

INSTRUCTION MANUAL

SUPER MICRO CYLINDER

SCM-LD

- 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 application, 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 instruction manual carefully for proper operation.

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

Precautions

- 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.

INDEX

SCM-LD

Super micro Cylinder Double acting, Direct foot type

Manual No. SM-225759-A

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NOTE: Letters & figures enclosed within Gothic style bracket
(examples such as [C2-4PP07] · [V2-503-B] etc.) are editorial
symbols being unrelated with contents of the book.



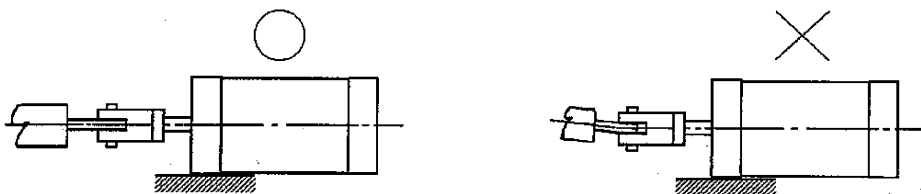
1. UNPACKING

- 1) Make sure that the type No. on the nameplate of the delivered Rotary Clamp 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

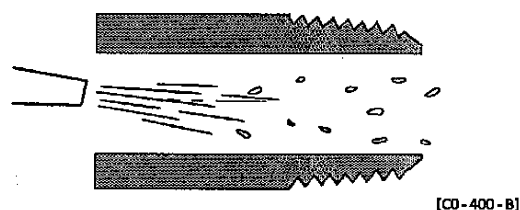
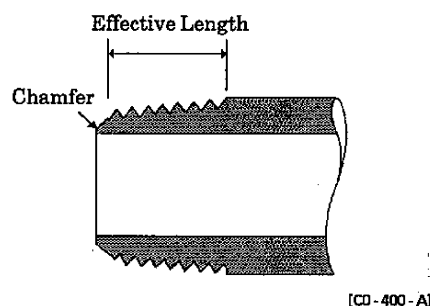
2.1 Installation

- 1) The ambient temperature range for this cylinder is -10 to 60°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.

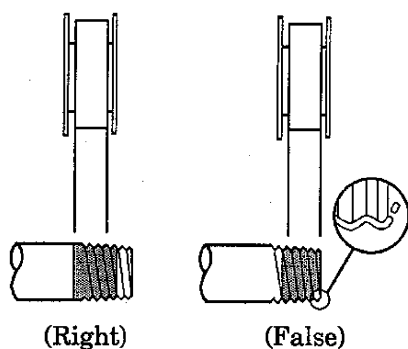


2.2 Piping

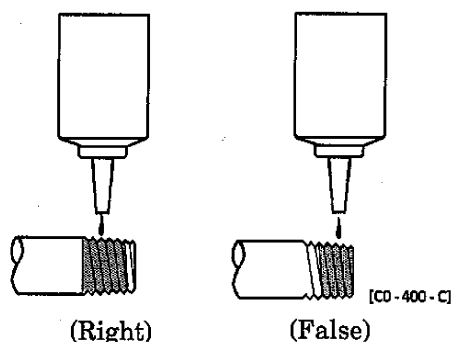
- 1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.
- 2) See to it that the pipe connecting cylinder and solenoid valve has an effective sectional area which is needed for the cylinder to drive at the specified speed.
- 3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust and foreign substances in the drain of the pipe.
- 4) Be sure to adhere to the effective thread length of gas pipe and make 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 the pipe to avoid residual substances from falling into the piping system.



