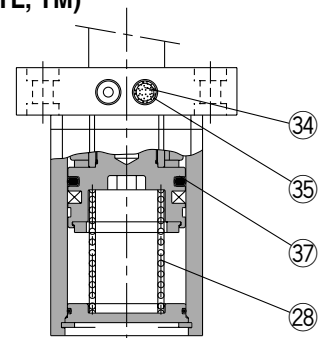
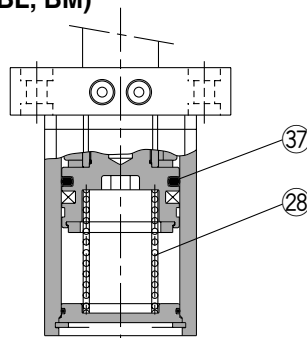
### ø50, ø63, ø80

Double acting (DL, DM)



Double acting spring type  
(BL, BM)

Single acting spring extended  
(TL, TM)



## Construction

### Parts list (Single acting)

| No. | Description                   | Material   | Note                          |
|-----|-------------------------------|--|-------------------------------|
| 1   | Rod cover                     | Aluminium alloy  | Metallic painted              |
| 2   | Bottom plate                  | Aluminium alloy  | Chromate                      |
| 3   | Cylinder tube                 | Aluminium alloy  | Hard anodized                 |
| 4   | Piston                        | Aluminium alloy  | Chromate                      |
| 5   | Piston rod                    | ø20: Stainless steel<br>ø32, ø50, ø63, ø80: Carbon steel | Hard chromium electro plating |
| 6   | Bushing                       | Bronze alloy   |                               |
| 7   | Guide rod                     | Carbon steel   | Hard chromium electro plating |
| 8   | Stopper screw                 | Stainless steel  |                               |
| 9   | Lever                         | Carbon steel   | Nickel plated                 |
| 10  | Lever holder                  | Carbon steel   | Nickel plated                 |
| 11  | Bumper A                      | Urethane rubber  |                               |
| 12  | Bumper B                      | Urethane rubber  |                               |
| 13  | Roller                        | Resin  | -□□L                          |
|     |                               | Carbon steel   | -□□M                          |
| 14  | Spring pin                    | Carbon tool steel  | ø20, 32 only                  |
| 15  | Roller pin                    | Carbon steel   |                               |
| 16  | Lever pin                     | Carbon steel   |                               |
| 17  | Ring A                        | Aluminium alloy  | Clear anodized                |
| 18  | Ring B                        | Aluminium alloy  | Clear anodized                |
| 19  | Adjustment dial               | Aluminium alloy  | ø20, 32 only                  |
| 20  | End rod                       | Special steel  | ø20, 32 only                  |
| 21  | Lever spring                  | Stainless steel wire                                     |                               |
| 22  | Magnet                        | Magnet   |                               |
| 23  | Flat washer                   | Steel wire   | Nickel plated                 |
| 24  | Flat washer                   | Steel wire   | Nickel plated                 |
| 25  | C type snap ring for shaft    | Carbon tool steel  |                               |
| 26  | C type snap ring for shaft    | Carbon tool steel  |                               |
| 27  | C type snap ring for shaft    | Carbon tool steel  |                               |
| 28  | Return spring                 | Piano wire   |                               |
| 29  | Hexagon socket head set screw | Chrome molybdenum steel                                  |                               |
| 30  | Hexagon socket head set screw | Chrome molybdenum steel                                  | ø20 only                      |
| 31  | Hexagon socket head plug      | Chrome molybdenum steel                                  | Nickel plated                 |
| 32  | Spring pin                    | Carbon tool steel  | ø20 only                      |
| 33  | Wear ring                     | Resin  |                               |
| 34  | Element                       | Bronze   | ø20 is socket set screw       |
| 35  | Snap ring                     | Steel wire   |                               |
| 36  | Shock absorber                | —  |                               |
| 37  | Piston seal                   | NBR  |                               |
| 38  | Rod seal                      | NBR  |                               |
| 39  | Scraper                       | NBR  | ø20, 32 only                  |
| 40  | Tube gasket                   | NBR  |                               |
| 41  | O-ring                        | NBR  |                               |

### Replacement parts: Seal kit

| Bore size (mm) | Kit no.       |                           |               | Contents  |
|----------------|---------------|---------------------------|---------------|---|
|                | Double acting | Double acting spring type | Single acting |   |
| 20             | RSH20D-PS     | RSH20T-PS                 |               | Set of items 37 to 41 in above table                    |
| 32             | RSH32D-PS     | RSH32T-PS                 |               |   |
| 50             | RSH50D-PS     | RSH50T-PS                 |               | Set of items 37 to 41 in above table (not including 39) |
| 63             | RSH63D-PS     | RSH63T-PS                 |               |   |
| 80             | RSH80D-PS     | RSH80T-PS                 |               |   |

\*The seal kits for ø20 to ø32 consist of items 37 to 41 and those for ø50 to ø80 consist of items 37 to 41. Please order them by using the seal kit number corresponding to each bore size.

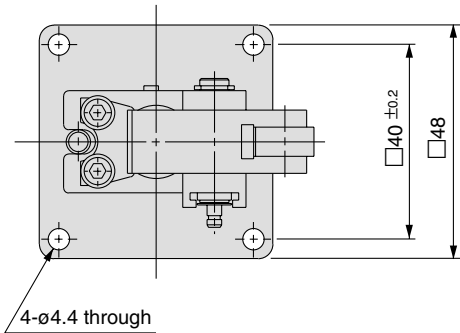
### Replacement parts: Shock absorber

| Bore size (mm) | Order no. |
|----------------|-----------|
| 20             | RSH-R20   |
| 32             | RSH-R32   |
| 50             | RS1H-R50  |
| 63             | RS1H-R63  |
| 80             | RS1H-R80  |

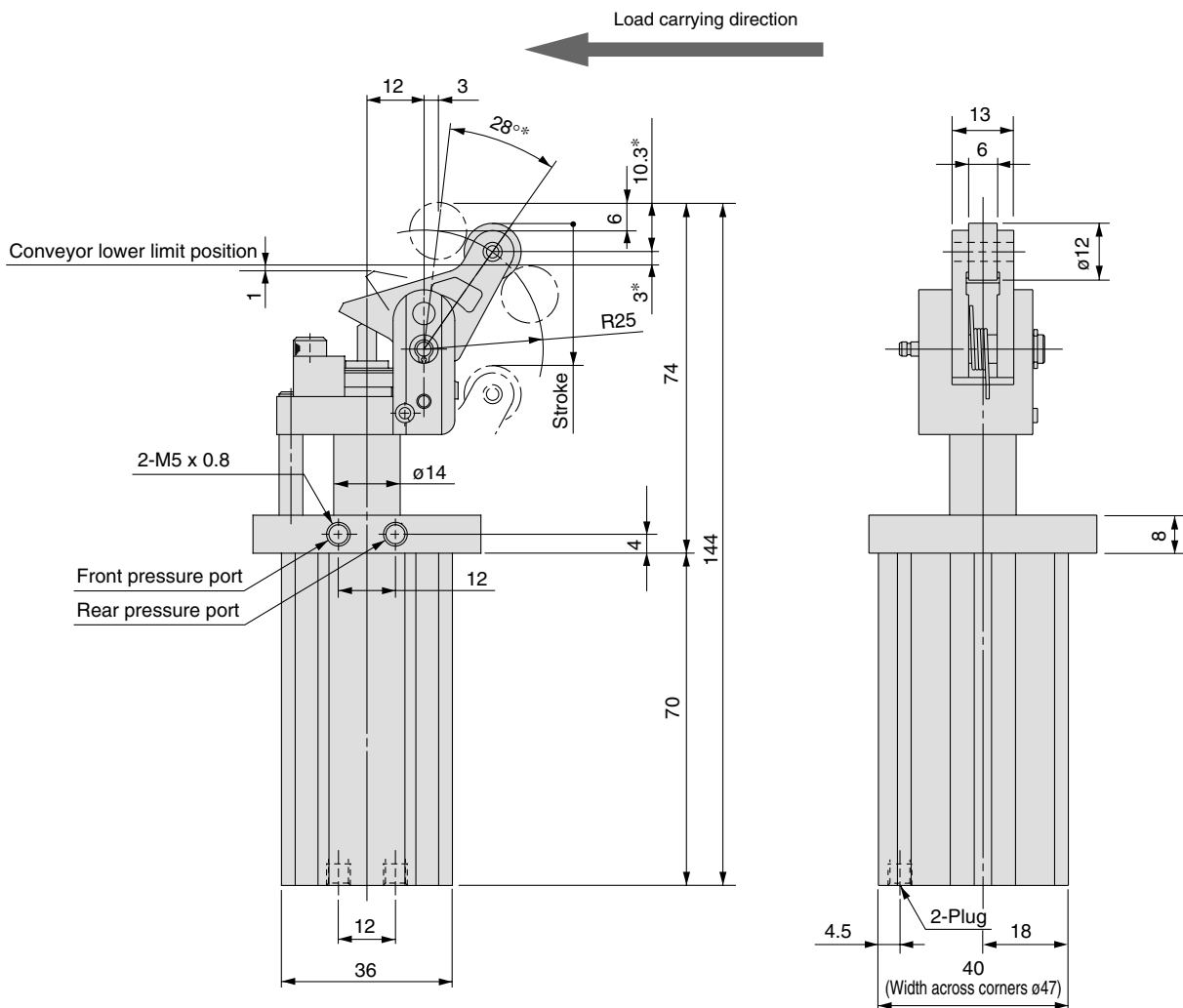
# Series RSH/RS1H

Dimensions/Bore size:  $\varnothing 20$

RSH20-15□□



\*The figure shows an extended piston rod.



Note 1) The figure shows dimensions at the maximum energy absorption capacity.

