CKD

SM－230478－A

INSTRUCTION MANUAL

SUPER MICRO CYLINDER

Position locking type

SCM－Q

- 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.

CKD Corporation

The 3rd edition

For Safety Use

To use this product safety, 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.

INDEX

SCM-Q

Super micro cylinder
Position Locking type

Manual No. SM-230478-A

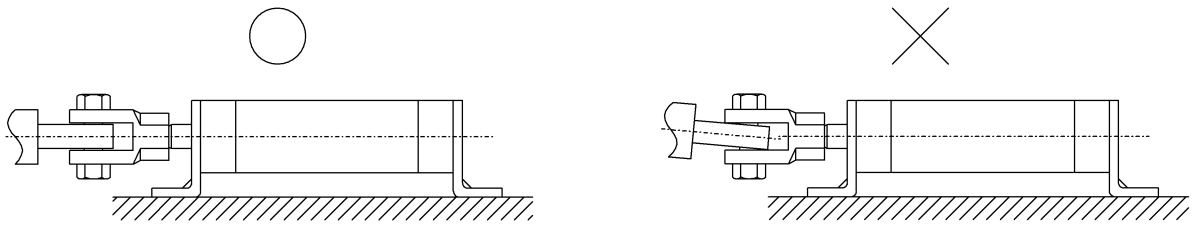
1. UNPACKING

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.

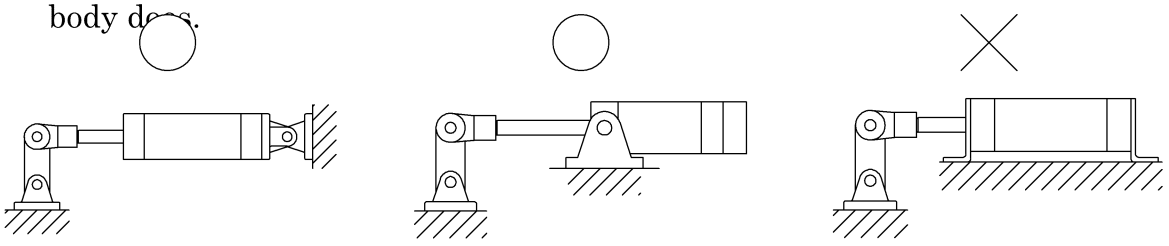
2. INSTALLATION

2.1 Installation

1) The ambient temperature for this cylinder is -10 to 60℃.
2) Consult CKD, when the cylinder is used in the dusty atmosphere, because there may be a case that foreign substances go inside through breathing hole of locking mechanism and cause malfunction.
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.



Clevise type　　Trunnion type　　Foot mount type

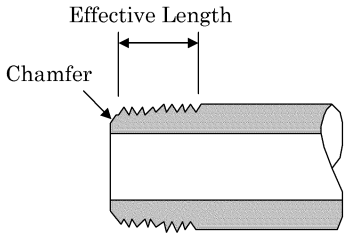
2.2 Piping

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℃, use copper pipes.

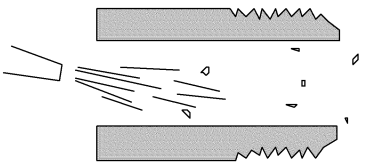
2) See to it that the pipe connecting cylinder and solenoid valve has effective cross-sectional area which is needed for the cylinder to drive at the specified speed.