● Seal Tape

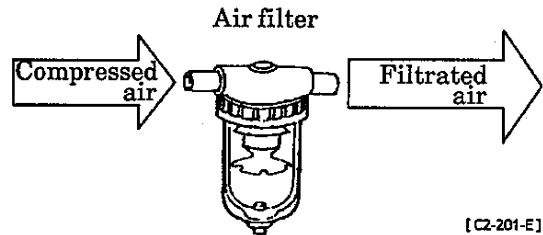


● Sealant (Paste or liquid)

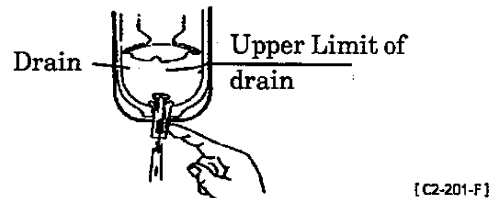


2.3 Fluid

- 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).



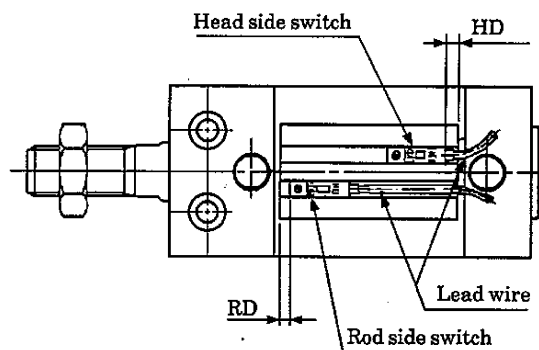
- 2) Be sure to drain out the accumulation in the filter periodically.



- 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.

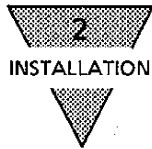
2.4 Location of mounting Switch

- 1) Location



- (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 highest sensitivity. (See Table 1.)



(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 points is of the highest sensitivity 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 $0.2\text{N} \cdot \text{m}$ { 1 to $2\text{kgf} \cdot \text{cm}$ })

(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 $0.2\text{N} \cdot \text{m}$ { 1 to $2\text{kgf} \cdot \text{cm}$ })

2) Motion limit

The range where switch turns on first and turns off as the piston moves along its stroke is called motion limit.

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

3) Mounting the switch rail

If your cylinder is equipped with an optional switch rail or such a switch rail is separately prepared, mount the switch rail according to the "Switch Rail Mounting Instructions" attached to it.

4) Hysteresis

The distance is called hysteresis between the positions where switch turns ON as piston slides long and where switch turns OFF due to reversing stroke of piston.

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

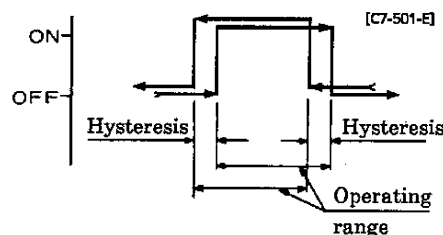


Table 1

(mm)

Tube bore	Non contact type switch (T2H/V, T3H/V)				Contact type switch (T0H/V, T5H/V)			
	Maximum sensitive position		Operating range	Hysteresis	Maximum sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
φ20	5.3	6.2	3 to 8	1.5 or less	2.3	5.2	6 to 14	3 or less
φ25	4.3	7.2	3 to 9		1.3	6.2	5 to 14	
φ32	5.3	8.2	3 to 8		2.3	7.2	5 to 12	
φ40	7.3	10.2	3 to 9		4.3	9.2	6 to 14	
φ50	9.8	11.7			6.8	10.7	7 to 15	
φ63								



3. OPERATION

3.1 Operating the Cylinder

- 1) See to it that the air supply pressure to the cylinder is as shown in the "Specification". Operate the cylinder within this pressure range.
- 2) A rubber cushion is used as a shock absorbing device.

If a kinetic energy value higher than that given in Table 2 is induced due to heavy loads and/or high speeds, consider using an additional shock absorbing device.