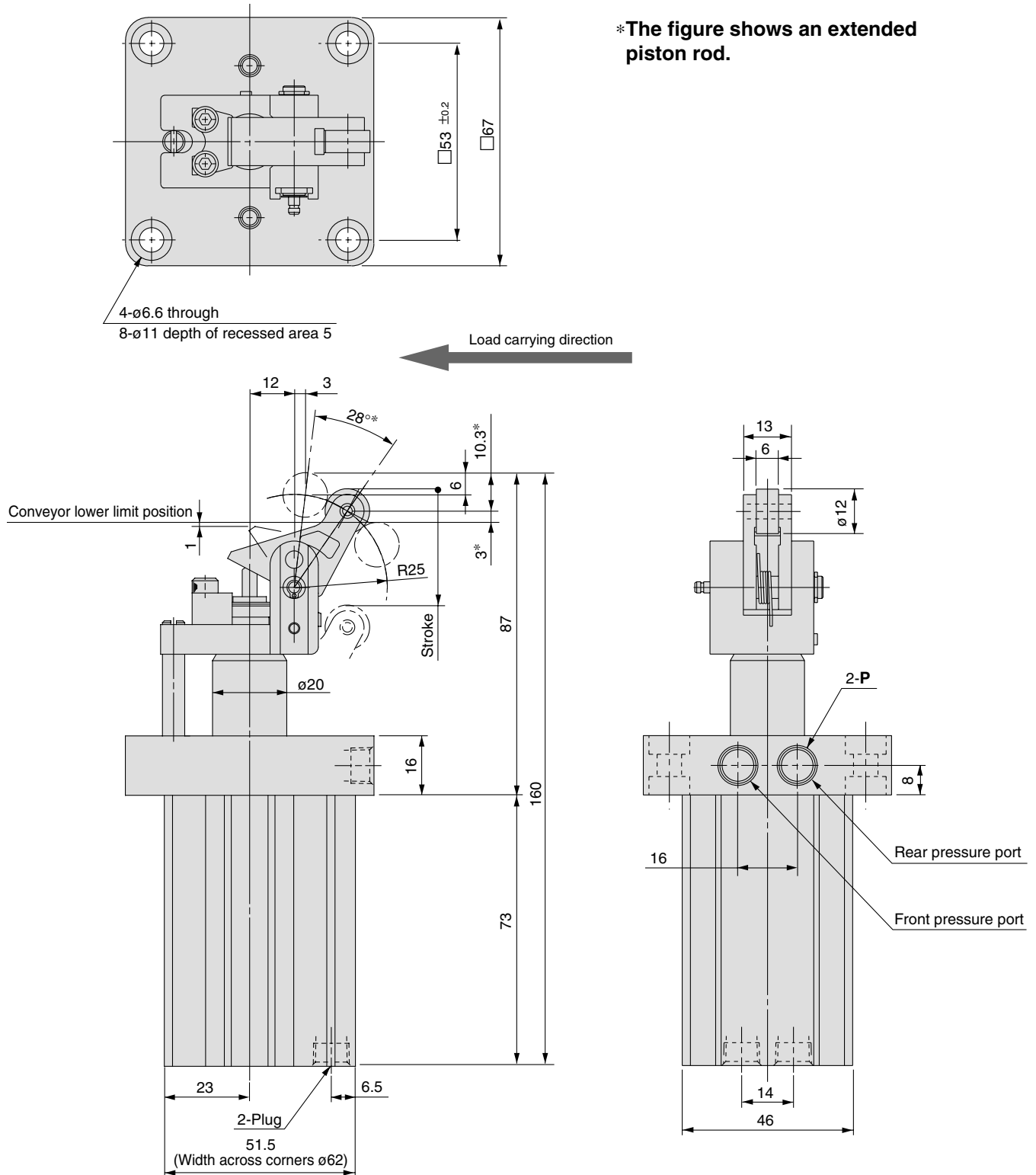
Note 2) Dimensions with auto switch are identical to the above.

Note 3) The dimensions marked with "\*" vary according to adjustment of the shock absorber dial.



**Dimensions/Bore size:  $\varnothing 32$**

RSH32-20□□



\*The figure shows an extended piston rod.

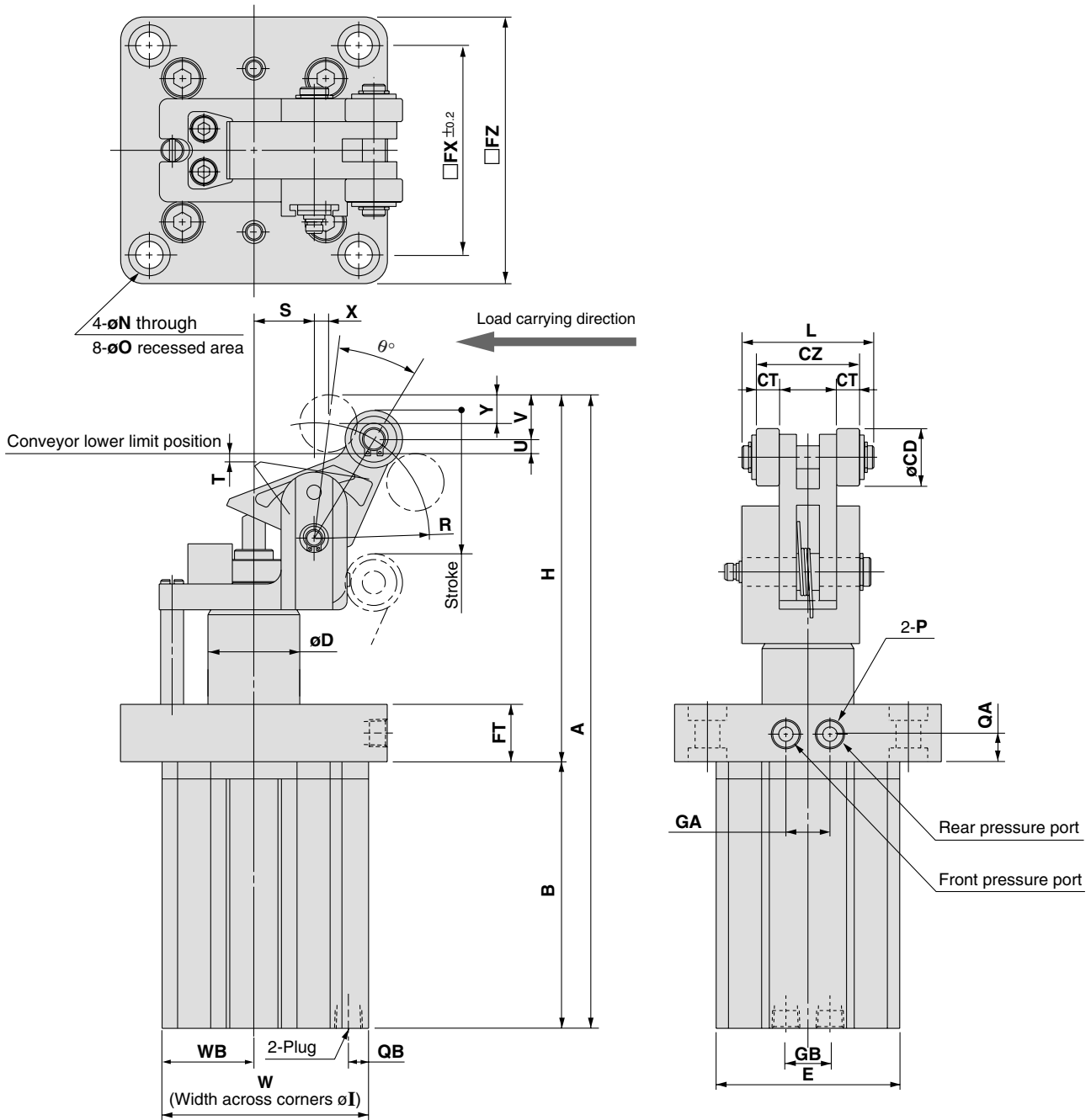
- Note 1) The figure shows dimensions at the maximum energy absorption capacity.
- Note 2) Dimensions with auto switch are identical to the above.
- Note 3) The dimensions marked with "\*" vary according to adjustment of the shock absorber dial.

| P (Piping port) |         |       |
|-----------------|---------|-------|
| Nil             | TN      | TF    |
| Rc 1/8          | NPT 1/8 | G 1/8 |

# Series RSH/RS1H

Dimensions/Bore size:  $\varnothing 50$ ,  $\varnothing 63$ ,  $\varnothing 80$

50  
RS1H 63 -   
80



| Bore size (mm) | Stroke | A     | B   | CD | CT | CZ | D  | E  | FT | FX  | FZ  | GA | GB | H     | Width across corners I | L  | N  | O          | QA   | QB  |
|----------------|--------|-------|-----|----|----|----|----|----|----|-----|-----|----|----|-------|------------------------|----|----|------------|------|-----|
| 50             | 30     | 221   | 93  | 20 | 8  | 36 | 32 | 64 | 20 | 73  | 93  | 16 | 16 | 128   | 85                     | 45 | 9  | 14 depth 5 | 10   | 7   |
| 63             | 30     | 243.5 | 99  | 20 | 10 | 45 | 40 | 77 | 25 | 90  | 114 | 24 | 24 | 144.5 | 103                    | 54 | 11 | 18 depth 6 | 12.5 | 8.5 |
| 80             | 40     | 299.5 | 128 | 25 | 10 | 45 | 50 | 98 | 25 | 110 | 138 | 24 | 35 | 171.5 | 132                    | 56 | 13 | 20 depth 6 | 12.5 | 10  |

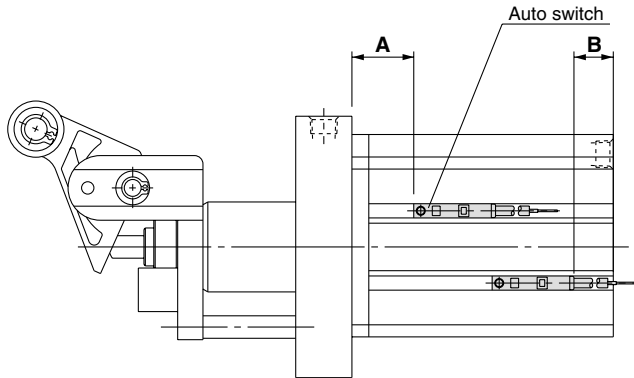
| Bore size (mm) | Stroke | R  | S    | T   | U   | V    | W    | WB   | X | Y    | $\theta^\circ$ |
|----------------|--------|----|------|-----|-----|------|------|------|---|------|----------------|
| 50             | 30     | 40 | 21   | 2   | 5.5 | 15.5 | 72   | 32   | 5 | 10   | 24             |
| 63             | 30     | 47 | 24.5 | 3.5 | 6.4 | 16   | 87.5 | 38.5 | 5 | 10   | 24             |
| 80             | 40     | 54 | 31   | 3   | 6.7 | 19.4 | 109  | 49   | 6 | 12.5 | 23             |

| Model  | P (Piping port) |         |       |
|--------|-----------------|---------|-------|
|        | Nil             | TN      | TF    |
| RS1H50 | Rc 1/8          | NPT 1/8 | G 1/8 |
| RS1H63 | Rc 1/4          | NPT 1/4 | G 1/4 |
| RS1H80 | Rc 1/4          | NPT 1/4 | G 1/4 |

Note 1) Dimensions with auto switch are identical to the above.  
Note 2) The figure shows an extended piston rod.

