

# INSTRUCTION MANUAL

## SUPER MICRO CYLINDER

### Double-acting·Standard type

## SCM

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

# For Safety Use

To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your applications, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, **read this operation manual carefully for proper operation.**

Observe the cautions on handling described in this manual, as well as the following instructions:

## CAUTION :

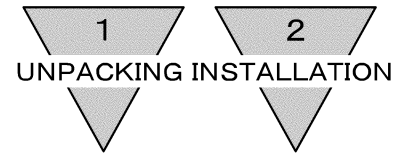
- Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch.  
Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.

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## SCM

Super micro cylinder  
Double-acting•Standard type  
Manual No. SM-227259-A

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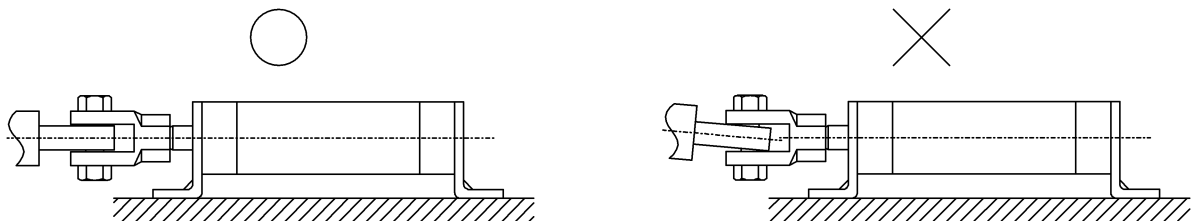
## 1. UNPACKING

- 1) Make sure that the type No. on the nameplate of the delivered Super Micro Cylinder matches the type No. you ordered.
- 2) Check the appearance for any damage.
- 3) Stop up the piping port with a sealing plug to prevent the entry of foreign substances into the cylinder. Remove the sealing plug before piping.

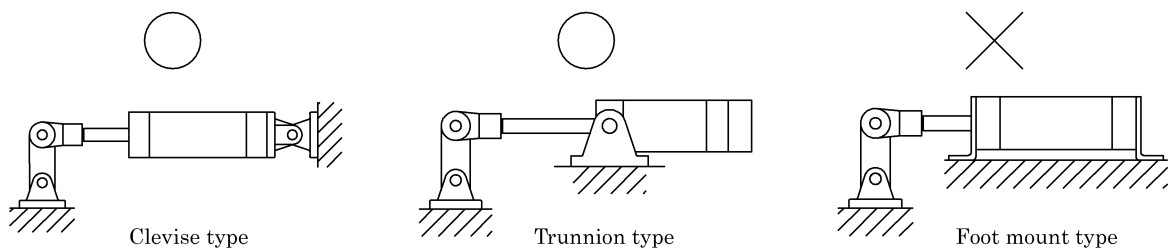
## 2. INSTALLATION

### 2.1 Installation

- 1) The ambient temperature for this cylinder is  $-10$  to  $60^{\circ}\text{C}$ .
- 2) Use cylinder with bellows over its rod within the area with much dust.
- 3) Carefully avoid other object from hitting the tube. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.
- 4) When cylinder is fixed and rod end is guided:  
In case the piston rod of cylinder and the load are misaligned, the bushes and packings of the cylinder are extremely worn out. Hence, connect them with CKD floating connector (spherical bearing).
- 5) When cylinder is fixed and rod end is connected with pin joint:  
In case the load acting direction is not parallel with the rod axial center, the rod and tube may get entangled causing seizure, etc. Hence, make sure that the rod axial center and the load transfer direction are aligned to each other.

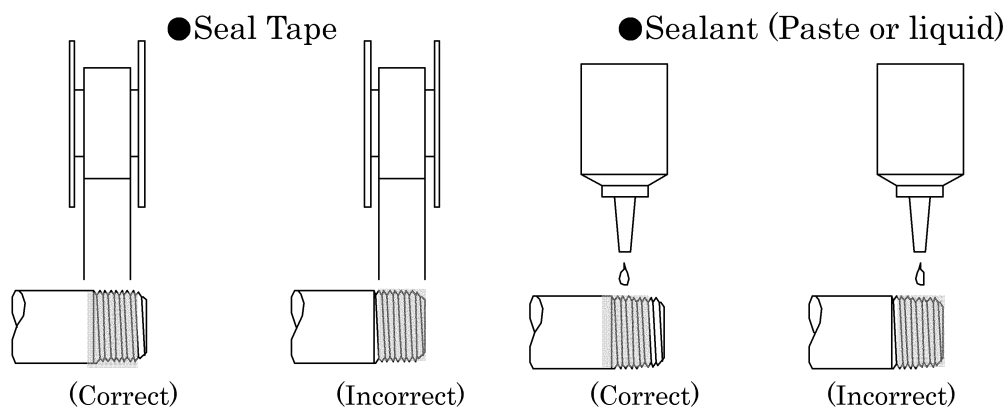
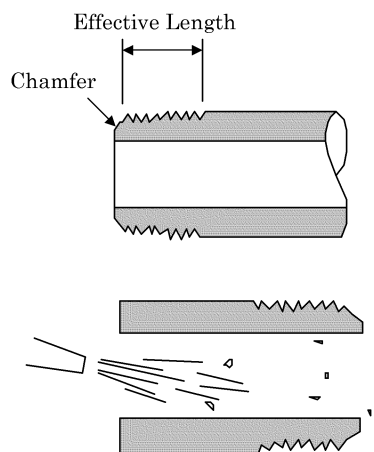


- 6) When the load acting direction changes with the cylinder operation:  
Use an oscillating cylinder (clevis type or trunnion type) capable of making revolution to a certain angle. Furthermore, install the rod and connecting metal (knuckle) so that it moves in the same direction as the cylinder main body does.



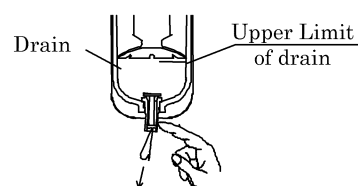
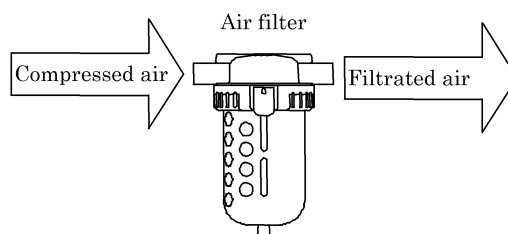
## 2.2 Piping

- 1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc. If the operating ambient temperature exceeds 60°C, use copper pipes.
- 2) See to it that the pipe connecting cylinder and solenoid valve has effective cross-sectional area which is needed for the cylinder to drive at the specified speed.
- 3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.
- 4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.
- 5) Flush air into the pipe to blow out foreign substances and chips before piping.
- 6) Refrain from mapplying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.



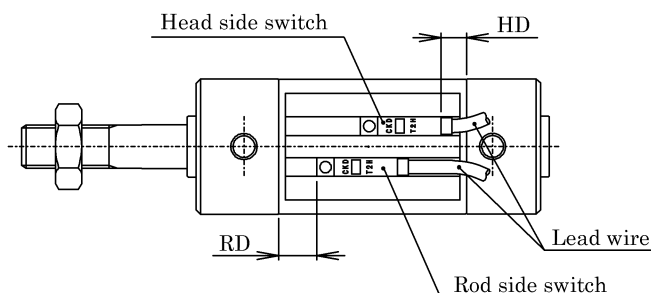
## 2.3 Fluid

- 1) It is necessary to use dehumidified air that has been filtered from compressed air. Carefully select an adequate filter that has an adequate filtration rate (preferably  $5\mu\text{m}$  or less), flow rate and its mounting location (as nearest to the directional control valve as possible).
- 2) Be sure to drain out the accumulation in the filter periodically.
- 3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.
- 4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 as a lubricant, if and when lubrication is needed.