Table 2 : Table of cushion characteristics

Tube bore (mm)	Rubber cushion
	Allowable energy absorption (J) { $\times 10^{-1} \text{kgf} \cdot \text{m}$ }
$\phi 20$	0.11
$\phi 25$	0.2
$\phi 32$	0.53
$\phi 40$	0.91
$\phi 50$	1.6
$\phi 63$	1.6

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

3.2 Operating the Switches

3.2.1 General Cautions

1) Magnetic environment

Avoid usage of these switches within the area where strong magnetic field or large current exists (such as a large magnet or spot welding equipment). Position censoring errors will be resulted when installing many cylinders with switches in parallel or magnetized piece come across the cylinder due to intervention among each other.

2) Protection of lead cord

Pay consideration to eliminate repeating bending stress or stretching of lead cord while laying the cord. To the moving portion, use such cord of flexibility as for building a robot.

3) Service temperature

It is unsuitable to operate it in high temperature (above 60°C) due to thermal characteristics of magnetic parts and electronic parts. Eliminate operation in such high temperature.

4) Intermediate position sensing

Beware of unstable response of relay when piston speed is excessive in the event of intending actuation of switch in the way of piston stroke.

5) Shock

Carefully avoid big shock or vibration during transportation of cylinder of mounting and adjusting 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.

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

3.2.2 Operational Cautions, Non contact type 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.

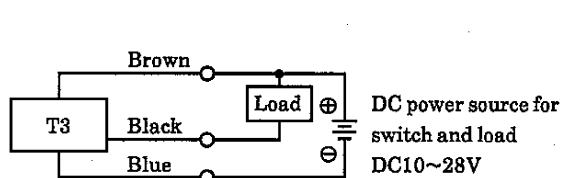


Fig.1 Basic Circuit Example (1)
(The same power source is used for switch and load.)

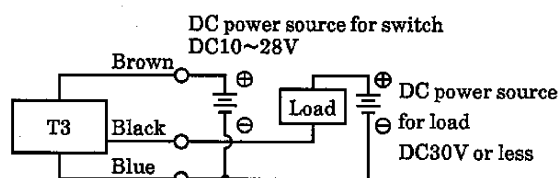


Fig.3 Basic Circuit Example (3) (Different power sources are used for switch and load.)

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).

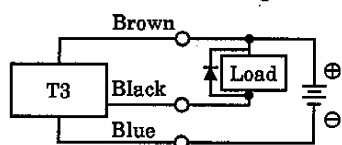


Fig.3 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)

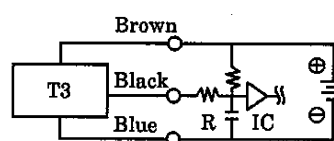


Fig.4 An example of using capacitor type load together with current regulating resistor R. Comply with the following formula to figure out required R.

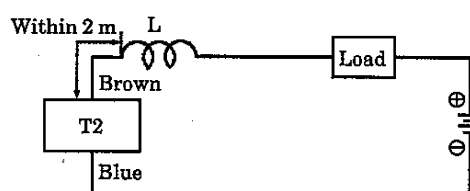
$$\frac{V}{0.10} = R(\Omega)$$


Fig.5 • Choke coil
L = a couple hundred μ H ~ a couple mH surpassing high frequency characteristic
• Install it nearby the switch (within 2 m).

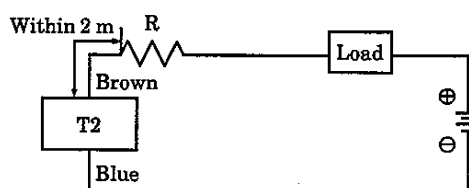


Fig.6 • Dash current restriction resistor
R = As much large resistor as the load circuit can afford.
• Install it nearby the switch (within 2 m).

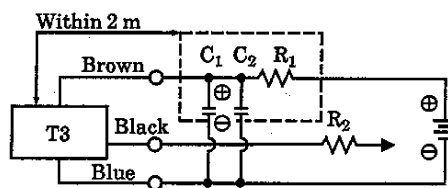


Fig. 7

- Electric power noise absorptive circuit
 $C_1 = 20$ to $50\mu\text{F}$ electrolytic capacitor
 (withstanding 50V or more)
 $C_2 = 0.01$ to $0.1\mu\text{F}$ ceramic capacitor
- Dash current restriction resistor
 $R_1 = 20$ to 30Ω
 $R_2 =$ 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.