## Auto Switch Proper Mounting Position



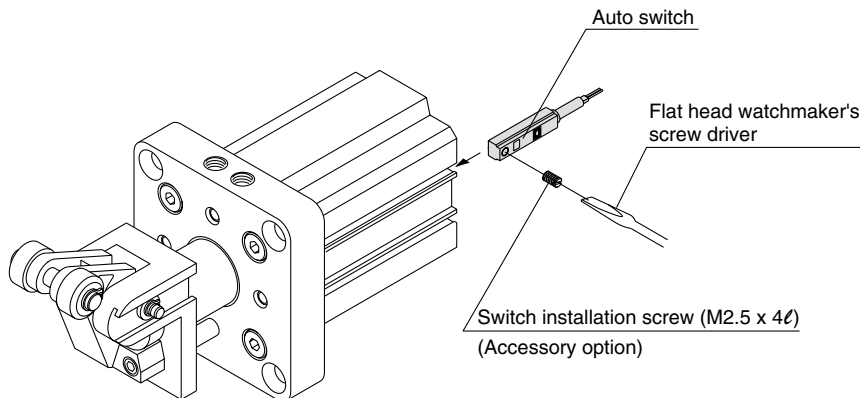
### Auto switch proper mounting position

| Auto switch models | D-Z7□<br>D-Z80<br>D-Y59□<br>D-Y7P<br>D-Y7□W |          | D-Y69□<br>D-Y7PV<br>D-Y7□WV |      | D-Y7BAL |     |
|--------------------|---|----------|-----------------------------|------|---------|-----|
|                    | A   | B        | A                           | B    | A       | B   |
| Bore size (mm)     |   |          |                             |      |         |     |
| 20                 | 18  | 8(6.5)   | 18                          | 9.5  | 18      | 2   |
| 32                 | 13.5  | 10.5(9)  | 13.5                        | 12   | 13.5    | 4.5 |
| 50                 | 22  | 12(10.5) | 22                          | 13.5 | 22      | 6   |
| 63                 | 24.5  | 15.5(14) | 24.5                        | 17   | 24.5    | 9.5 |
| 80                 | 37  | 22(20.5) | 37                          | 23.5 | 37      | 16  |

The values inside ( ) are for D-Z73.

## How to Install Auto Switch

To set the auto switch, insert the auto switch into the switch groove from the direction shown in the drawing to the below, After placing it in the mounting position, use a flat head watchmakers screw driver to tighten the mounting screw which is included.



Note) When adjusting the auto switch mounting screws, use a flat head watchmaker's screwdriver.  
The guideline of the tightening torque is 0.05 to 0.1 Nm.  
Turn another 90° from the position where tightening is felt by hand.

# Lever Detection Switch (Proximity Switch)

## Proximity switch specifications/Maker: OMRON Co. Ltd.

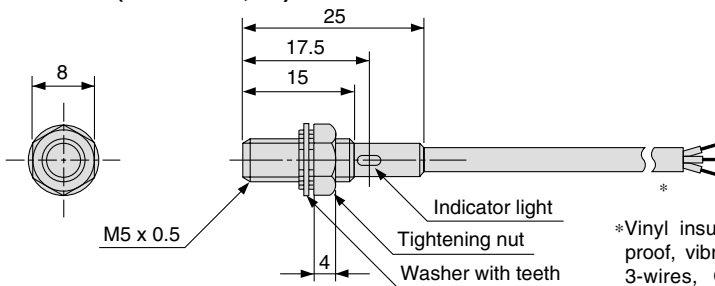
| Model  | E2E-X1C1  | E2E-X2D1-N  |
|--|---|---|
| Applicable cylinder bore size                  | RSH20, 32   | RS1H50, 63, 80  |
| Output type                                    | Normally open   |   |
| Power supply voltage (Operating voltage range) | 12 to 24VDC (10 to 30VDC), Ripple 10% or less (P-P)                             |   |
| Current consumption (Leakage current)          | 17mA or less  | 0.8mA or less   |
| Response frequency                             | 3kHz  | 1.5kHz  |
| Control output (chest)                         | Open collector maximum 100mA  | 3 to 100mA  |
| Indicator light                                | Detection indication (Red LED)  | Operation indication (Red LED),<br>Set operation indication (Green LED) |
| Ambient temperature                            | -25 to 70°C (No freezing)   |   |
| Operating ambient humidity                     | 35 to 95% RH  |   |
| Residual voltage <sup>Note 1)</sup>            | 2V or less  | 3V or less  |
| Withstand voltage <sup>Note 2)</sup>           | 500VAC  | 1000VAC   |
| Vibration                                      | Endurance 10 to 55 Hz, Duplex amplitude 1.5mm X,Y,Z direction each 2h           |   |
| Impact   | Endurance 500m/s <sup>2</sup> (approx. 50G), X, Y, Z direction each 10 times    |   |
| Enclosure                                      | IEC standards IP67 (Immersion proof shape and oil proof shape by JEM standards) |   |

Note 1) At load current 100mA and cord length of 2m

Note 2) Between case and whole charging part

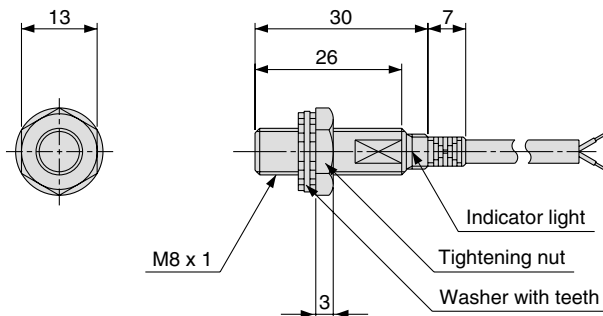
## Dimensions

### E2E-X1C1 (For RSH20, 32)



\*Vinyl insulation round cord (oil proof, vibration proof) 0.14mm<sup>2</sup>, 3-wires, O.D. ø2.9, Standard 2m, Cord extension (Individual metal piping), Max. 100m

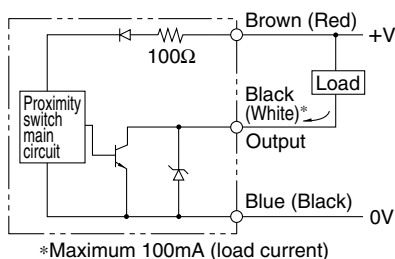
### E2E-X2D1-N (For RS1H50, 63, 80)



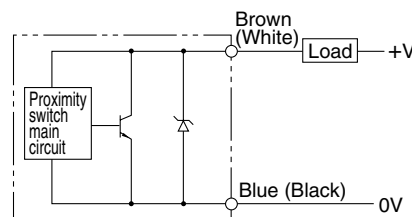
\*Vinyl insulation round cord ø3.5 (18/ø0.12), 2-wire, Standard 2m, Cord extension (Individual metal piping), Max. 200m

## Output Circuit

### E2E-X1C1/3-wire



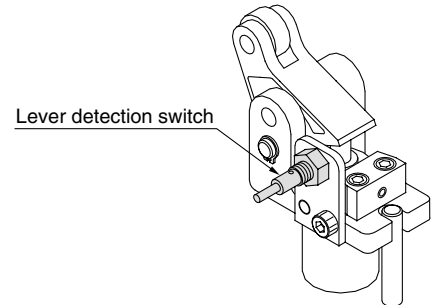
### E2E-X2D1-N/2-wire



## Mounting Position

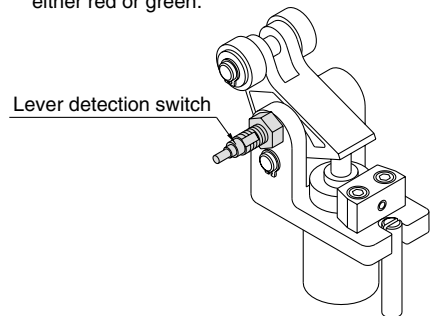
### ●E2E-X1C1 (For RSH20, 32)

While holding the lever in the detection range of the switch, screw in the switch gradually until the indicator light (red) turns on. Then, screw the switch in further, halfway between the turn-on point and the lever.



### ●E2E-X2D1-N (For RS1H50, 63, 80)

While holding the lever in the detection range of the switch, screw in the switch until the indicator light (green) turns on. Then, give an additional half rotation of screw. After that, incline the lever by 90° and confirm that the indicator light is not on and does not show either red or green.



# Series RSH/RS1H Auto Switch Specifications

## Auto Switch Common Specifications

| Type                  | Reed switch  | Solid state switch                               |
|-----------------------|--|--|
| Leakage current       | None   | 3 wire: 100μA or less, 2 wire: 0.8mA or less     |
| Operating time        | 1.2ms  | 1ms or less                                      |
| Impact resistance     | 300m/s <sup>2</sup>                                    | 1000m/s <sup>2</sup>                             |
| Insulation resistance | 50MΩ or more at 500VDC (between lead wire and case)    |  |
| Withstand voltage     | 1500VAC 1 min.<br>(between lead wire and case)         | 1000VAC for 1min<br>(between lead wire and case) |
| Ambient temperature   | -10 to 60°C  |  |
| enclosure             | IEC529 standard IP67, JISC0920 watertight construction |  |

## Lead Wire Length

Lead wire length indication

(Example) **D-Y59A** **L**

Lead wire length

|     |      |
|-----|------|
| Nil | 0.5m |
| L   | 3m   |
| Z   | 5m   |

Note 1) Lead wire length Z: 5m applicable auto switch  
Reed switch: D-Z73  
Solid state: All models are produced upon receipt of order  
(standard availability).

## Contact Protection Boxes/ CD-P11, CD-P12

### <Applicable switches>

D-Z7, Z8

The above auto switches do not have internal contact protection circuits.