## 2.4 Location of mounting Switches on a Cylinder

- 1) Location of mounting switches on a cylinder. (Common items)



- (1) At the stroke end  
Refer the illustration above. Mount switches within the rod side dimension RD as well as the head side dimension HD for the purpose of having switches function at the points of the maximum sensitive position.  
(Refer to Tables 1 and 2.)

(2) Intermediate of stroke

Move the piston where it is anticipated to stop and fix it tentatively. Slide a switch carefully along the side of cylinder over the piston to find out the spot where switch turns on. This type spot should be located on both side of piston. The intermediate spot between those posits is of the maximum sensitive position and where the switch is supposed to be installed.

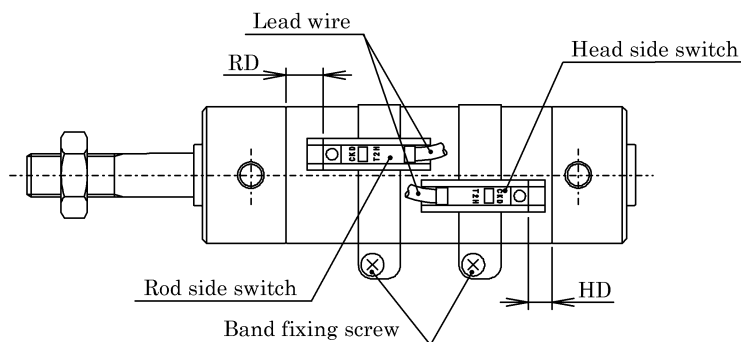
(3) Relocation of switch

Slide switch body along cylinder tube after loosening mounting screws and tighten screws when located the most sensitive position. (Apply tightening torque of 0.1 to 0.2N·m)

(4) Replacing switch

Take out switch out of groove after loosening mounting screws. Slide new replacing switch into groove and tighten screws upon placing the switch at the most sensitive position. (Apply tightening torque of 0.1 to 0.2N·m)

2) Switch mounting position (Band method)



(1) Fine adjustment of switch mounting position

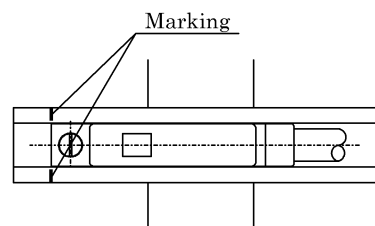
When the switch is mounted by means of the band method, the one-color indication switch is finely adjusted about  $\pm 3$  mm back and forth from the mounting position, which has been set before shipment.

If the adjustment range exceeds  $\pm 3$  mm or the fine adjustment of the two-color indication switch is performed, move the band.

(2) Replacement of switch

A marking is provided at a position where is 4 mm far from the end face of the switch rail. When replacing the switch, this marking is used as reference mounting position. Additionally, the marking of the switch rail has been set at the maximum switch sensitivity position before shipment from the factory.

As the switch type is changed or the band is moved, the maximum sensitivity position is changed. If this happens, adjust the mounting position appropriately.



(3) Movement of switch(Circumference direction)

Loosen the band fixing screws and move the switch rail in the circumference direction. Secure the rail at the specified position by tightening the fixing screws. At this time, the tightening torque is 0.6 to 0.8 N·m.

(4) Movement of band

Loosen the band fixing screws and move the switch rail and band along with the cylinder tube. Secure the rail and band at the specified position by tightening the fixing screws. At this time, the tightening torque is 0.6 to 0.8 N·m.

3) Operating range

The switch turns on first and turns off as the piston moves along its stroke. Precise operating range deviate slightly depending upon the direction of piston movement as shown right.

The center of the range is the maximum sensitive position. Setting switch at this point eliminates majority of external disturbance and provides the most stable actuation of switch.

4) Hysteresis

(1) Precise operating range deviate slightly depending upon the direction of piston movement as shown right.

(2) Switch is apt to be disturbed its accuracy by external effect when piston stops within this range. Carefully avoid designing stopping location of piston.

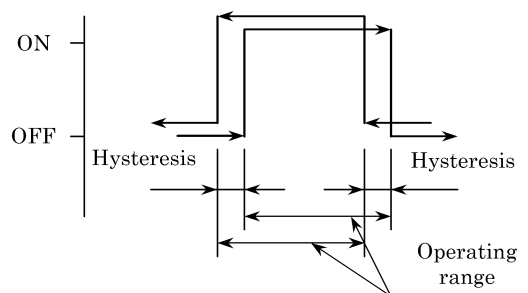


Table1 (Rail method)

(mm)

Bore size (mm)	Solid state switch (T2H/T2V, T3H/T3V)				Reed switch (T0H/T0V, T5H/T5V)			
	Maximum sensitive position		Operating range	Hysteresis	Maximum sensitive position		Operating range	Hysteresis
	RD	RD			HD	RD		
φ 20	7.0	7.5	3 to 8	1.5 or less	4.0	6.5	6 to 14	3 or less
φ 25	6.0	8.5	3 to 9		3.0	7.5	5 to 14	
φ 32	7.0	9.5	3 to 8		4.0	8.5	5 to 12	
φ 40	9.0	11.5	3 to 9		6.0	10.5	6 to 14	
φ 50	11.5	13.0			8.0	12.5	7 to 15	
φ 63					10.5	19.5		
φ 80	13.0	20.0	4 to 10		11.0	18.5	9 to 15	
φ 100	13.5	19.5						



## 2 INSTALLATION

Table2 (Band method)

(mm)

Bore size (mm)	Solid state switch (T2H/T2V, T3H/T3V)			Hysteresis	Reed switch (T0H/T0V, T5H/T5V)			
	Maximum sensitive position		Operating range		Maximum sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
φ 20	6.5	7.5	3 to 8	1.5 or less	5.5	6.5	6 to 14	3 or less
φ 25	5.5	8.5	3 to 9		4.5	7.5	5 to 14	
φ 32	6.5	9.5	3 to 8		5.5	8.5	5 to 12	
φ 40	8.5	11.5	3 to 9		7.5	10.5	6 to 14	
φ 50	11.0	13.0			10.0	12.5	7 to 15	
φ 63					12.0	19.0		
φ 80	13.0	20.0	4 to 10		12.5	18.5	9 to 15	
φ 100	13.5	19.5						

### 3. OPERATION

#### 3.1 Operating the Cylinder

- 1) The working pressure for this type of cylinder is specified in “Product Specifications”. Operate the system within this range.

- 2) Though the cushion has been adjusted at no load when delivered, adjust the cushion needle when the change of cushion effect is required.

Tightening the needle (clock-wise) makes cushion more effective. Tighten the needle lock nut all the way after adjustment. However, if kinetic energy such as load is heavy or speed is too fast, exceeding the values given in Table 3, consider of providing a shock absorber.