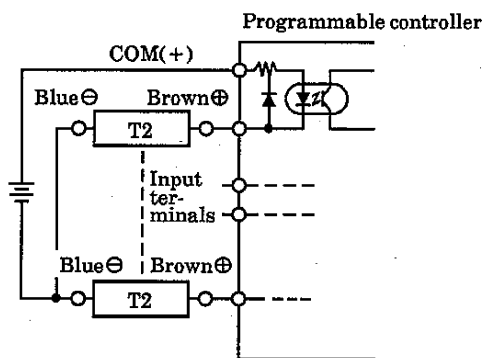


Fig. 8 An example of T2 connection to source input type (an external power source)

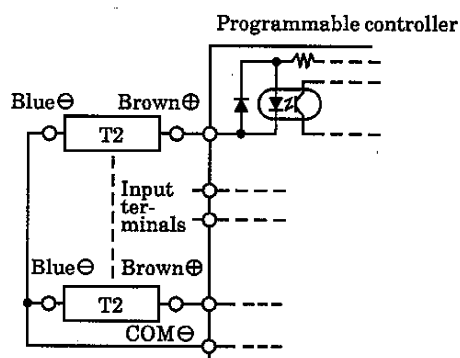


Fig. 9 An example of T2 connection to source input type (an internal power source)

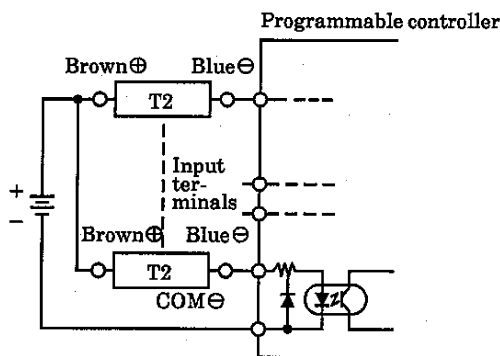


Fig. 10 An example of T2 connection to sink input type

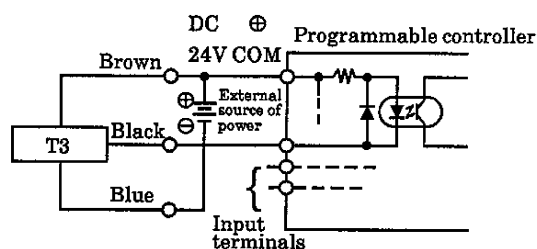


Fig. 11 An example of T3 connection to source input type (an external power source)

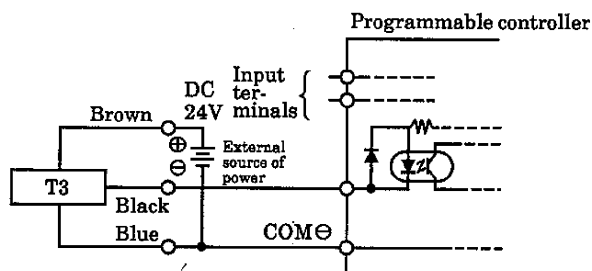


Fig. 12 An example of T3 connection to source input type (an internal power source)



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 lamp may exist.

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

3.2.3 Operational Cautions, Contact type switch (T0, T5)

1) Connection of lead cord

Instead of connecting the cord to the power source directly, always connect to the load in series. In case of model T0 connection, pay the following precautions.

Ⓐ For DC connection, use such polarities of cords as white \oplus and black \ominus . The switch still functions right with reversed polarities but lamp is not lit.

Ⓑ For AC connection to either relay or input terminal to programmable controller, Switch lamp sometimes is not lit in case when half-wave rectification is being carried out. Lamp is lit, in this occasion, when polarities of cords for switch is reversed.