1. The operating load is an induction load.
2. The length of wiring to the load is 5m or more.
3. The load voltage is 100 or 200VAC.

Use a contact protection box in any of the above situations.

The life of the contacts may otherwise be reduced. (They may stay ON all the time.)

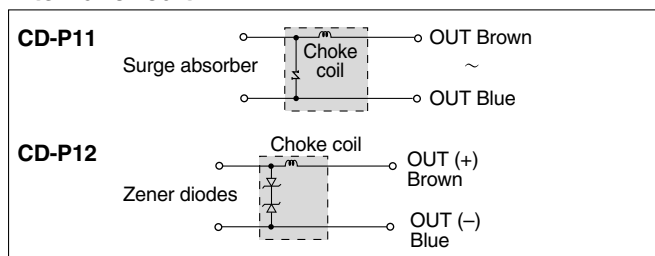
### Specifications

| Part no.             | CD-P11 | CD-P12 |       |
|----------------------|--------|--------|-------|
| Load voltage         | 100VAC | 200VAC | 24VDC |
| Maximum load current | 25mA   | 12.5mA | 50mA  |

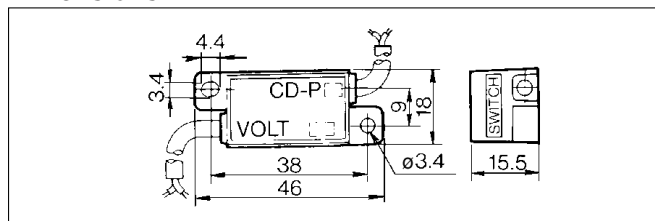
\*Lead wire length — Switch connection side 0.5m  
Load connection side 0.5m



### Internal circuit



### Dimensions



### Connection

To connect a switch to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch. Furthermore, the switch unit should be kept as close as possible to the contact protection box, with a lead wire length of no more than 1 meter between them.

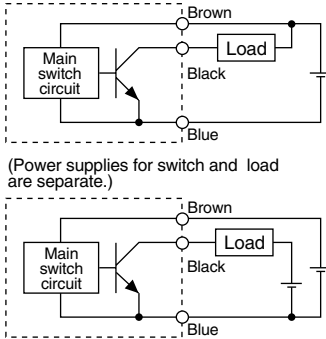


# Series RSH/RS1H

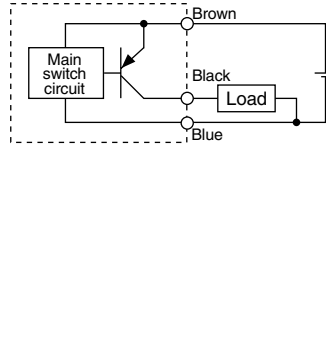
## Auto Switch Connections and Examples

### Basic Wiring

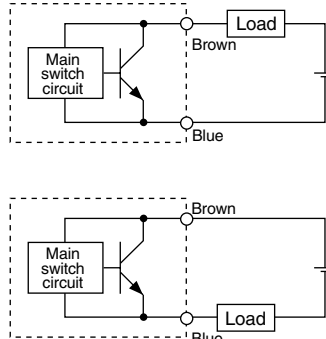
#### Solid state 3-wire, NPN



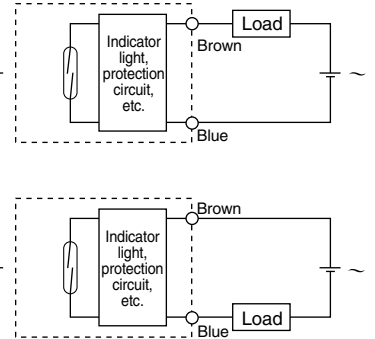
#### Solid state 3-wire, PNP



#### 2-wire <Solid state>

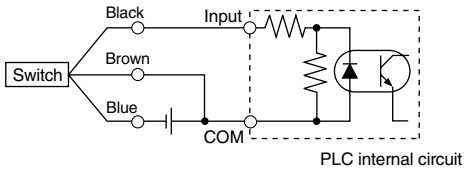


#### 2-wire <Reed switch>

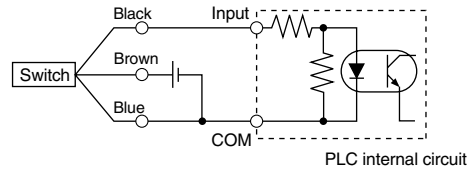


### Examples of Connection to PLC

#### Sink input specifications 3-wire, NPN

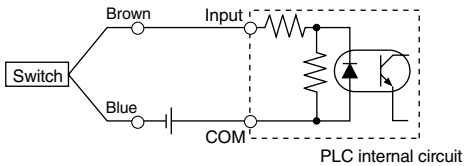


#### Source input specifications 3-wire, PNP

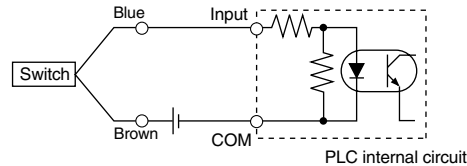


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

#### 2-wire



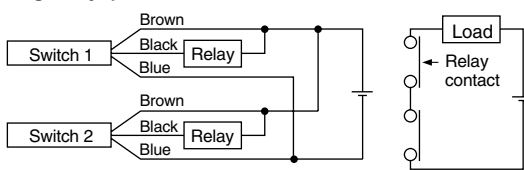
#### 2-wire



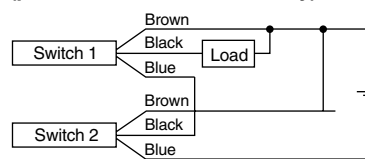
### Connection Examples for AND (Series) and OR (Parallel)

#### 3-wire

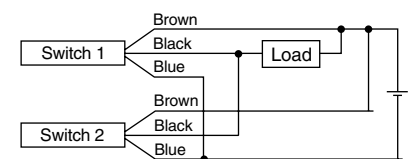
##### AND connection for NPN output (using relays)



##### AND connection for NPN output (performed with switches only)

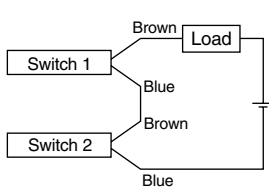


##### OR connection for NPN output



The indicator lights will light up when both switches are turned ON.

#### 2-wire with 2 switch AND connection

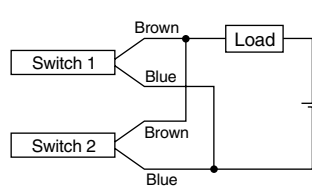


When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up if both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Internal voltage drop} \times 2 \text{ pcs.} \\ &= 24\text{V} - 4\text{V} \times 2 \text{ pcs.} \\ &= 16\text{V} \end{aligned}$$

Example: Power supply is 24VDC  
Internal voltage drop in switch is 4V

#### 2-wire with 2 switch OR connection



##### <Solid state>

When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

$$\begin{aligned} \text{Load voltage at OFF} &= \text{Leakage current} \times 2 \text{ pcs.} \times \text{Load impedance} \\ &= 1\text{mA} \times 2 \text{ pcs.} \times 3\text{k}\Omega \\ &= 6\text{V} \end{aligned}$$

Example: Load impedance is 3kΩ  
Leakage current from switch is 1mA

##### <Reed switch>

Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes dim or not light up, because of dispersion and reduction of the current flowing to the switches.

# Solid State Switches/Direct Mount Type D-Z73, D-Z76, D-Z80

## Grommet



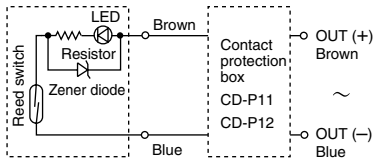
## Auto Switch Specifications

| D-Z7 (with indicator light)                 |   |                         |                          |
|---|---|-------------------------|--------------------------|
| Auto switch part no.                        | D-Z73   |                         | D-Z76                    |
| Applicable load                             | Relay, PLC  |                         | IC circuit               |
| Load voltage                                | 24VDC   | 100VAC                  | 4 to 8VDC                |
| Maximum load current and load current range | 5 to 40mA   | 5 to 20mA               | 20mA                     |
| Contact protection circuit                  | None  |                         |                          |
| Internal voltage drop                       | 2.4V or less (to 20mA)/3V or less (to 40mA)       | 0.8V or less            |                          |
| Indicator light                             | Red LED lights when ON                            |                         |                          |
| D-Z8 (with indicator light)                 |   |                         |                          |
| Auto switch part no.                        | D-Z80   |                         |                          |
| Applicable load                             | Relay, PLC, IC circuit                            |                         |                          |
| Load voltage                                | 24V <sup>AC</sup><br>DC or less                   | 48V <sup>AC</sup><br>DC | 100V <sup>AC</sup><br>DC |
| Maximum load current                        | 50mA  | 40mA                    | 20mA                     |
| Contact protection circuit                  | None  |                         |                          |
| Internal resistance                         | 1Ω or less (Includes the lead wire length of 3m.) |                         |                          |

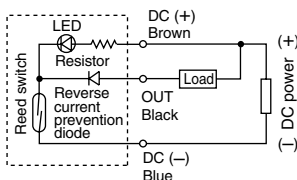
- Lead wire – Oil proof heavy duty vinyl cord,  $\phi 3.4$ , 0.2mm<sup>2</sup>, 3 cores (brown, black, blue), 2 cores (brown, blue), 0.5m ( $\phi 2.7$ , 0.18mm<sup>2</sup>, 2-wire only in case of D-Z73)
- Note 1) Refer to page 10 for reed state switch common specifications.
- Note 2) Refer to page 10 for lead wire length.

## Auto Switch Internal Circuits

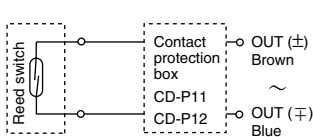
### D-Z73



### D-Z76



### D-Z80



- Note) ① The operating load is inductive load.  
 ② The wiring to the load is 5 m or longer.  
 ③ The load voltage is 100VAC.

If any of the above conditions is applicable, the life time of the contact may be shortened. Use a contact protection box. (Refer to page 10 about the contact protection box.)