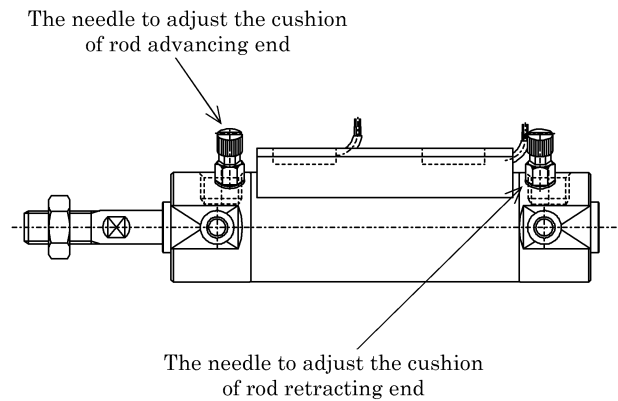


Table 3 Table of cushion characteristics

Bore size (mm)	Rubber cushion	Air cushion	
	Allowable energy absorption (J)	Effective air cushion length (mm)	Allowable energy absorption (J)
φ 20	0.11	8.1	0.8
φ 25	0.2		1.26
φ 32	0.53	8.6	2.5
φ 40	0.91		3.7
φ 50	1.6	13.4	8
φ 63			14.4
φ 80	3.3	15.4	25
φ 100	5.8		46

- 3) Adjust the working piston speed with the speed controller mounted.

## 3.2 How to use the Switches

### 3.2.1 Common items

- 1) Magnetic environment  
Do not operate this product in a place where a strong magnetic field or large current (large magnet or spot welder, etc.) exists. If a cylinder with the switch is installed in parallel to this product or the magnetic substance moves near the cylinder, the mutual interference may occur and affect the detection accuracy.
- 2) Protection of lead wire  
Pay consideration to eliminate repeating bending stress or stretching of lead wire while laying the wire.  
To the moving portion, use such cord of flexibility as for building a robot.
- 3) Operating temperature  
Do not operate the product at a high temperature (60°C)  
Always avoid operation of the product in a hot place due to temperature characteristics of magnetic and electronics parts.
- 4) Intermediate position detection  
When activating the switch halfway of the stroke, the relay may not respond if the working piston speed is too fast.
- 5) Impact  
Do not apply a large vibration or impact to the product when transporting the cylinder, or mounting or adjusting the switch.
- 6) Changing switch lead wire colors  
The colors of the switch lead wires have been changed, as shown in the following table, in response to the revision of the JIS standard and the subsequent revision of the NECA (Nippon Electric Controllers Association) standard

		Before change	After change
M, S, R, A, T, K, V, H Series	2-wire type	White (+)	Brown (+)
		Black (-)	Blue (-)
	3-wire type	Red (+)	Brown (+)
		White (output)	Black (output)
		Black (-)	Blue (-)
		White (+)	Brown (+)
T, K Series (Equipped with preventive maintenance output)	3-wire type	Yellow (preventive maintenance output)	Orange (preventive maintenance output)
		Black (-)	Blue (-)
		Red (+)	Brown (+)
	4-wire type	White (regular output)	Black (regular output)
		Yellow (preventive maintenance output)	Orange (preventive maintenance output)
		Black (-)	Blue (-)
		White (+)	Brown (+)

### 3.2.2 Operational Cautions, Solid state switch (T2, T3)

#### 1) Connection of lead cord

Comply with the color coding specified on the illustrations. Be sure to turn the power off before starting connecting work.

An erroneous wiring or short circuiting of load causes damage to not only switches, but also load side circuit. Wiring work without shutting electricity off may cause damage to the load side circuit

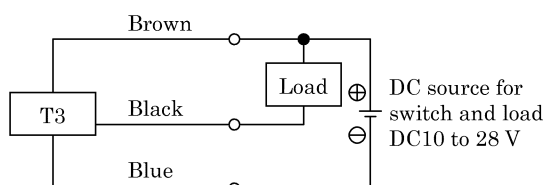


Fig.1 Fundamental circuit Example of T3 (1)  
(In case the same source of power is used.)

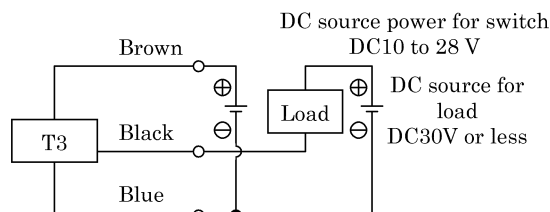


Fig.2 Fundamental circuit Example of T3 (2)  
(In case individual sources of power are used.)

#### 2) Protection of output circuit

Install some protective circuit as illustrated in Fig. 3 when inducing type load (Relay or solenoid valve) are to be used because those types apt to generate surge current switch off.

Install some protective circuit as illustrated in Fig. 4 when capacitor type load (Capacitor type) are to be used, because these types apt to generate a dash current when turning the switch ON.

Install some protective circuit as illustrated in Fig. 5 or 6 (in case of model T2) and Fig 7 (in case of model T3).

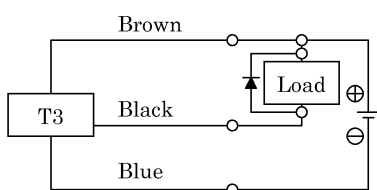


Fig.3 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)

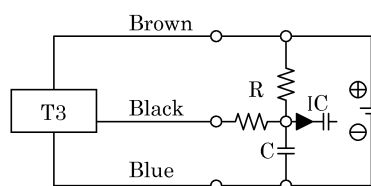


Fig.4 An example of using capacitor type load together with current regulating resistor R.  
Comply with the following formula to figure out required R.

$$\frac{V}{0.05} = R(\Omega)$$

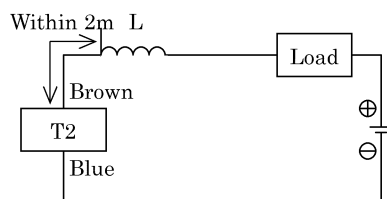


Fig.5 · Choke coil  
L= a couple hundred  $\mu$  H to a couple mH surpassing high frequency characteristic  
· Install it near by a switch (within 2m).

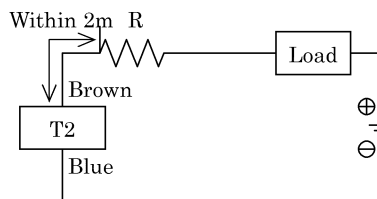


Fig.6 · Dash current restriction resistor.  
R= As much large resistor as the load circuit can afford.  
· Install it near by a switch (within 2m).

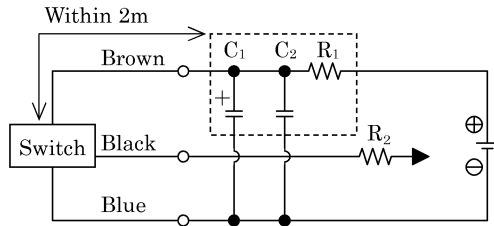


Fig7· Electric power noise absorptive circuit.

$C_1=20$  to  $50\ \mu\text{F}$  electrolytic capacitor  
(Withstand voltage 50V or more)

$C_2=0.01$  to  $0.1\ \mu\text{F}$  ceramic capacitor

$R_1=20$  to  $30\ \Omega$

· Dash current restriction resistor.

$R_2$ =As much large resistor as the load circuit can afford.

· Install it nearby the switch (Within 2m)

### 3) Connection to a programmable controller (Sequencer).

Type of connection varies depending upon the model of the programmable controller. Refer to the following Fig. 8 to 12 respectively.