2) Capacity of contact points

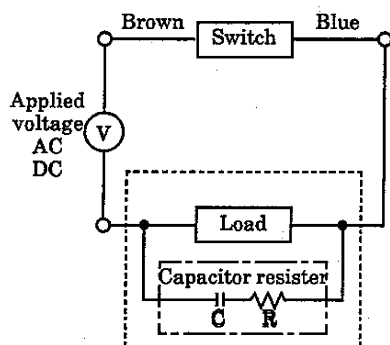
Avoid using a load exceeding the max. capacity of contact points. On the other hand, in case of T0 model, switch lamp may not be lit sometimes when current is lower than the rated current.

3) Protection of contact point

Install such a protective circuit as illustrated in either Fig 1 or 2, as follows, when inducing a type load such as a relay is to be used.

Provide a contact protection circuit as shown in Figs. 3 and 4 if the wiring length exceeds the length shown in below table.

Voltage	Wire length
DC	100m
AC	10m



- [Dashed box] User circuit
 [Solid box] Protective circuit (Spark absorbing circuit)

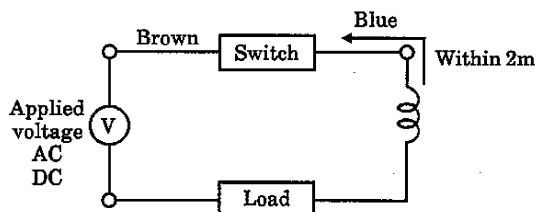
Recommended value

C (Capacitor) = 0.033 to 0.1 μ F

R (Resistor) = 1 to 3k Ω

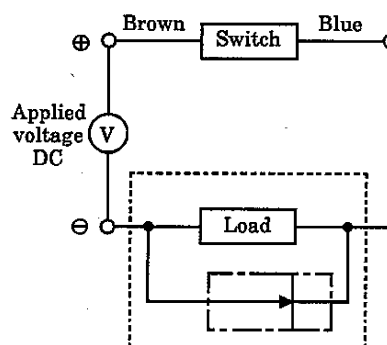
XEB1K1 Okaya Denki Mfg. or equivalent

Fig.1 When capacitor resistor is used.



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

Fig.3

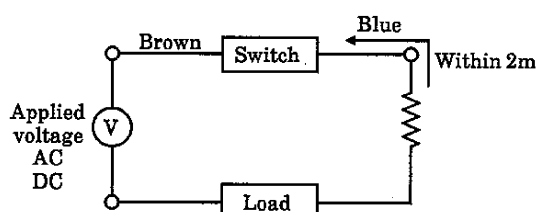


- [Dashed box] User circuit
 [Solid box] Protective circuit

Rectifying diode, general use

Hitachi Mfg. product V06C or equivalent

Fig.2 When diode is used.



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

Fig.4

4) Relay

Use such products as specified below or equivalent.

- | | |
|------------------------------------------------------|-----------|
| <input type="radio"/> OMRON Corporation | Model MY |
| <input type="radio"/> FUJI ELECTRIC CORP | Model HH5 |
| <input type="radio"/> Matsushita Electric Works Ltd. | Model HC |

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.

Lamp 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 lamp or complete lamp 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 fittings and supporting fittings for slackening.
 - ② Check to see that the cylinder operates smoothly.
 - ③ Check any change of the 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

This cylinder is able to be disassembled.

- 1) 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 3.

Table 3

Tube bore (mm)	Pair face of cover	Recommended hand tools			
φ20	24	Spanner 24	Adjustable wrench 250	Pipe wrench 250	
φ25	29	" 29	" 250	" 350	
φ32	36	" 36	" 375	" 350	
φ40	44		" 375	" 450	
φ50	55			" 600	
φ63	69			" 900	

Note • Pipe wrench may sometimes give defects to cover.