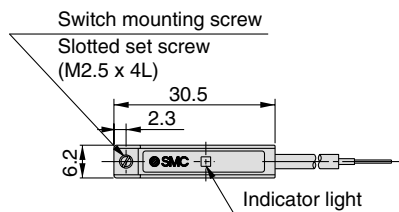
## Auto Switch Weights

Unit: g

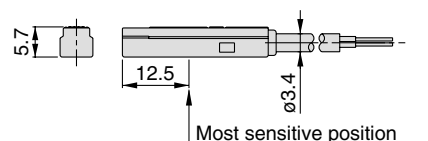
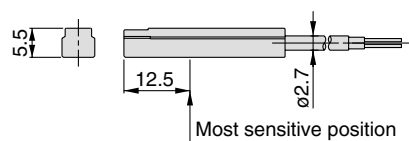
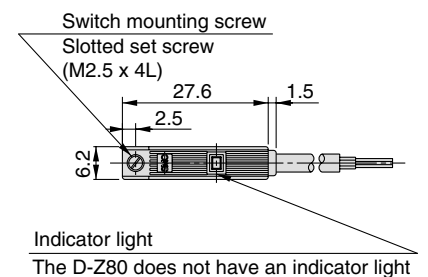
| Model                 |     | D-Z73 | D-Z76 | D-Z80 |
|-----------------------|-----|-------|-------|-------|
| Lead wire length<br>m | 0.5 | 7     | 10    | 9     |
|                       | 3   | 31    | 55    | 49    |
|                       | 5   | 50    | -     | -     |

## Auto Switch Dimensions

### D-Z73 (L)



### D-Z76, Z80



# Solid State Switches/Direct Mount Type D-Y59<sup>A</sup><sub>B</sub>, D-Y69<sup>A</sup><sub>B</sub>, D-Y7P(V)

## Grommet



## Auto Switches Specifications

| D-Y5□, D-Y6□, D-Y7P, D-Y7PV (with indicator light) |   |               |              |               |                        |               |
|--|---|---------------|--------------|---------------|------------------------|---------------|
| Auto switch part no.                               | D-Y59A  | D-Y69A        | D-Y7P        | D-Y7PV        | D-Y59B                 | D-Y69B        |
| Electrical entry direction                         | In-line   | Perpendicular | In-line      | Perpendicular | In-line                | Perpendicular |
| Wiring type  | 3-wire  |               |              |               | 2-wire                 |               |
| Output type  | NPN   |               | PNP          |               | —                      |               |
| Applicable load                                    | IC circuit, Relay, PLC                              |               |              |               | 24VDC relay, PLC       |               |
| Power supply voltage                               | 5, 12, 24VDC (4.5 to 28VDC)                         |               |              |               | —                      |               |
| Current consumption                                | 10mA or less  |               |              |               | —                      |               |
| Load voltage                                       | 28VDC or less                                       |               | —            |               | 24VDC (10 to 28VDC)    |               |
| Load current                                       | 40mA or less  |               | 80mA or less |               | 5 to 40mA              |               |
| Internal voltage drop                              | 1.5V or less<br>(0.8V or less at 10mA load current) |               | 0.8V or less |               | 4V or less             |               |
| Leakage current                                    | 100μA or less at 24VDC                              |               |              |               | 0.8mA or less at 24VDC |               |
| Indicator light                                    | Red LED lights when ON                              |               |              |               |                        |               |

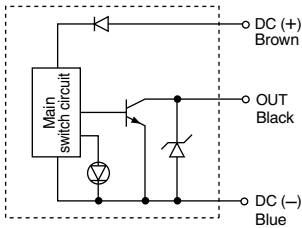
- Lead wire—Oil proof heavy duty vinyl cord,  $\phi 3.4$ , 0.15mm<sup>2</sup>, 3 cores (brown, black, blue), 2 cores (brown, blue), 0.5m

Note 1) Refer to page 10 for solid state switch common specifications.

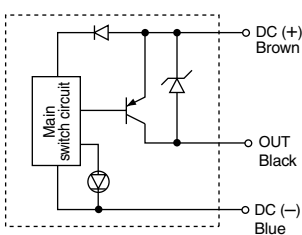
Note 2) Refer to page 10 for lead wire length.

## Auto Switch Internal Circuits

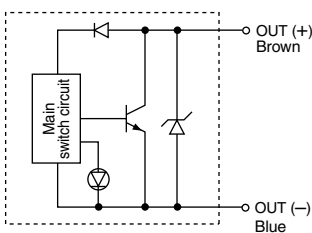
### D-Y59A, D-Y69A



### D-Y7P, D-Y7PV



### D-Y59B, D-Y69B



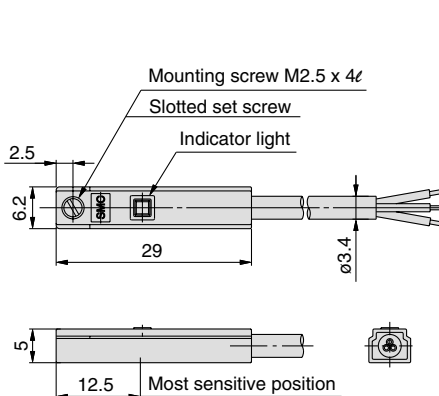
## Auto Switch Weights

Unit: g

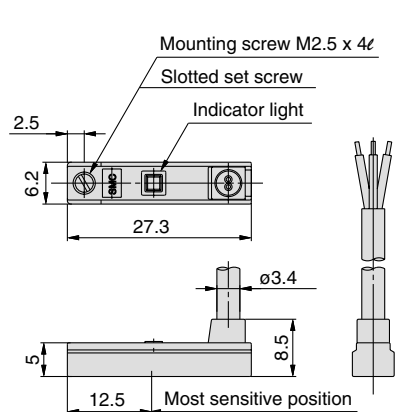
| Model                 |     | D-Y59B | D-Y69B | D-Y59A | D-Y69A | D-Y7P(V) |
|-----------------------|-----|--------|--------|--------|--------|----------|
| Lead wire length<br>m | 0.5 | 9      | —      | 10     | —      | 10       |
|                       | 3   | 50     | —      | 53     | —      | 53       |
|                       | 5   | 83     | —      | 87     | —      | 87       |

## Auto Switch Dimensions

### D-Y59A, D-Y7P, D-Y59B



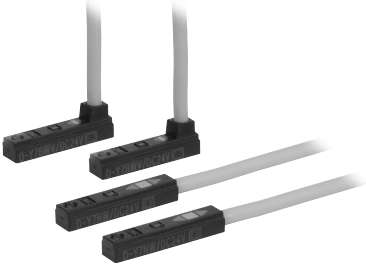
### D-Y69A, D-Y7PV, D-Y69B



# 2-Color Indication Solid State Switches/Direct Mount Type D-Y7NW(V), D-Y7PW(V), D-Y7BW(V)

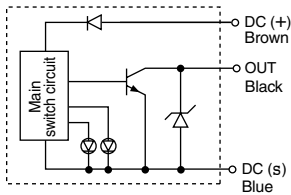
## Grommet

The optimum operation position can be judged by the color of the light (red → green ← red)

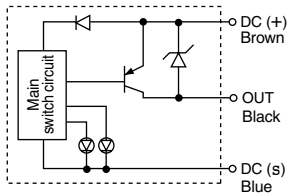


## Auto Switch Internal Circuits

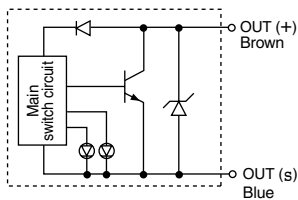
### D-Y7NW, Y7NWV



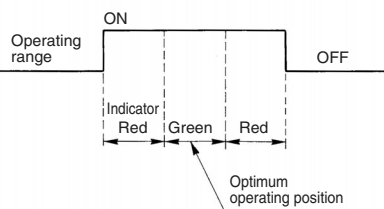
### D-Y7PW, Y7PWV



### D-Y7BW, Y7BWV



## Indicator light/Display method



## Auto Switch Specifications

| D-Y7□W, D-Y7□WV (with indicator light) |   |               |              |               |                     |               |
|--|---|---------------|--------------|---------------|---------------------|---------------|
| Auto switch part no.                   | D-Y7NW  | D-Y7NWV       | D-Y7PW       | D-Y7PWV       | D-Y7BW              | D-Y7BWV       |
| Electrical entry direction             | In-line   | Perpendicular | In-line      | Perpendicular | In-line             | Perpendicular |
| Wiring type                            | 3-wire  |               |              |               | 2-wire              |               |
| Output type                            | NPN   |               | PNP          |               | S                   |               |
| Applicable load                        | IC circuit, Relay, PLC  |               |              |               | 24VDC relay, PLC    |               |
| Power supply voltage                   | 5, 12, 24VDC (4.5 to 28V)   |               |              |               | S                   |               |
| Current consumption                    | 10mA or less  |               |              |               | S                   |               |
| Load voltage                           | 28VDC or less   |               | S            |               | 24VDC (10 to 28VDC) |               |
| Load current                           | 40mA or less  |               | 80mA or less |               | 5 to 40mA           |               |
| Internal voltage drop                  | 1.5V or less<br>(0.8V or less at 10mA load current)   |               | 0.8V or less |               | 4V or less          |               |
| Leakage voltage                        | 100μA or less at 24VDC  |               |              |               | 0.8mA or less       |               |
| Indicator light                        | Actuated position////////// Red LED light up<br>Optimum operating position/////Green LED light up |               |              |               |                     |               |

- Lead wires: Oil proof heavy duty vinyl cord,  $\phi 3.4$ , 0.15mm<sup>2</sup>, 3 cores (brown, black, blue), 2 cores (brown, blue), 0.5m

Note 1) Refer to page 10 for solid state switch common specifications.

Note 2) Refer to page 10 for lead wire length.