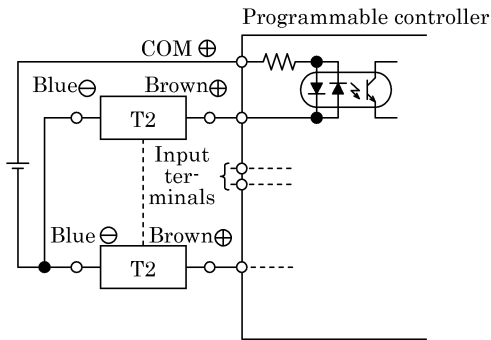


Fig.8 An example of T2 connection to source input type  
(an external power source)

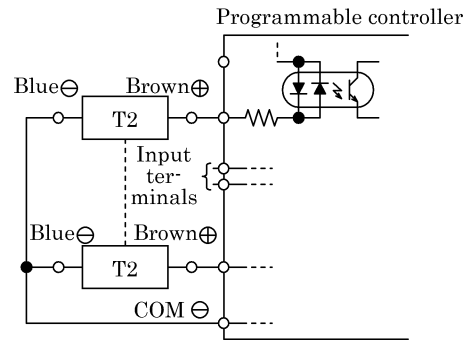


Fig.8 An example of T2 connection to source input type  
(an internal power source)

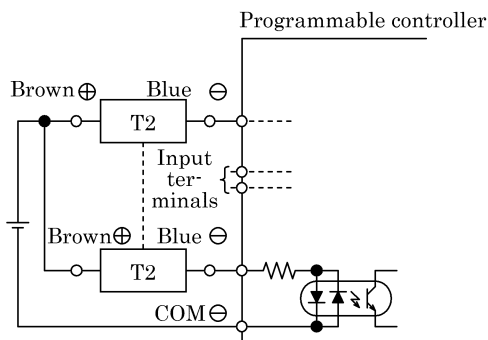


Fig.10 An example of T2 connection to source input type

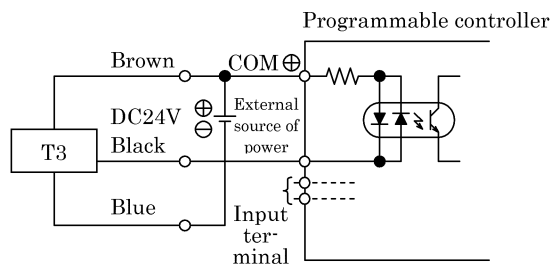


Fig.11 An example of T3 connection to source input type  
(an internal power source)

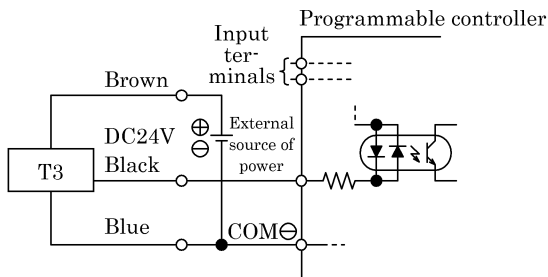


Fig.12 An example of T3 connection to source input type  
(an internal power source)



4) Series connection

The total voltage will decrease when the T2 switches connections have a leak. Therefore, confirm the input specifications for the programmable controllers, which are the connecting load. However, dimming or total failure of the indicator light may exist.

T3 switches hardly ever leak. When less than  $10\ \mu\text{A}$ , then leakage may occur. Usually dimming and failure of the indicator light do not occur.

### 3.2.2 Reed switch (T0, T5)

#### 1) Lead wire connections

Do not connect the lead wires of the switch to the power supply directly. Always connect the loads in series. For T0 switch, carefully check following items ①, ②.

- ① When using the switch for DC power supply, connect the brown and blue lines to the positive and negative sides, respectively. If these lines are connected reversely, the switch is activated, but the indicator light is not lit.
- ② When the switch is connected to an AC relay or a programmable controller input, the indicator light on the switch is not lit if the half-wave rectification is performed in the connected circuit. If this occurs, reverse the polarities of the switch lead wire connection. The indicator light may then be lit.

#### 2) Contact protective measures

When an inductive load, such as relay is used or the wire length exceeds that stated in Table 1, always install a contact protective circuit.

Table1

Electric power	Length of wire
DC	100m
AC	10m

#### (1) Protective circuit when connecting an inductive type load.

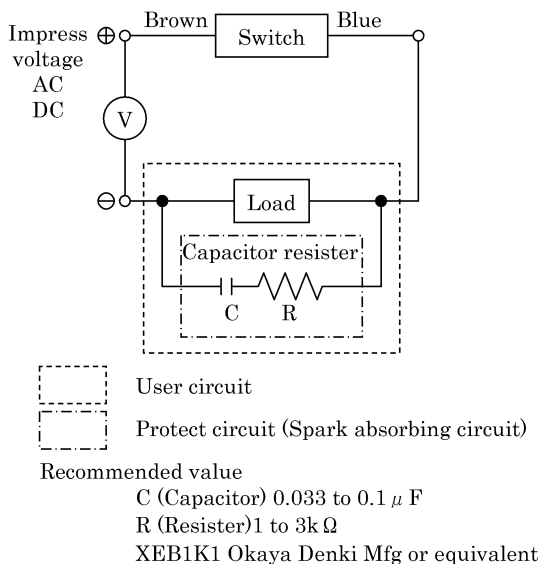


Fig.1 When capacitor resistor is used.

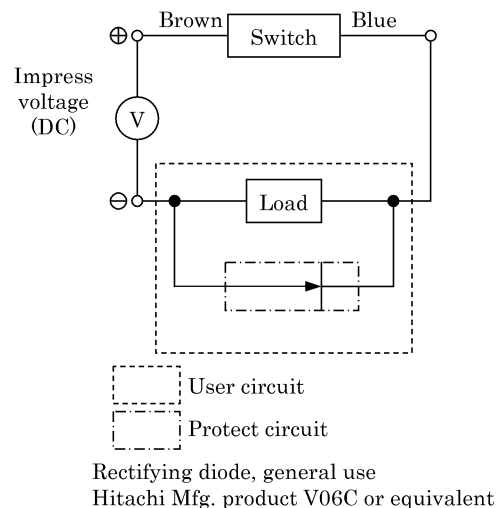
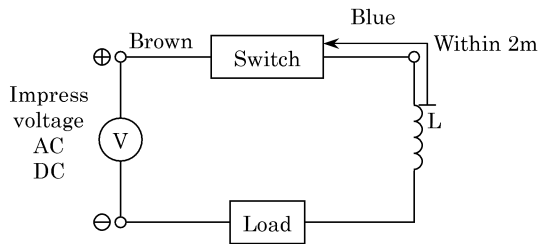


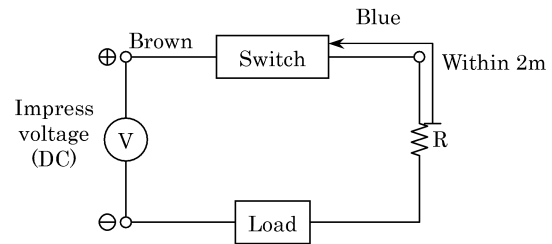
Fig.2 When diode is used.

(2) Protective circuit when the wire length exceeds that stated Table 1



- Choke coil  
L=a couple hundred  $\mu$  H to a couple mH  
surpassing high frequency characteristic
- Install it near by a switch (within 2m).

Fig.3



- Dash current restriction resister  
R=As much large resister as the load circuit can afford.
- Install it near by a switch (within 2m).

Fig.4

3) Contact capacity

Do not use a load exceeding the maximum contact capacity of the switch. Additionally, if the current is lower than the rated current value, the indicator light may not be lit.

4) Relay

Always use the relays listed below.