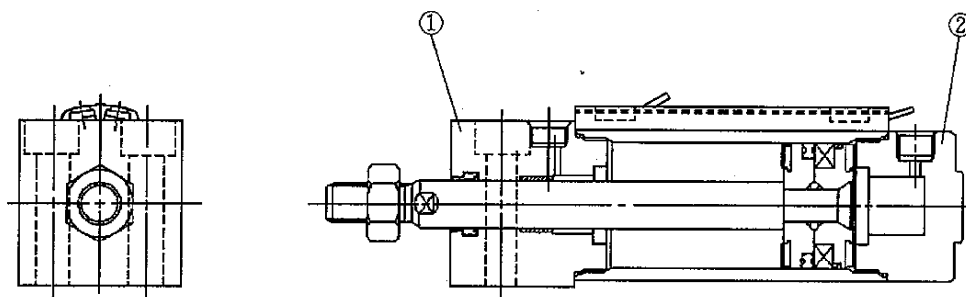
- (5) Remove rod packing ③, piston packing ⑩, cylinder gasket ⑥ & wear ring ⑬ using sharp pointed tool such as ⊖ tip screw driver or bodkin.

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) Apply a film of high grade grease (Litium alkali base) over the inner surface of cylinder tube, outer surface of piston and packings.
- 4) When tightly assembling rod cover and head cover onto tube, make sure, for tight finishing, to turn the cover approx. 2° beyond former position before disassembling.

4.4 Internal structure drawings and Expendable parts list

- 1) Internal structure drawing and expendable parts list (single-acting plunger type cylinder with a rubber cushion)

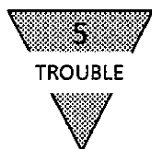


No.	Parts name	Material	Remarks
1	Rod cover	Aluminum alloy	Black finish almite
2	Head cover	Aluminum alloy	Black finish almite

Expendable parts list

Tube bore (mm)	Parts name Kit No.	Rod packing	Cylinder gasket	Piston packing	Wear ring
φ 20	SCM-20DK	PDU-8Z	O ring φ20×φ1.3	PSD-20	F4-125610
φ 25	SCM-25DK	PDU-10Z	O ring φ24.99×φ1.27	PSD-25	F4-161716
φ 32	SCM-32DK	PDU-12Z	O ring φ31.93×φ1.35	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	PDU-20Z	AS568-037	PSD-63	F4-650241

Note : Specify the kit No. on your purchase order.



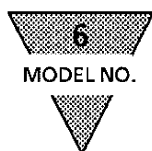
5. TROUBLE SHOOTING

1) Cylinder

Trouble	Cause	Countermeasure
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 supporting system.
	Broken piston packing	Replace the cylinder.
Does not function smoothly	Speed is below the low speed limit	Reduce the load.
	Improper or misalignment of installation	Correct the installation state and/or change the supporting system.
	Exertion of transverse (lateral) load	Install a guide. Revise the installation state and/or change the supporting system.
	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 installation direction 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 supporting system.

2) Switch

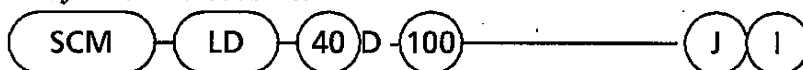
Trouble	Cause	Countermeasure
Lamp is not lit.	Deposited contact point	Replace switch.
	Excessive load than rated capacity	Replace the relay w/recommended one or replace the switch
	Damage to the lamp	Replace the lamp.
	Inadequate incoming signal	Review the external signal circuit and remove the causes
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
	Incorrect direction of switch mounting	Correct the direction of the switch.
	Relay is unable to respond properly within the piston stroke	Adjust speed slow Replace the relay
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch
Switch does not return.	Piston is not moving	Correct to have 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
	Improper ambient temperature	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.