3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

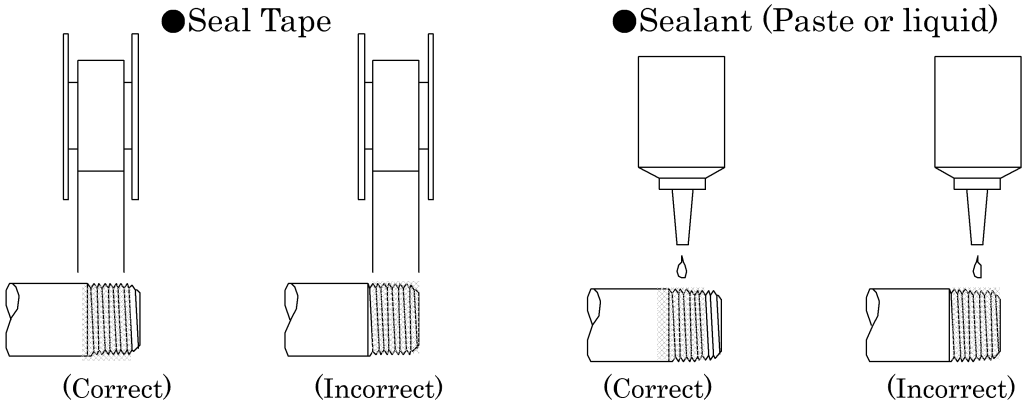
4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.



5) Flush air into the pipe to blow out foreign substances and chips before piping.

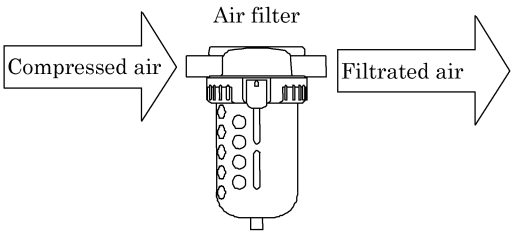


6) Refrain from mapplying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

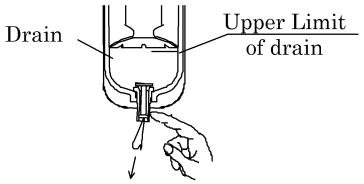


2.3 Fluid

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 μ 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.

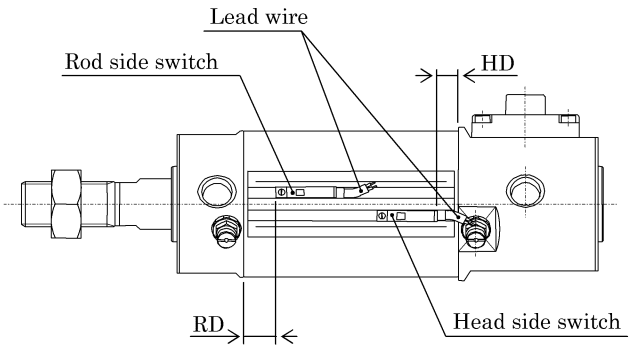


3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.

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)



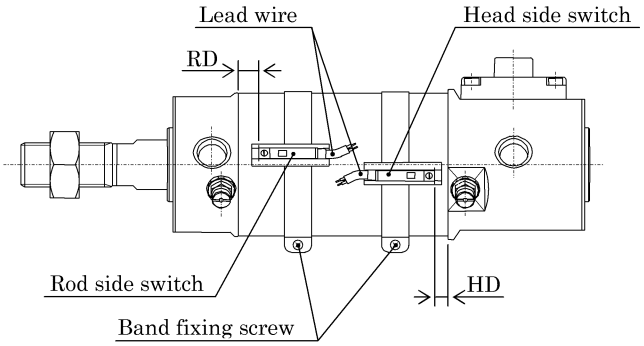
(1) At the stroke end
Refer the illustration above. Mount switches within the rod side dimension RD as well as the head side dimension HD for the purpose of having switches function at the points of the maximum sensitive position.
(Refer to Tables 1 and 2.)

(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 maximum sensitive position. (Apply tightening torque of 0.1 to 0.2N・m)

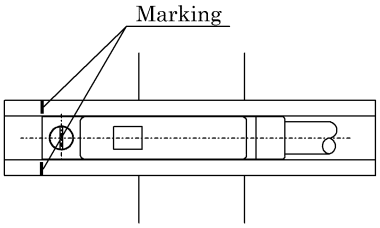
(4) Replacing switch
Take out switch out of groove after loosening mounting screws. Slide new replacing switch into groove and tighten screws upon placing the switch at the maximum sensitive position. (Apply tightening torque of 0.1 to 0.2N・m)

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 ±3 mm back and forth from the mounting position, which has been set before shipment.
If the adjustment range exceeds ±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 sensitive position before shipment from the factory.