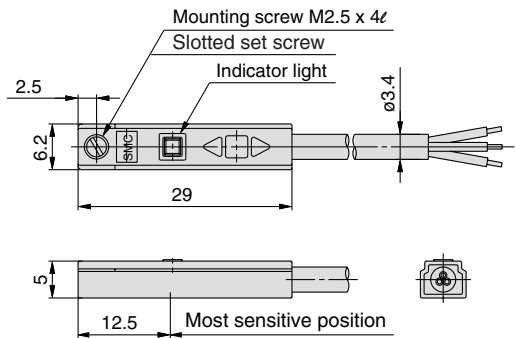
## Auto Switch Weights

Unit: g

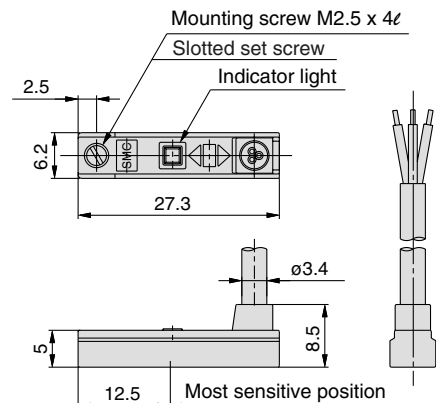
| Model                 |     | D-Y7NW(V) | D-Y7PW(V) | D-Y7BW(V) |
|-----------------------|-----|-----------|-----------|-----------|
| Lead wire length<br>m | 0.5 | 11        | 11        | 11        |
|                       | 3   | 54        | 54        | 54        |
|                       | 5   | 88        | 88        | 88        |

## Auto Switch Dimensions

### D-Y7□W



### D-Y7□WV



# 2-Color Indication Solid State Switches/Direct Mount Type D-Y7BAL

## Grommet

Improved water (coolant liquid) resistance



## Caution

### Operation instructions

Consult SMC when using solvents other than water.

## Auto Switch Specifications

| D-Y7BAL (with indicator light) |   |
|--------------------------------|---|
| Auto switch part no.           | D-Y7BAL   |
| Wiring type                    | 2-wire  |
| Applicable load                | 24VDC relay, PLC  |
| Load voltage                   | 24VDC (10 to 28VDC)   |
| Load current                   | 5 to 40mA or less   |
| Internal voltage drop          | 4V or less  |
| Leakage current                | 0.8mA or less at 24VDC  |
| Indicator light                | Actuated position.....Red LED light up<br>Optimum operating position.....Green LED light up |

- Lead wire—Oil proof heavy duty vinyl cord,  $\phi 3.4$ , 0.15mm<sup>2</sup>, 2 cores (brown, blue), 0.5m (standard)

Note 1) Refer to page 10 for solid state switch common specifications.

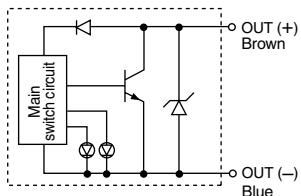
Note 2) Refer to page 10 for lead wire length.

## Auto Switch Weights

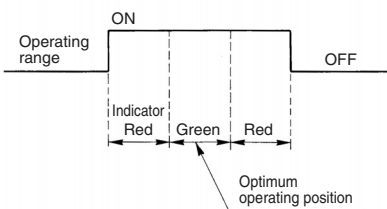
Unit: g

| Model                 |     | D-Y7BA |
|-----------------------|-----|--------|
| Lead wire length<br>m | 0.5 | —      |
|                       | 3   | 54     |
|                       | 5   | 88     |

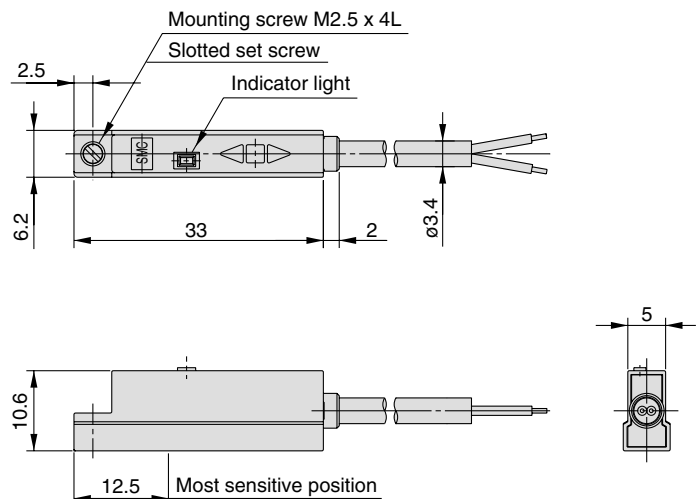
## Auto Switch Internal Circuits



## Indicator light/Display method



## Auto Switch Dimensions





# Series RSH/RS1H Model Selection

## Operating Range

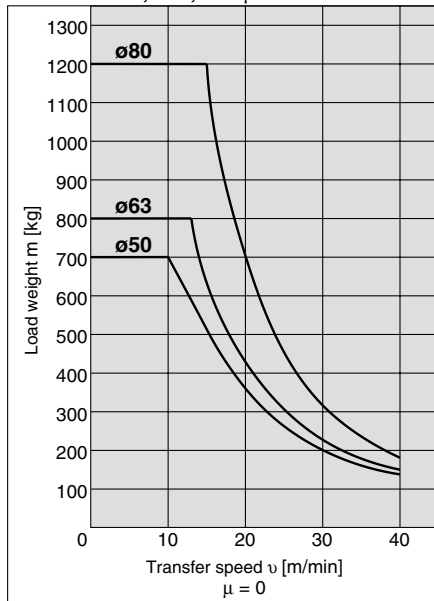
(Example) Load weight 300kg, Transfer speed 20m/min, Friction coefficient  $\mu = 0.1$

(How to read graph)

In graph [2], find the intersection of the vertical axis representing the weight of 300kg and the horizontal axis representing the speed of 20m/min. And select the bore size  $\phi 63$  positioned within the operating range of the cylinder.

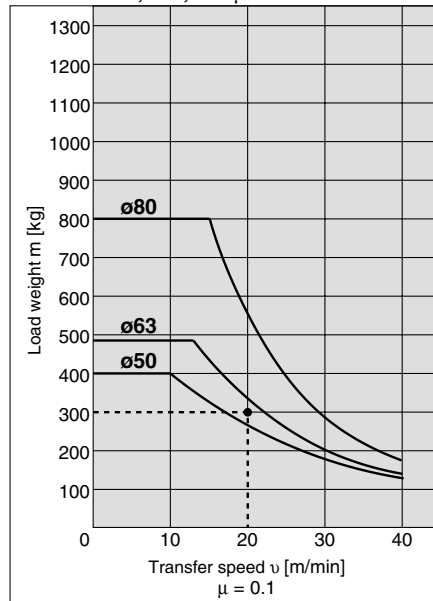
### Graph ①

Bore size  $\phi 50, \phi 63, \phi 80/\mu = 0$



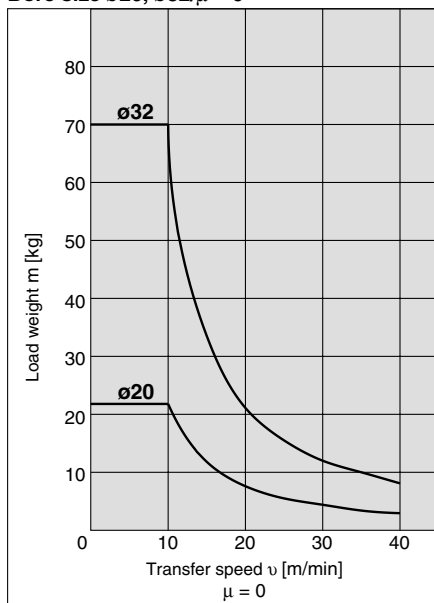
### Graph ②

Bore size  $\phi 50, \phi 63, \phi 80/\mu = 0.1$



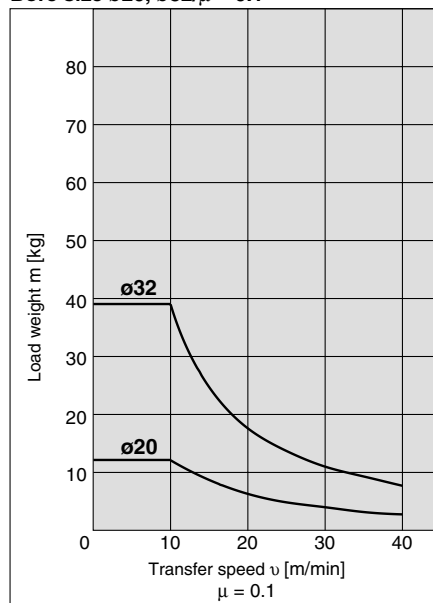
### Graph ③

Bore size  $\phi 20, \phi 32/\mu = 0$



### Graph ④

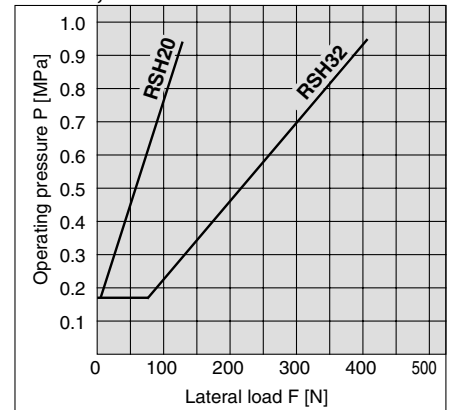
Bore size  $\phi 20, \phi 32/\mu = 0.1$



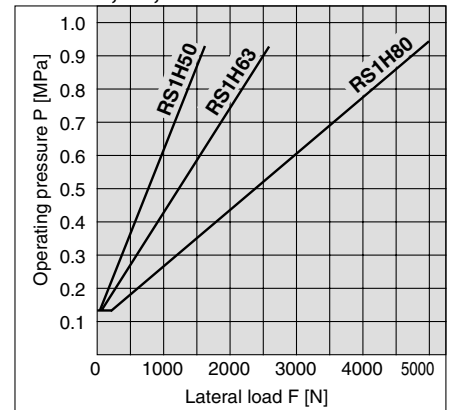
## Lateral Load and Operating Pressure

The greater lateral load needs higher cylinder operating pressure. Set the operating pressure by using the graph as a guideline.

### RSH20, 32




### RS1H50, 63, 80







# Series *RSH/RS1H* 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 – Recommendations for the application of equipment to transmission and control systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

## **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.

### **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. (Bleed air into the system gradually to create back pressure.)

### **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, 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 RSH/RS1H Actuator Precautions 1

Be sure to read before handling.

## Design

### ⚠ Warning

#### 1. There is a danger of sudden action by air cylinders if sliding parts of machinery are twisted, etc., and changes in forces occur.

In such cases, human injury may occur; e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be designed to avoid such dangers.

#### 2. Install a protective cover when there is a risk of human injury.

If a driven object and moving parts of a cylinder pose a danger of human injury, design the structure to avoid contact with the human body.