Omron Corporation .....MY type  
Fuji Electric Co., Ltd. ....HH5 type  
Panasonic, Ltd. ....HC type

5) Serial connection

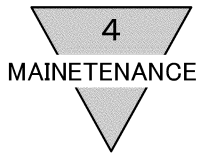
Total voltage loss, when connected T0 switches in series, equals to the sum of respective voltage loss of each switch.

The total voltage loss becomes equivalent to one T0 (approx. 2.4V) when connecting the combination of one T0 for actuation confirming and rest of T5 switches. Indicator light is lit only when all switches turn on.

6) Parallel connection

There is no restriction in parallel connection number of switches of these types. Multi number connection of model T0, sometimes, cause a dimmed indicator light or complete indicator light failure.





## 4. MAINTENANCE

### 4.1 Periodical Inspection

- 1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.
- 2) Inspection items
  - (1) Check the bolts and nuts fitting the piston rod end bracket and mounting bracket for slackening.
  - (2) Check to see that the cylinder operates smoothly.
  - (3) Check any change of the working piston speed and cycle time.
  - (4) Check for internal and/or external leakage.
  - (5) Check the piston rod for flaw (scratch) and deformation.
  - (6) Check the stroke for abnormality.

See “Trouble shooting”, 5 should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

### 4.2 Disassembly Procedure

- 1) This cylinder is able to be disassembled.  
Replace component parts listed in Expendable parts List by disassembling cylinder referring to internal structure diagram when air leakage is ever occurred.
  - (1) Shut off the fluid and remove the residual pressure.
  - (2) Disconnect cylinder from piping and load.
  - (3) Tuck a cover, either head cover ⑮ or rod cover ⑤, onto a pair of vise.
  - (4) Remove the cover by holding the unfixed width across the flats of the cover with a spanner or monkey wrench.

For tools required to remove the cover, see Table 5.

Table 5

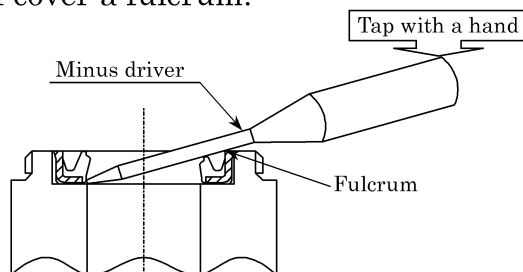
Bore size (mm)	Pair face of cover (mm)	Recommended hand tools
φ 20	24	Spanner 24Adjustable wrench 250 Pipe wrench 250
φ 25	29	" 29 " 250 " 350
φ 32	36	" 36 " 375 " 350
φ 40	44	" 375 " 450
φ 50	55	" 600
φ 63	69	" 900
φ 80	80	" 1200
φ 100	100	" 1200

Note · Pipe wrench may sometimes give defects to cover.

· Fairly large torque (350N·m or more) is required for φ 80, φ 100. Using rigid enough vise to fix the cylinder, also apply a piece of pipe of approx. 1.5m onto the handle of spanner, adjustable wrench or pipe wrench to loosen cylinder cover.

- (5) Remove rod packing ③, piston packing ⑩, cylinder gasket ⑥ & wear ring ⑬ using sharp pointed tool such as standard driver or bodkin.

- (6) To replace cushion packing on the cover with cushion which was not dis-assembled, tuck pair face of the cover onto a pair of vise and loosen the tube by applying pipe wrench to OD of the tube as near to the cover as possible. (Beware that cylinder tube may be scratched by pipe wrench.)
- (7) To remove cushion packing, tuck the pair face of cover with a pair of vise, then ply it out with a minus driver by tapping the handle of screw driver with a hand upon inserting the tip under the loin of packing while making the corner edge of cover a fulcrum.



### 4.3 Assembly Procedure

- 1) Clean each component parts.
- 2) Take reversed sequence of disassembly to assemble cylinder after cleaning parts. Carefully avoid giving damage to packings to prevent malfunction or air leakage.
- 3) Assembling cushion packings.

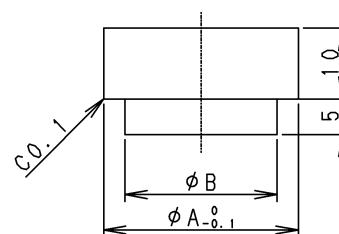
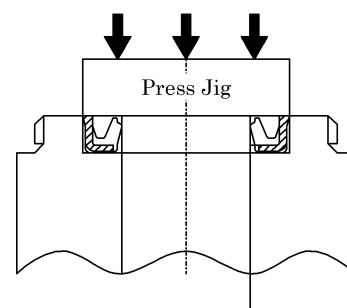
To prevent a damage to packing also a tilt of it, use a jig and carefully press it in the place. Make sure to press it down so as the upper edge of its metal ring sink about 0.5mm below the top surface of the cover.

Table 6 and the illustration is an example of the jig.

Make it a reference of jig fabrication.

Table 6 Press Jig dimension (mm)

Bore size	A	B
$\phi 20$	14.5	9.5
$\phi 25$	17	12
$\phi 32$	20	14
$\phi 40$	28	20
$\phi 50, \phi 63$	32	24
$\phi 80, \phi 100$	45	35

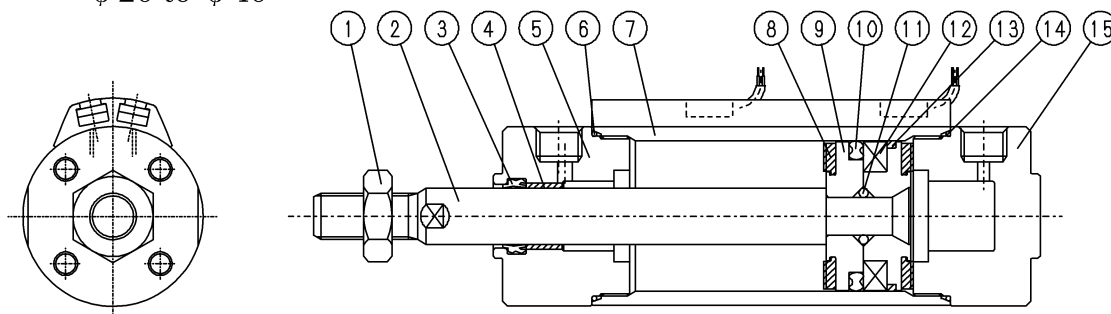


- 4) Apply a film of high grade grease (Litium alkali base) over the inner surface of cylinder tube, outer surface of piston and packings.
- 5) When tightly assembling rod cover and head cover onto tube, make sure, for tight finishing, to turn the cover approx.  $2^\circ$  beyond former position before disassembling. (As for both end angle mounting type, carefully select tight finishing position so as to have both mounting faces of bracket become flat.)