As the switch type is changed or the band is moved, the maximum sensitive 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 mostly sensitive position. Setting switch at this point eliminates majority of external disturbance and provides the most stabile 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.

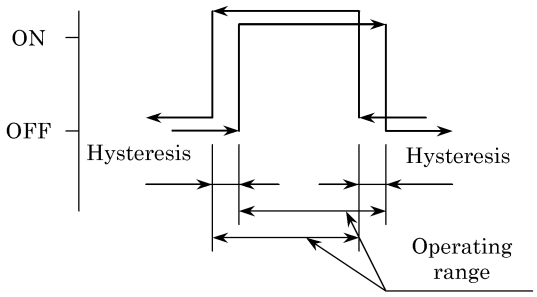


Table1 (Rail method) (mm)

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		
ϕ20	7.0	7.5	3 to 8	1.5 or less	4.0	6.5	6 to 14	3 or less
ϕ25	6.0	8.5	3 to 9		3.0	7.5	5 to 14	
ϕ32	7.0	9.5	3 to 8		4.0	8.5	5 to 12	
ϕ40	9.0	11.5	3 to 9		6.0	10.5	6 to 14	
ϕ50	11.5	13.0			8.0	12.5		
ϕ63							7 to 15	
ϕ80	13.0	20.0	4 to 10		10.5	19.5		
ϕ100	13.5	19.5			11.0	18.5	9 to 15	

Table2 (Band method) (mm)

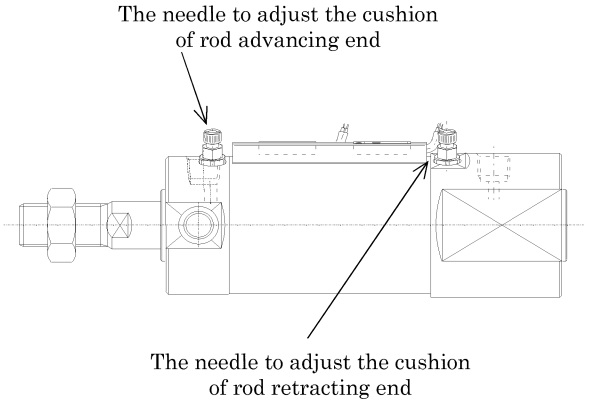
Bore size (mm)	Solid state switch (T2H/T2V, T3H/T3V)				Reed switch (T0H/T0V, T5H/T5V)			
	Maximum sensitive position		Operating range	Hysteresis	Maximum sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
ϕ 20	6.5	7.5	3 to 8	1.5 or less	5.5	6.5	6 to 14	3 or less
ϕ 25	5.5	8.5	3 to 9		4.5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

3. OPERATION

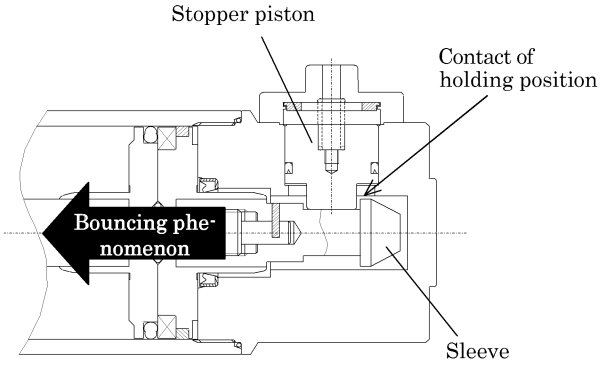
3.1 Operating the Cylinder

1) The working pressure for this type of cylinder is specified in “Product Specifications”. Operate the system within this range.
Let the load factor of the cylinder be 50 % or less.