#### 3. Securely tighten all mounting parts and connecting 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, etc., may be required.

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the impact. In this case, the rigidity of the machinery should also be examined.

#### 5. Consider a possible drop in circuit pressure due to a power outage, etc.

When a cylinder is used in 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, etc. Therefore, safety equipment should be installed to prevent damage to machinery and/or human injury. Suspension mechanisms and lifting devices also require consideration for drop prevention.

#### 6. Consider a possible loss of power source.

Measures should be taken to protect against human injury and equipment damage in the event that there is a loss of power to equipment controlled by air pressure, electricity or hydraulics, etc.

#### 7. Design circuitry to prevent sudden lurching of driven objects.

When a cylinder is driven by an exhaust center type directional control valve or when starting up after residual pressure is exhausted from the circuit, etc., 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 there is a danger of human injury and/or damage to equipment when this occurs.

#### 8. Consider emergency stops.

Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, a power outage or a manual emergency stop.

#### 9. Consider the action when operation is restarted after an emergency stop 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 safe manual control equipment.

## Selection

### ⚠ Warning

#### 1. Confirm 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 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 air cylinder model selection procedure for the maximum useable stroke.

#### 2. Operate the piston in such a way that collision damage will not occur at the stroke end.

The operation range should prevent damage from occur ring 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.

#### 4. Provide intermediate supports for long stroke cylinders.

Provide intermediate supports for cylinders with long strokes to prevent rod damage due to sagging of the rod, deflection of the tube, vibration and external loads.



# Series RSH/RS1H 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 malfunction.

Scratches and gouges on the sliding part of the piston rod can damage packing and cause air leakage.

2. **Prevent sticking of rotating parts.**

Prevent sticking of rotating parts (pin, etc.) by applying sufficient lubrication.

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

Verify correct mounting by suitable function and leakage tests after compressed air and power are connected following mounting, maintenance or conversions.

4. **Instruction manual**

The product should be mounted and operated after thoroughly reading the manual and understanding its contents.

Keep the instruction manual where it can be referred to as needed.

## Piping

### ⚠ Caution

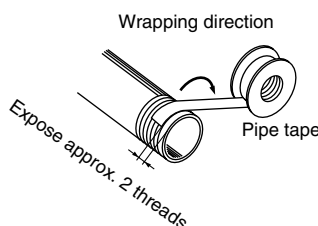
1. **Preparation before piping**

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, etc., be certain that chips from the pipe threads and sealing material do not get inside the piping.

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



## 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, additional lubrication must be continued once it has been started.

## Air Supply

### ⚠ Warning

1. **Use clean air.**

Do not use compressed air containing chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, as this can cause damage or malfunction.

### ⚠ Caution

1. **Install air filters.**

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

2. **Install an after-cooler, air dryer, or water separator (Drain Catch).**

Air that includes excessive drainage or condensate may cause malfunction of valves and other pneumatic equipment. To prevent this, install an after-cooler, air dryer or water separator (Drain Catch).

3. **Use the product within the specified range of fluid and ambient temperature.**

Take measures to prevent freezing when below 5°C or less, since moisture in circuits can freeze and cause damage to seals and lead to malfunction.

Refer to SMC's "Best Pneumatics vol. 4" catalog 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 locations or where water or oil splashing is a regular occurrence, protect the rod by installing a rod cover.**

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

## Maintenance

### ⚠ Warning

1. **Perform maintenance inspection and service according to the procedure indicated in the instruction manual.**

Improper handling and maintenance may cause malfunctioning and damage of machinery or equipment to occur.

2. **Removal of components, and supply/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 cylinder from lurching.

### ⚠ Caution

1. **Filter drainage**

Drain out condensate from air filters regularly.



# Series RSH/RS1H Auto Switch Precautions 1

Be sure to read before handling.

## Design and Selection

### Warning

#### 1. Confirm the specifications.

Read the specifications carefully and use the product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications for load current, voltage, temperature, or impact.

#### 2. Take precautions when multiple cylinders are used close together.

When two or more auto switch cylinders are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40mm. (When the allowable interval is specified for each cylinder series, use the indicated value.)

#### 3. Monitor the length of time that a switch is ON at an intermediate stroke position.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V(\text{mm/s}) = \frac{\text{Auto switch operating range (mm)}}{\text{Load operating time}} \times 1000$$

#### 4. Keep wiring as short as possible.

##### <Reed switches>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)

- 1) For an auto switch without a contact protection circuit, use a contact protection box when the wire length is 5m or longer.

##### <Solid state switches>

- 2) Although wire length should not affect switch function, use a wire that is 100m or shorter.

#### 5. Monitor the internal voltage drop of the switch.

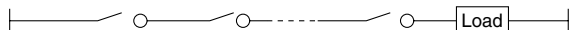
##### <Reed switches>

- 1) Switches with an indicator light (Except D-Z76)

- If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)

[The voltage drop will be "n" times larger when "n" auto switches are connected.]

Even though an auto switch operates normally, the load may not operate.



- Similarly, when operating below a specified voltage, it is possible that the load may be ineffective even though the auto switch function is normal. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (Model D-Z80).

##### <Solid state switches>

- 3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1).

Also, note that a 12VDC relay is not applicable.

#### 6. Monitor leakage current.

##### <Solid state switch>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

$$\text{Operating current of load (OFF condition)} > \text{Leakage current}$$

If the condition given in the above formula are not met, the switch will not reset correctly (it stays ON). Use a 3-wire switch if this condition cannot be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

#### 7. Do not use a load that generates surge voltage.

##### <Reed switches>

If driving a load that generates surge voltage, use as a relay, use a switch with a built-in contact protection circuit or a contact protection box.

##### <Solid state switches>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if a surge is applied repeatedly. When directly driving a load that generates surge, such as a relay or solenoid valve, use a switch with a built-in surge absorbing element.

#### 8. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to safeguard against malfunctions by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch. Also perform periodic maintenance inspections and confirm proper operation.

#### 9. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.





# Series RSH/RS1H Auto Switch Precautions 2

Be sure to read before handling.

## Mounting and Adjustment

### Warning

#### 1. Do not drop or bump.

Do not drop, bump or apply excessive impacts (300m/s<sup>2</sup> or more for reed switches and 1000m/s<sup>2</sup> or more for solid state switches) while handling.

Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

#### 2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

#### 3. Mount switches using the proper tightening torque.

When a switch is tightened beyond the range of tightening torque, the mounting screws or switch may be damaged. On the other hand, tightening below the range of tightening torque may allow the switch to slip out of position. (Refer to page 8 for how to install or move the switch and for specifications of the tightening torque, etc.)

#### 4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting positions shown in the catalog indicate the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), the operation may be unstable.

## Wiring

### Warning

#### 1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from repeatedly applying bending stress or stretching force to the lead wires.

#### 2. Be sure to connect the load before power is applied.

##### <2 wire type>

If the power is turned ON when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

#### 3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (such as contact with other circuits, ground fault, improper insulation between terminals). Damage may occur due to excess current flow into a switch.

#### 4. Do not wire in conjunction with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits containing auto switches may malfunction due to noise from these other lines.

## Wiring

### 5. Do not allow short circuit of loads.

#### <Reed switches>

If the power is turned ON with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

#### <Solid state switches>

D-J51 and all models of PNP output type switches do not have built-in short circuit protection circuits. If loads are short circuited, the switches will be instantly damaged, as in the case of reed switches.

Take special care to avoid reverse wiring with the brown [red] power supply line and the black [white] output line on 3 wire type switches.

### 6. Avoid incorrect wiring.

#### <Reed switches>

A 24VDC switch with indicator light has polarity. The brown [red] lead wire is (+), and the blue [black] lead wire is (-).

- 1) If connections are reversed, the switch will still operate, but the light emitting diode will not light up.

Also note that a current greater than the maximum specified one will damage a light emitting diode and make it inoperate.

Applicable models: D-Z73

#### <Solid state switches>

- 1) If connections are reversed on a 2-wire type switch, the switch will not be damaged because it is protected by a protection circuit, but it will remain in a normally ON state. However, it is still necessary to avoid reversed connections since the switch will be damaged if a load short circuits in this condition.
- 2) Even if (+) and (-) power supply line connections are reversed on a 3-wire type switch, the switch will still be protected by a protection circuit. However, if the (+) power supply line is connected to the blue [black] wire and the (-) power supply line is connected to the black [white] wire, the switch will be damaged.

### \* Lead wire color changes

Lead wire colors of SMC switches have been changed in order to meet NECA Standard 0402 for production beginning September, 1996 and thereafter. Please refer to the tables provided. Special care should be taken regarding wire polarity during the time that the old colors still coexist with the new colors.

#### 2-wire

|            | Old   | New   |
|------------|-------|-------|
| Output (+) | Red   | Brown |
| Output (-) | Black | Blue  |

#### 3-wire

|                  | Old   | New   |
|------------------|-------|-------|
| Power supply (+) | Red   | Brown |
| Power supply GND | Black | Blue  |
| Output           | White | Black |

#### Solid state with diagnostic output

|                   | Old    | New    |
|-------------------|--------|--------|
| Power supply (+)  | Red    | Brown  |
| Power supply GND  | Black  | Blue   |
| Output            | White  | Black  |
| Diagnostic output | Yellow | Orange |

#### Solid state with latch type diagnostic output

|                              | Old    | New    |
|------------------------------|--------|--------|
| Power supply (+)             | Red    | Brown  |
| Power supply GND             | Black  | Blue   |
| Output                       | White  | Black  |
| Latch type diagnostic output | Yellow | Orange |



# Series RSH/RS1H Auto Switch Precautions 3

Be sure to read before handling.

## Operating Environment

### ⚠ Warning

#### 1. Never use in the presence of explosive gases.

The construction of our auto switches does not make them explosion-proof. Never use them in the presence of an explosive gas, as this may cause a serious explosion.

#### 2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside cylinders will become demagnetized if used in such an environment.

#### 3. Do not use in an environment where the auto switch will be continually exposed to water.

Auto switches satisfy IEC standard IP67 construction (JIS C 0920: watertight construction). Nevertheless, they should not be used in applications where they are continually exposed to water splash or spray. They may cause deterioration of the insulation or swelling of the potting resin inside switches and may lead to a malfunction.