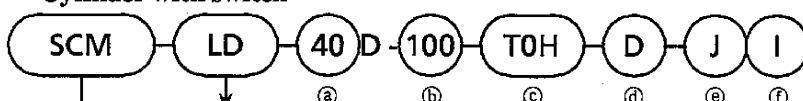
6. MODEL NO. CLASSIFICATION

6.1 Product Number Coding

- Cylinder without switch



- Cylinder with switch



Super micro cylinder
Double acting type

② Tube bore		③ Stroke		④ Switch model			
		Standard stroke	Max. stroke		Lead wire straight type	Lead wire L-shaped type	
			Tube bore	Stroke			
20	φ20	25	φ20	1000	T0H※	T0V※	Contact type
25	φ25				T5H※	T5V※	
32	φ32				T2H※	T2V※	Non contact type
40	φ40	50	φ25	1500	T3H※	T3V※	
50	φ50	75	φ32		T2YH※	T2YV※	2-color indicating, non contact type
63	φ63	100	φ40		T3YH※	T3YV※	
		125	φ50	1500	T2YFH※	T2YFV※	Preventive maintenance output, non contact type
		150	φ63		T3YFH※	T3YFV※	
		200			T2YMH※	T2YMV※	4-core
		250			T3YMH※	T3YMV※	
		300					

※ mark specifies the length of lead cord.

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

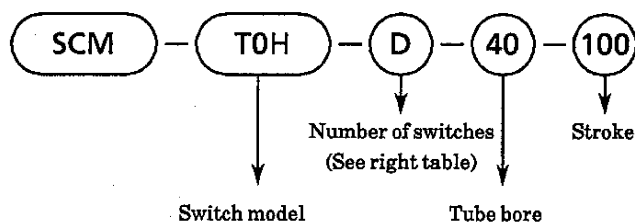
④ Number of switches		⑤ Options		⑥ Accessories	
R	1 ea., Rod end	J	Bellow: Nylon tarpaulin	I	Single knuckle
H	1 ea., Head end	K	Bellow: Neoprene sheet	Y2	Double knuckle
D	2 ea.	L	Bellow: Silicone rubber glass cloth		
T	3 ea.	M	Alteration in piston rod material		
4	4 ea.	N	Alteration in piston rod lug length and thread area		
5	5 ea.	Q	Delivered with switch rail		

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

6.2 Component parts Model coding

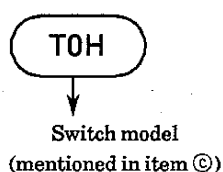
1) Switches

(1) Switch body + Set of mounting rail

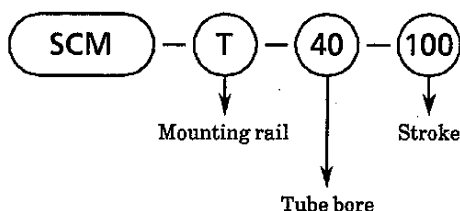


Number of switches	
R	1 ea., Rod end
D	2 ea.
T	3 ea.

(2) Switch alone



(3) Mounting rail alone

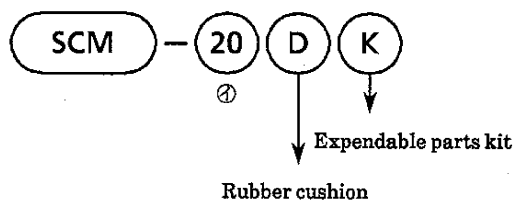


Note 1: When making an order for a single switch whose stroke is more than 300 mm, enter "X".

Note 2: A short rail (switch's adjustable traveling distance: 100 mm) accompanies each switch with a stroke of more than 300 mm.

When making an order only for rails for switches represented by "X", the number of rails must be equivalent to the number of switches to be used.