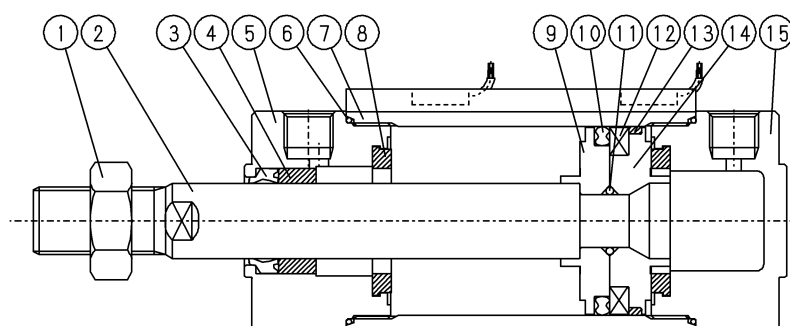
## 4.4 Internal structure drawings and Expendable parts list

### 1) Double acting, single rod type : Internal structure and parts list (with rubber cushions)

- $\phi 20$  to  $\phi 40$



- $\phi 50$  to  $\phi 100$



Part No.	Part Name	Material	Remarks
1	Rod nut	Steel	Nickel plated
2	Piston rod	$\phi 20$ to $\phi 25$ : Stainless steel $\phi 32$ to $\phi 100$ : Steel	Industrial chrome planting
3	Rod packing	Nitril rubber	Packing standard PDU
4	Bush	Oil impregnated bearing alloy	Copper (type 6 : cast iron)
5	Rod cover	※Aluminum alloy	※Black finish almite
6	Cylinder gasket	Nitril rubber	
7	Cylinder tube	Aluminum alloy	Hard almite
8	Cushion rubber	Polyurethane rubber	
9	Piston (R)	$\phi 20$ to $\phi 40$ : Aluminum alloy $\phi 50$ to $\phi 100$ : Aluminum alloy Die casted	
10	Piston packing	Nitril rubber	Packing standard PSD
11	Piston gasket	Nitril rubber	
12	Magnet	Plastic magnet	
13	Wear ring	Polyacetal	
14	Piston (H)	$\phi 20$ to $\phi 40$ : Aluminum alloy $\phi 50$ to $\phi 100$ : Aluminum alloy Die casted	
15	Head cover	※Aluminum alloy	※Black finish almite

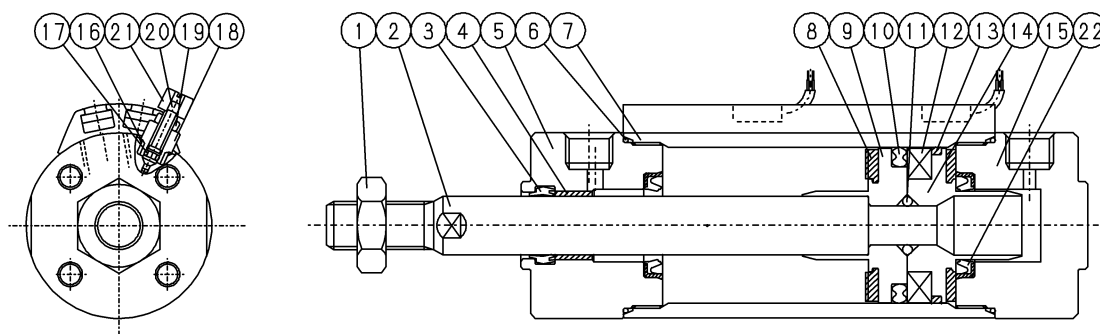
※ Material of  $\phi 50$ ,  $\phi 63$  is Aluminum alloy, die casted and painted finish.

Expendable parts list (Specify the kit No. on your purchase order.)

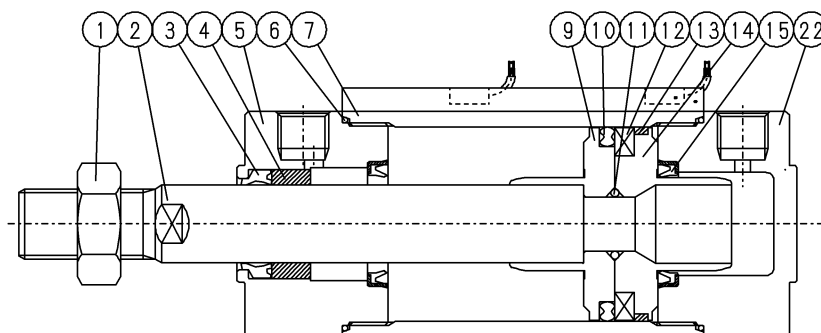
Bore size (mm)	Kit No.	Parts No	③	⑥	⑩	⑬
		Parts name	Rod packing	Cylinder gasket	Piston packing	Wear ring
φ 20	SCM-20DK		PDU-8Z	O ring φ 20 × φ 1.3	PSD-20	F4-125610
φ 25	SCM-25DK		PDU-10Z	O ring φ 24.99 × φ 1.27	PSD-25	F4-161716
φ 32	SCM-32DK		PDU-12Z	O ring φ 31.93 × φ 1.35	PSD-32	F4-161733
φ 40	SCM-40DK		PDU-16Z	AS568-030	PSD-40	F4-650239
φ 50	SCM-50DK	PDU-20Z		AS568-033	PSD-50	F4-650240
φ 63	SCM-63DK			AS568-037	PSD-63	F4-650241
φ 80	SCM-80DK		PDU-25Z	AS568-042	PSD-80	F4-650242
φ 100	SCM-100DK		PDU-30Z	AS568-155	PSD-100	F4-650243

## 2) Double acting, single rod type : Internal structure and parts list (with air cushion)

- φ 20 to φ 40



- φ 50 to φ 100



No.	Parts name	Material	Remarks
1	Rod nut	Steel	Nickel plated
2	Piston rod	$\phi$ 20 to $\phi$ 25 : Stainless steel $\phi$ 32 to $\phi$ 100 : Steel	Industrial chrome planting
3	Rod packing	Nitril rubber	Packing standard PDU
4	Bush	Oil pregated bearing alloy	
5	Rod cover	※Aluminum alloy	※Black finish almite
6	Cylinder gasket	Nitril rubber	
7	Cylinder tube	Aluminum alloy	Hard almite
8	Cushion rubber	Polyurethane rubber	
9	Piston R	$\phi$ 20 to $\phi$ 40 : Aluminum alloy $\phi$ 50 to $\phi$ 100 : Aluminum alloy die casted	
10	Piston packing	Nitril rubber	Packing standard PSD
11	Piston gasket	Nitril rubber	
12	Magnet	Plastic magnet	
13	Wear ring	Polyacetal	
14	Piston H	$\phi$ 20 to $\phi$ 40 : Aluminum alloy $\phi$ 50 to $\phi$ 100 : Aluminum alloy die casted	
15	Head cover	※Aluminum alloy	※Black finish almite
16	Needle gasket	Nitril rubber	
17	Holder gasket	Nitril rubber	
18	Needle holder	Aluminum alloy	
19	Lock nut	Steel	Nickel plated
20	Needle	Stainless steel	
21	Knob	Aluminum alloy	
22	Cushion packing	Nitril rubber, Steel	

※ Material of  $\phi$  50,  $\phi$  63 is Aluminum alloy, die casted and painted finish.

Expendable parts list (Specify the kit No. on your purchase order.)