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 (clockwise) 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.



If the cushion adjusting needle on the locking mechanism side is fastened too tight, the piston bounces on the stroke end to bring the sleeve and the stopper piston into contact with a bump, thereby resulting in damage in the locking mechanism. On the other hand, if the cushion adjusting needle is opened too much, the piston bounces on the end of stroke, it also causes damage to the mechanism. Make adjustments of the needles for the cushion so as not to allow bouncing of the piston.



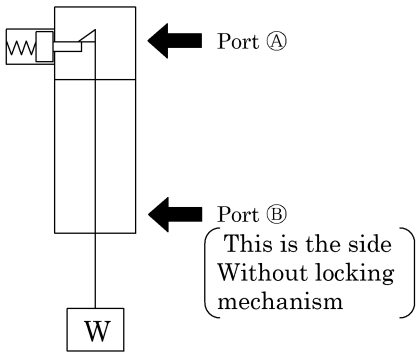
When an external cushion dumper (such as a shock absorber) is used to stop the piston, it is also needed to make adjustments so as not to allow bouncing of the piston.
Conduct periodic inspections once or two times a year to check for damage on the holding portion by this phenomenon.

Table 3 Table of cushion characteristics

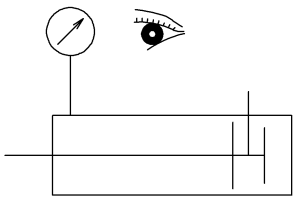
Bore size (mm)	Rubber cushion	Air cushion	
	Allowable energy absorption (J)	Effective air cushion length (mm)	Allowable energy absorption (J)
ϕ 20	0.11	8.1	0.8
ϕ 25	0.2		1.26
ϕ 32	0.53	8.6	2.5
ϕ 40	0.91		3.7
ϕ 50	1.6	13.4	8
ϕ 63			14.4
ϕ 80	3.3	15.4	25
ϕ 100	5.8		46

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

4) To release the locking, be sure to remove the load to locking mechanism by supplying pressure to the port B first where no locking mechanism is installed.
It is quite dangerous to supply pressure to the A direct while piston is being locked after both ports A and B are exhausted because the piston rod is apt to pop out all the sudden due to the load on the tip of piston rod. When the port A is pressurized, at the same moment, pilot line releases the locking mechanism.

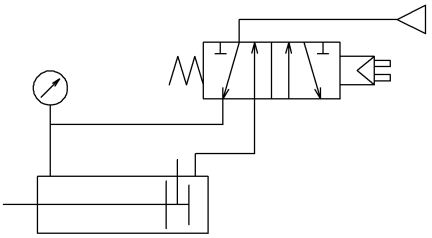


5) Confirm by an air gage, before starting daily operation, that the cylinder chamber where no locking device mounted (port B) is adequately pressurized.

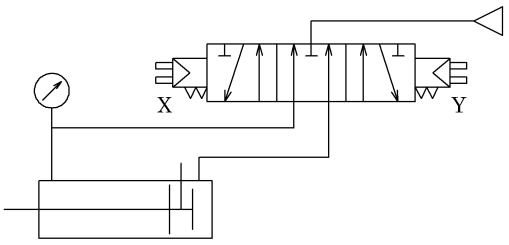


6) During the design of circuit layout, make sure the pressure delivery just before starting daily operation is so arranged as shown on the illustration.

(A) A satisfactory layout



(B) A sample of layout which requirs a particular consideration to start a system.
Piston rod is apt to pop out when Y solenoid is energized first. Design the circuit which energizes X solenoid first then dose Y solenoid.



7) There is a tendency that it takes some lengthy time before locking when the exhausting air speed is excessively slow from the chamber of locking mechanism side. (For instance, speed control is set at low speed while piping is long and small diameter.)

8) There is approx. 1mm play along piston rod axis under locking status.

9) It only locks when piston comes to its stroke end of mechanism side.