#### 4. Do not use in an environment laden with oil or chemicals.

Consult with SMC if auto switches will be used in an environment laden with coolants, cleaning solvent, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by a deterioration of the insulation, a malfunction due to swelling of the potting resin, or hardening of the lead wires.

#### 5. Do not use in an environment with temperature cycles.

Consult with SMC if switches are to be used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.

#### 6. Do not use in an environment where there is excessive impact shock.

##### <Reed switches>

When excessive impact (300m/s<sup>2</sup> or more) is applied to a reed switch during operation, the contact point may malfunction and generate or cut off a signal momentarily (1ms or less). Consult with SMC regarding the need to use a solid state switch depending on the environment.

#### 7. Do not use in an area where surges are generated.

##### <Solid state switches>

When there are units (such as solenoid type lifter, high frequency induction furnace, motor) that generate a large amount of surge in the area around cylinders with solid state auto switches, their proximity may cause deterioration or damage to internal circuit elements of the switch. Avoid and protect against sources of surge generation and crossed lines.

#### 8. Avoid close contact with accumulated iron waste or magnetic substances.

When a large accumulated amount of ferrous waste such as machining chips or welding spatter, or a magnetic substance (something attracted by a magnet) is brought into close proximity to a cylinder with auto switches, this may cause the auto switches to malfunction due to a loss of the magnetic force inside the cylinder.

## Maintenance

### ⚠ Warning

#### 1. Perform the following maintenance inspection and services periodically in order to prevent possible danger due to unexpected auto switch malfunction.

##### 1) Securely tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten screws securely after readjusting the mounting position.

##### 2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires if damage is discovered.

##### 3) Confirm that the green light on a 2-color indicator type switch lights up.

Confirm that the Green LED is ON when stopped at the set position. If the Red LED is ON when stopped at the set position, the mounting position is not appropriate. Readjust the mounting position until the Green LED lights up.

## Other

### ⚠ Warning

#### 1. Consult with SMC concerning water resistance, elasticity of lead wires, and usage at welding sites.



# Series RSH/RS1H Specific Product Precautions 1

Be sure to read before handling.

Refer to pages 17 through 22 for safety instructions, actuator precautions and auto switch precautions.

## Instructions

### ⚠ Caution

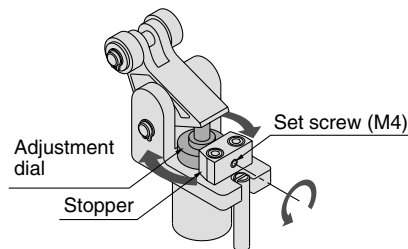
#### 1. Shock absorber capacity variable adjustment method (ø50 to ø80)

To stop the work gently, loosen the fixing screw (M4) on the stopper and turn the shock absorber dial according to the energy value of the transferred object to select the optimum absorption position (retardation value). After adjustment, tighten the fixing screw firmly to secure the shock absorber dial.

Note 1) Cautions for adjustment

When adjusting the shock absorber retardation value, first try the maximum value and then proceed to smaller values. If the energy value of the transferred work piece is larger than the retardation value of the shock absorber, an excessive load will be applied to the lever and may cause malfunction.

Note 2) Although it is not possible to change the shock absorber drag value of ø20 and ø32 types, the shock absorber stroke can be changed by adjusting the height of the adjustment dial (6st to 4st.)



#### 2. How to change the positional relationship between the transfer and piping directions

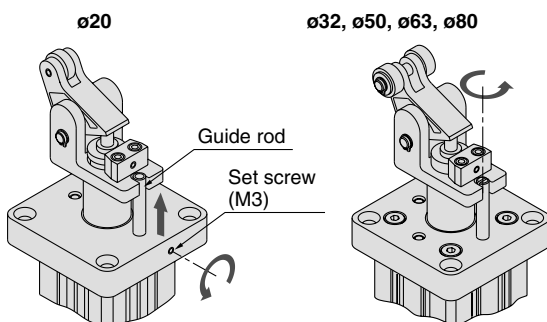
The positional relationship between the transfer and piping directions can be changed in 90° increments (or 180° increments in case of ø20).

##### ●ø20

Loosen the fixing screw (M3) beside the rod cover and pull up the guide rod. The lever is released to allow 180° rotations.

##### ●ø32 to ø80

Fit a driver (-) into the notch on the guide rod end surface and loosen the guide rod. The lever is released to allow rotations in 90° increments.

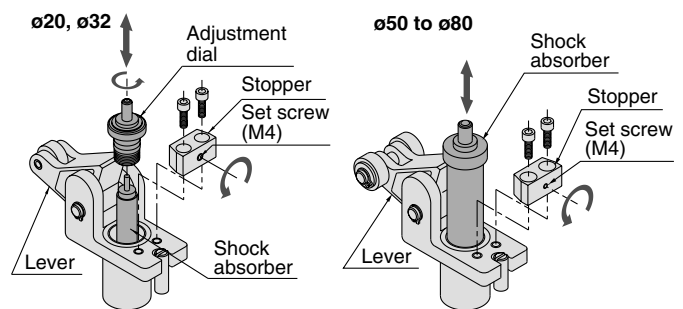


#### 3. How to replace shock absorber during maintenance

Loosen the hexagon socket head bolts and shock absorber fixing screw (M4) on the stopper to remove the stopper from the lever holder. Incline the lever by 90° and pull out the shock absorber. (In case of ø20 and ø32, remove the stopper, loosen the adjustment dial and then pull out the shock absorber.)

\*Cautions for assembly

After replacing the shock absorber, tighten the bolts and fixing screw firmly and apply grease to the shock absorber rod end surface.





# Series RSH/RS1H Specific Product Precautions 2

Be sure to read before handling.

Refer to pages 17 through 22 for safety instructions, actuator precautions and auto switch precautions.

## Selection

### **Danger**

#### **1. Use the equipment only within the specified operating range.**

If the condition exceeds the specified operating range, it will cause excessive impact or vibration to the stopper cylinder, leading to possible damages.

### **Caution**

#### **1. Do not collide the pallet while the lever is standing erect.**

In case of a lever with built-in shock absorber type, do not collide the next pallet while the lever is standing erect. Otherwise, all energy will be applied to the cylinder body.

#### **2. When a load directly connected to the cylinder is stopped at an intermediate position:**

Apply the operating range in the catalog only in these cases where the stopper cylinder is used to stop pallets on a conveyor belt. When using the stopper cylinder to stop loads directly connected to a cylinder or some other equipment, a lateral load is applied as the cylinder thrust. Consult SMC in such cases.

## Mounting

### **Caution**

#### **1. Do not apply rotational torque to the cylinder rod.**

Align the cylinder parallel to the working face of the pallet working when installing in order to prevent rotational torque working on the cylinder rod.

#### **2. Do not scratch or gouge the sliding part of the piston rod or guide rod.**

Scratches and gouges may damage the packing, causing air leakage or malfunction.

## Operation

### **Caution**

#### **1. In case of an end lever type with locking mechanism, do not apply an external force from the opposite side when the lever is locked.**

Lower the cylinder before adjusting the conveyor or moving the pallet.

#### **2. Do not let your hand become caught when operating the cylinder.**

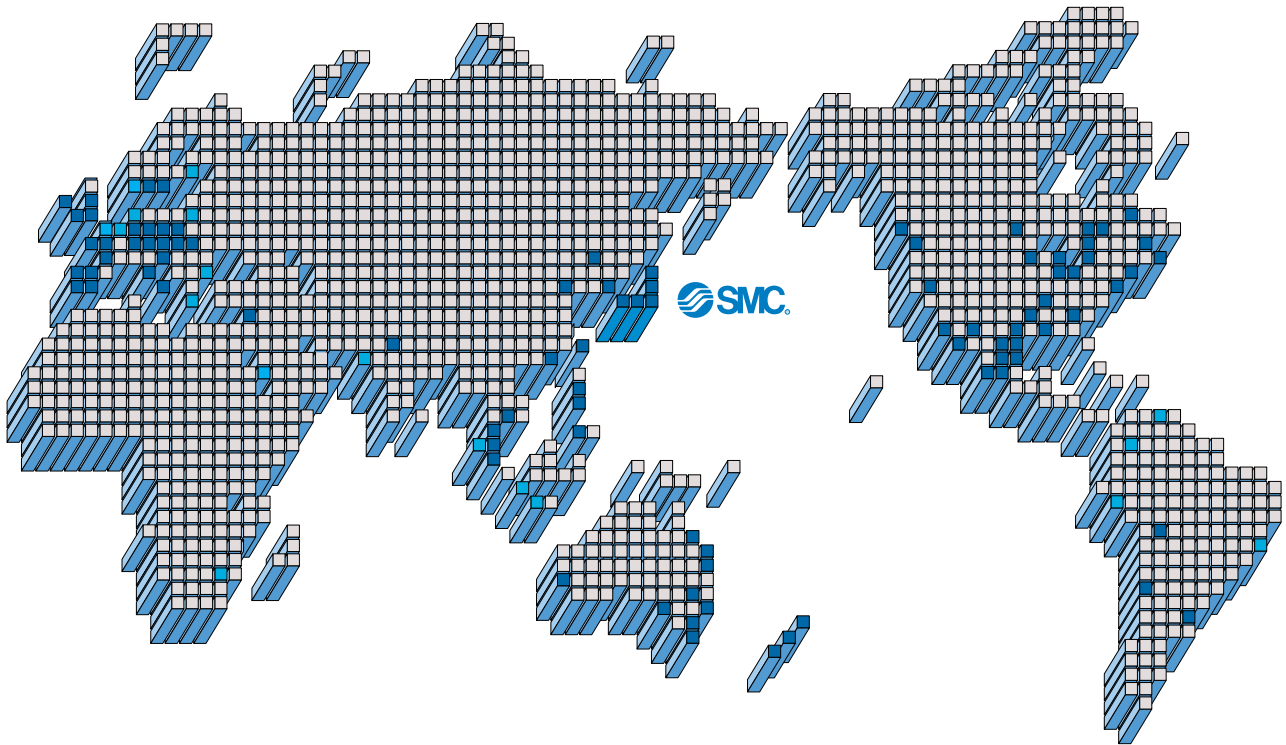
The lever holder goes up and down while the cylinder is in operation. Pay sufficient attention not to let your hand or fingers become caught between the rod cover and lever holder.

#### **3. Do not let water, cutting oil or dust splash on the equipment.**

It can cause oil leakage and malfunction of the shock absorber.



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