Parts No.		③	⑥	⑩	⑬
Parts name		Rod packing	Cylinder gasket	Piston packing	Wear ring
Bore size (mm)	Kit No.				
$\phi$ 20	SCM-20BK	PDU-8Z	O ring $\phi$ 20 $\times$ $\phi$ 1.3	PSD-20	F4-125610
$\phi$ 25	SCM-25BK	PDU-10Z	O ring $\phi$ 24.99 $\times$ $\phi$ 1.27	PSD-25	F4-161716
$\phi$ 32	SCM-32BK	PDU-12Z	O ring $\phi$ 31.93 $\times$ $\phi$ 1.35	PSD-32	F4-161733
$\phi$ 40	SCM-40BK	PDU-16Z	AS568-030	PSD-40	F4-650239
$\phi$ 50	SCM-50BK	PDU-20Z	AS568-033	PSD-50	F4-650240
$\phi$ 63	SCM-63BK		AS568-037	PSD-63	F4-650241
$\phi$ 80	SCM-80BK	PDU-25Z	AS568-042	PSD-80	F4-650242
$\phi$ 100	SCM-100BK	PDU-30Z	AS568-155	PSD-100	F4-650243

Parts No.		⑰	⑳
Parts name		Holder gasket	Cushion packing
Bore size (mm)	Kit No.		
$\phi$ 20	SCM-20BK	O ring $\phi$ 4.7 $\times$ $\phi$ 0.6	F4-161817
$\phi$ 25	SCM-25BK		F4-161818
$\phi$ 32	SCM-32BK		F4-161819
$\phi$ 40	SCM-40BK		PCS-20
$\phi$ 50	SCM-50BK	O ring $\phi$ 6.5 $\times$ $\phi$ 1.0	PCS-24
$\phi$ 63	SCM-63BK		PCS-35
$\phi$ 80	SCM-80BK		
$\phi$ 100	SCM-100BK		

## 5. TROUBLE SHOOTING

### 1) Cylinder

Trouble	Causes	Remedies
Does not operate.	No pressure or inadequate pressure.	Provide an adequate pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Broken piston packing	Replace the piston packing.
Does not function smoothly.	Speed is below the low speed limit	Limit the load variation.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Exertion of transverse (lateral) load.	Install a guide. Revise the installation state and/or change the mounting style.
	Excessive load.	Increase the pressure itself and/or the inner diameter of the tube.
	Speed control valve is built in the way of "Meter in" circuit.	Change the meter-out circuit of the speed control valve.
Breakage and/or deformation	Impact force due to high speed operation	Turn the speed down. Reduce the load and/or install a mechanism with more secured cushion effect (e.g. external cushion mechanism).
	Exertion of transverse load.	Install a guide. Reverse the installation state and/or change the mounting style.

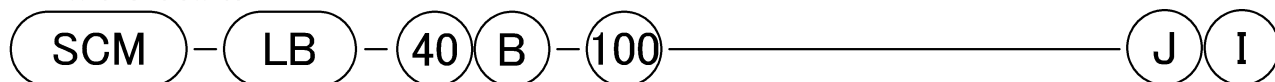
### 2) Switch

Troubles	Causes	Remedies
Indicator light is not lit.	Deposited contact point	Replace the switch.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	Damaged indicator light	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
Switch does not function right.	Broken circuit	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
	Improper voltage	Correct voltage to specified.
	Incorrect location of switch	Correct its location.
	Aberrant position of switch	Set it back to original position and tighten the mounting device.
	Incorrect direction of switch mounting	Correct the direction of the switch mounting.
	Relay is unable to respond properly	Turn the speed down. Replace the relay with a recommended one.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
Switch does not return.	Piston is not moving	Make the piston move.
	Deposited contact point	Replace the switch
	Excessive load (relay) than rated capacity	Replace the relay with a recommended one or replace the switch.
	The ambient temperature is out of the specification range	Adjust the ambient temperature within the range of -10 to 60°C
	Existence of a foreign magnetic field	Shield the magnetic field.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.

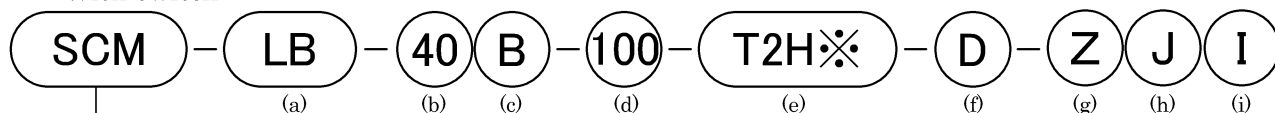
## 6. HOW TO ORDER

### 6.1 Product Number Coding

- Without switch



- With switch



Super micro cylinder  
Double acting, standard type, equipped

(a) Mounting style (Note1)		(b) Bore size (mm)		(c) Cushion	
00	Basic type	20	φ 20	B	With air cushion at both ends
LB	Foot mount type, along axis	25	φ 25	R	With air cushion at rod side
FA	Rod side flange type	32	φ 32	H	With air cushion at head side
FB	Head end flange type	40	φ 40	D	With rubber cushion at both ends
CA	Single clevis type (φ 20 to φ 63)	50	φ 50		
CB	Double clevis type (φ 80 to φ 100)	63	φ 63		
TA	Rod side trunnion type (φ 20 to φ 63)	80	φ 80		
TB	Head end trunnion type (φ 20 to φ 63)	100	φ 100		

(d) Stroke (mm)	(e) Switch model (Note2)				(f) Qty. of switch (Note3, 4)	
25	Lead wire	Lead wire	Switch type	Lead wire	R	Rod side, 1 ea.
50	Straight type	L-shaped type			H	Head side, 1 ea.
75	T0H※	T0V※	Reed switch	2-wire	D	2 ea.
100	T5H※	T5V※			T	3 ea.
125	T2H※	T2V※	Solid state switch	4	4	4 ea.
200	T3H※	T3V※			5	5 ea.
250	T2YH※	T2YV※	2-color indicating solid state switch	2-wire		
300	T3YH※	T3YV※				
	T2YFH※	T2YFV※	Preventive maintenance output, solid state switch	3-wire		
	T3YFH※	T3YFV※		4-wire		
	T2YMH※	T2YMV※		3-wire		
	T3YMH※	T3YMV※		4-wire		

※ Lead wire length	
No code	1m (Standard)
3	3m (Optional)
5	5m (Optional)

(g) Switch mounting method		(h) Option		(i) Accessory	
No code	Rail method	J	Bellow : Nylon tarpaulin	I	Rod eye
Z	Band method	K	Bellow : Neoplain sheet	Y	Rod clevis
		L	Bellow : Silicone rubber glass cloth	B1	Eye bracket (φ 80 to φ 100)
		Q	Delivered with switch rail	B2	Clevis bracket (φ 20 to φ 63)
		M	Piston rod stainless steel		
		P6	Copper and PTFE free		

Note1: Mounting bracket is attached to the product at shipment.

Note2: T3PH, T3PV type is also available. (Custom order) ※ mark indicates the length of lead wire.

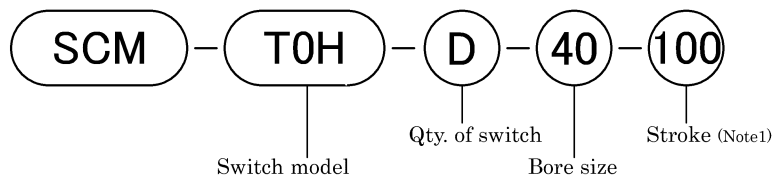
Note3: Specify the number of switches if four or more switches are to be used.

Note4: For details of switch model coding, see the next page.