3.2 Principle of Mechanical Motion

1) Locking Motion

(a) Stopper piston ④ is pushed up by the slant of sleeve tip ② as the piston ① of cylinder approaches to its stroke end. (Fig. 1)
The stopper piston, however, is held up by the pressure when the pressure within the chamber Ⓐ is Min. working pressure or higher.

(b) When the piston of cylinder further comes closer to its stroke end and the groove Ⓑ of sleeve matches to the tail of stopper piston, the stopper piston drops back to the groove Ⓑ due to expansion force of spring ③, generating an effect of locking the piston of cylinder. (Fig. 2)

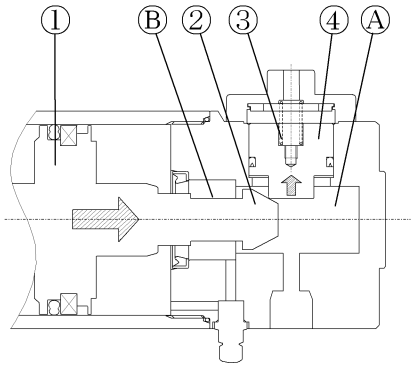


Fig.1

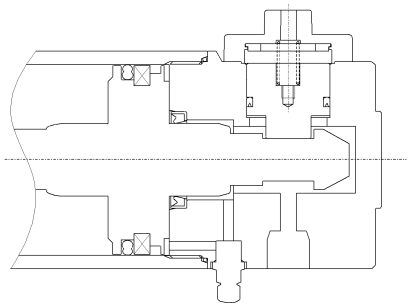


Fig.2

2) Unlocking Motion

The stopper piston, when compressed air is supplied through the port, floats up against the force of the spring ③ and comes off the groove Ⓑ of sleeve, generating an effect of unlocking the piston of cylinder. (Fig. 3)

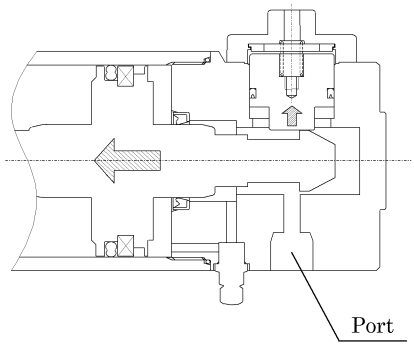
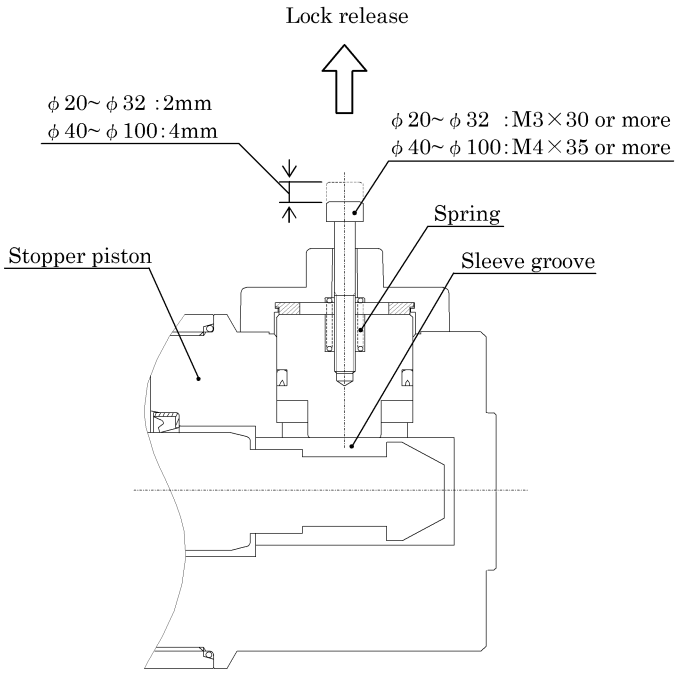


Fig.3

3) Unlocking Procedures by Manual control

Screw a hexagon socket head cap screw (φ20 to φ32 : M3 ×30 or more, φ40 to φ100 : M4 ×35 or more) into the stopper piston, and pull the bolt up φ20 to φ32 : 2mm, φ40 to φ100 :4mm with a force of 2 kgf or more.The stopper piston moves and the lock is released.
When the hand is released, if the stopper piston is returned by the internal spring and enters the piston rod groove, the piston locks.