2) Expendable parts



③ Tube bore	
20	φ20
25	φ25
32	φ32
40	φ40
50	φ50
63	φ63



7. SPECIFICATION

7.1 Specifications

Model code	SCM-LD						
Item							
Action	Double acting, Direct foot type						
Media	Compressed Air						
Maximum working pressure MPa {kgf/cm ² }	1.0 {10.2}						
Minimum working pressure MPa{kgf/cm ² }	0.1 {1.02}				0.05 {0.51}		
Proof pressure MPa {kgf/cm ² }	1.6 {16.3}						
Ambient tempreature °C	- 10 to 60 (Not to be frozen)						
Tube bore mm	φ20	φ25	φ32	φ40	φ50	φ63	
Port size Rc	1/8	1/8	1/8	1/8	1/4	1/4	
Stroke tolerance mm	+1.4 0				+2.3 0		
Working piston speed mm/s	30 to 1000 (Set the speed within the range of energy absorption.)						
Cushioning	Rubber cushion						
Lubrication	Not required (Use Turbine oil Class 1, ISO, VG32 if and when lubrication is needed)						

7.2 Switch Specifications

1) Type of switches and applications

Model code				Application (Purpose)
Item				
Non contact type	2-core	T2H	for DC programmable controller, exclusive	
		T2V		
	3-core	T3H	for DC programmable controller or Relay	
		T3V		
Contact type	2-core	T0H	for AC/DC Relay or programmable controller	
		T0V		
		T5H	for AC/DC programmable controller, relay or IC circuit (not including Lamp), for Series connection	
		T5V		

Note 1: T×H designates Lead cord outlet is straight out type as well as T×V designates Lead cord outlet is L shape type.

2) Switch specifications

Kind and Model code	Contact point switch	
Item	T0H · T0V	T5H · T5V
Application	For Relay or Programmable controller	For AC/DC programmable controller, relay or IC circuit (not including Lamp), for Series connection
Voltage of source of power	—	
Load voltage and current	DC12/24V, 5 to 50mA AC100V, 7 to 20mA	DC 12/24V, 50mA or less AC100V, 20mA or less
Power consumption	—	
Internal voltage drop	2.4V or lower	0V
Lamp	LED (Lights while power is ON)	—
Current leak	0	
Length of lead cord (※1)	Standard 1m (Oil proof vinyl, Cabtyre cord, 2-core, 0.2mm ²)	
Max. shock	294m/s ² {30G}	
Insuration resistance	20MΩ or more by DC 500V megger	
Insuration voltage	No abnormalities upon charging AC1000V for one minute.	
Ambient temperature	-10 to + 60°C	
Protective structure	IEC Standard IP67, JIS C0920 (Intrusion type without water), Oil proof	

Kind and Model code	Proximity Switch			
Item	T2H · T2V	T2YH · T2YV	T3H · T3V	T3YH · T3YV
Application	For Programmable controller, exclusive		For Programmable controller or Relay	
Voltage of source of power	————		DC10 to 28V	
Load voltage and current	DC10 to 30V 5 to 25mA (※2)		DC 30V or lower, 100mA or less	DC 30V or lower, 50mA or less
Power consumption	————		10mA or less at DC24V (While Power is ON)	
Internal voltage drop	4V or less		0.5V or less by 100mA	0.5V or less
Lamp	LED (Lights while power is ON)	LED (Red/Green) (Lights while power is ON)	LED (Lights while power is ON)	LED (Red/Green) (Lights while power is ON)
Current leak	1mA or less		10μA or less	
Length of lead cord (※1)	Standard 1m (Oil proof vinyl, Cabtyre cord, 2-core, 0.2mm ²)		Standard 1m (Oil proof vinyl, Cabtyre cord, 3-core, 0.2mm ²)	
Max. shock	980m/s ² {100G}			
Insuration resistance	20MΩ or more by DC 500V megger	100MΩ or more by DC 500V megger	20MΩ or more by DC 500V megger	100MΩ or more by DC 500V megger
Insuration voltage	No abnormalities upon charging AC1000V for one minute.			
Ambient temperature	-10 to +60℃			
Protective structure	IEC Standard IP67, JIS C0920 (Intrusion type without water), Oil proof			