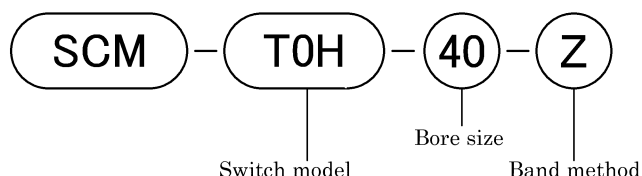
## 6.2 Component parts Model coding

### 1) Switches

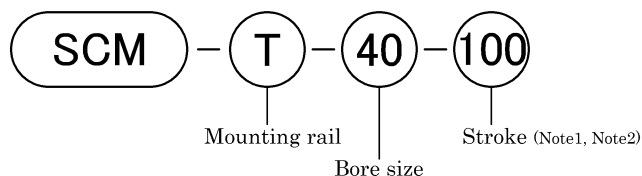
#### (1) Switch body + Set of Mounting rail



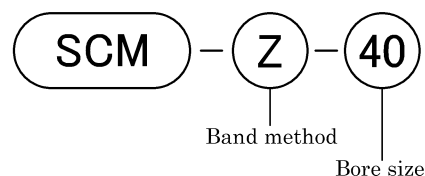
#### (2) Switch body + Mounting rail + Set of Band



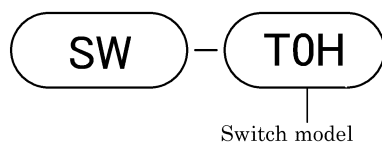
#### (3) Mounting rail alone



#### (4) Mounting rail + Band



#### (5) Switch body alone



(e) Switch model (Note2)				(b) Bore size (mm)		(d) Stroke (mm)
Lead wire Straight type	Lead wire L-shaped type	Switch type	Lead wire	20	φ 20	Standard stroke
				25	φ 25	25
T0H※	T0V※	Reed switch	2-wire	32	φ 32	50
T5H※	T5V※			40	φ 40	75
T2H※	T2V※			50	φ 50	100
T3H※	T3V※	Solid state switch	3-wire	63	φ 63	125
				80	φ 80	200
				100	φ 100	250
						300
						X

※ mark indicates the length of lead wire.

(f) Qty. of switch (Note3, 4)	
R	Rod side,1 ea.
H	Head side,1 ea.
D	2 ea.
T	3 ea.
4	4 ea.
5	5 ea.

Specify the number of switches if four or more switches are to be used.

※ Lead wire length	
No code	1m (Standard)
3	3m (Optional)
5	5m (Optional)

Note1: When making an order for a single switch whose stroke is more than 300 mm, enter "X".  
 A short rail (switch's adjustable traveling distance: 100 mm) accompanies each switch with a stroke of more than 300 mm.

Note 2: If "X" is shown only with the mounting rail and the mounting rail and band are used, the number of rails equivalent to that of switches to be used must be ordered.



## 2) Model coding of mounting bracket

Bore size (mm) Mounting bracket	φ 20	φ 25	φ 32	φ 40
End angle type (LB)	SCM-LB-20	SCM-LB-25	SCM-LB-32	SCM-LB-40
Flange type (FA/FB)	SCM-FA-20	SCM-FA-25	SCM-FA-32	SCM-FA-40
Single clevis type (CA)	SCM-CA-20	SCM-CA-25	SCM-CA-32	SCM-CA-40
Double clevis type (CB)	—	—	—	—
Trunnion type (TA/TB)	SCM-TA-20	SCM-TA-25	SCM-TA-32	SCM-TA-40

Bore size (mm) Mounting bracket	φ 50	φ 63	φ 80	φ 100
End angle type (LB)	SCM-LB-50	SCM-LB-63	SCM-LB-80	SCM-LB-100
Flange type (FA/FB)	SCM-FA-50	SCM-FA-63	SCM-FA-80	SCM-FA-100
Single clevis type (CA)	SCM-CA-50	SCM-CA-63	—	—
Double clevis type (CB)	—	—	SCM-CB-80	SCM-CB-100
Trunnion type (TA/TB)	SCM-TA-50	SCM-TA-63	—	—

Note: Required mounting bolts are attached to bracket.

## 7. SPECIFICATION

### 7.1 Product Specifications

Model		SCM				
Item						
Bore size		mm	φ 20	φ 25	φ 32	φ 40
Actuation		Double-acting type				
Working fluid		Compressed Air				
Max. working pressure		MPa	1.0			
Min. working pressure		MPa	0.1			
Proof pressure		MPa	1.6			
Ambient temperature		°C	-10 to 60 (No freezing)			
Port size	With rubber cushion	Rc1/8				
	With air cushion	M5		Rc1/8		
Stroke tolerance	With rubber cushion	+ 1.0 0 ( less than 1000)			+ 1.4 0 ( less than1500)	
	With air cushion	+ 1.0 0 ( less than 1000)			+ 1.4 0 ( less than1500)	
Working piston speed		mm/s	30 to 1000 (Set the speed within the range of allowable energy absorption.)			
Cushion		Be able to select rubber cushioned or air cushioned				
Lubrication		Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)				
Allowable energy absorption	With rubber cushion	J	0.11	0.2	0.53	0.91
	With air cushion	J	0.8	1.26	2.52	3.74

Part number		SCM			
Item					
Bore size	mm	φ 50	φ 63	φ 80	φ 100
Actuation		Double-acting type			
Working fluid		Compressed Air			
Maximum working pressure	MPa	1.0			
Minimum working pressure	MPa	0.05			
Proof pressure	MPa	1.6			
Ambient temperature		-10 to 60 (No freezing)			
Port size	With rubber cushion	Rc1/4		Rc3/8	Rc1/2
	With air cushion	Rc1/4		Rc3/8	Rc1/2
Stroke tolerance mm	With rubber cushion	$+2.3_0$ (less than 1000),		$+2.7_0$ (less than 1500)	
	With air cushion	$+1.4_0$ (less than 1000),		$+1.8_0$ (less than 1500)	
Working piston speed		mm/s	30 to 1000 (Set the speed within the range of allowable energy absorption.)		
Cushion		Be able to select rubber cushioned or air cushioned			
Lubrication		Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)			
Allowable energy absorption J	With rubber cushion	1.6	1.6	3.3	5.8
	With air cushion	8	14.4	25.4	45.6

## 7.2 Switch Specification

Type & Model	Reed switch			
Item	T0H, T0V		T5H, T5V	
Applications	For use with relay, programmable controller		For use with programmable controller relay, IC circuit (without indicator light), series connection	
Load Voltage	DC24V	AC100V	DC24V	AC100V
Load Current	5 to 50mA(Note 2)	7 to 20mA(Note 2)	50mA or less	20mA or less
Current consumption	—			
Internal voltage drop	2.4V or lower		0V	
Indicator light	Lit when LED is on		—	
Leakage current	0mA			
Lead wire length (Note 1)	Standard 1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.2mm <sup>2</sup> )			
Shock resistance	294m/s <sup>2</sup>			
Insulation resistance	20 MΩ or more measuring with DC500V megger tester			
Withstand voltage	No abnormalities should occur after applying AC1,000V for 1 minute			
Ambient temperature	-10 to 60°C			
Degree of protection	IEC Standard IP67, JIS C0920 (water tight tpye), Oil resistance			

Type & Model	Solid state switch	
Item	T2H, T2V	T3H, T3V
Applications	For use exclusively with programmable controller	For use with programmable controller, relay
Power supply voltage	—	DC10 to 28V
Load Voltage	DC10 to 30V	DC30V or less
Load Current	5 to 20mA (Note 2)	100mA or less
Current consumption	—	10mA or less at DC24V (While Power is ON)
Internal voltage drop	4V or less	0.5V or less by 100mA
Indicator light	Lit when LED is on	
Leakage current	1mA or less	10 $\mu$ A or less
Lead wire length (Note 1)	Standard 1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.2mm <sup>2</sup> )	Standard 1m (Oil-proof vinyl cabtyre cord, 3-wire, 0.2mm <sup>2</sup> )
Shock resistance	980m/s <sup>2</sup>	
Insulation resistance	20 M $\Omega$ or more measuring with DC500V megger tester	
Withstand voltage	No abnormalities should occur after applying AC1,000V for 1 minute	
Ambient temperature	-10 to 60°C	
Degree of protection	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance	

Note 1: 3m or 5m long lead wire is optionally available.

Note 2: Max. load current above is value at 25 °C. The current will be lower if the temperature around switch is higher than 25 °C. (50% at 60°C).