3.3 How to use the Switches

3.3.1 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 rapeating 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℃)
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 (−)
T, K Series (Equipped with preventive maintenance output)	3-wire type	White (+)	Brown (+)
		Yellow (preventive maintenance output)	Orange (preventive maintenance output)
		Black (−)	Blue (−)
	4-wire type	Red (+)	Brown (+)
		White (regular output)	Black (regular output)
		Yellow (preventive maintenance output)	Orange (preventive maintenance output)
		Black (−)	Blue (−)

3.3.2 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

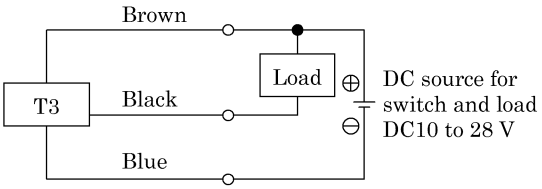


Fig.1 Fundamental circuit Example (1) of T3
(In case the same source of power is used.)

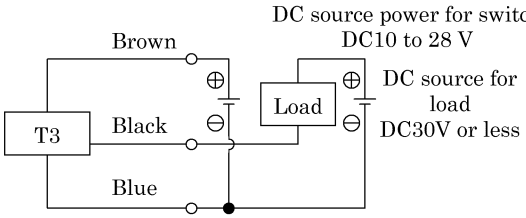


Fig.2 Fundamental circuit Example (2) of T3
(In case individual sources of power are used.)

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).

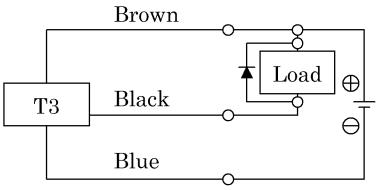
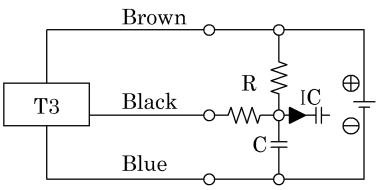


Fig.3 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



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

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

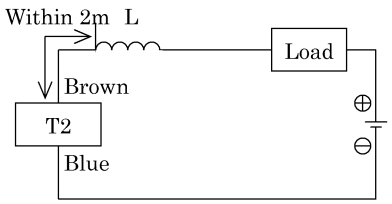


Fig.5 ・Choke coil
L= a couple hundred μ H to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

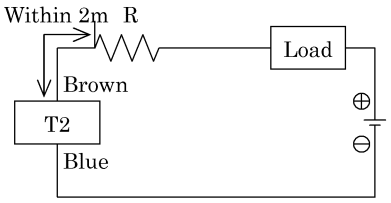


Fig.6 ・Dash current restriction resister.
R= As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

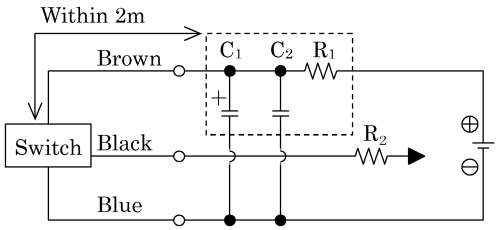


Fig7・ Electric power noise absorptive circuit.
C_1=20 to 50 μF electrolytic capacitor
(Withstand voltage 50V or more)
C_2=0.01 to 0.1 μF ceramic capacitor
R_1=20 to 30Ω

・ Dash current restriction resister.
R_2=As much large resister 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.

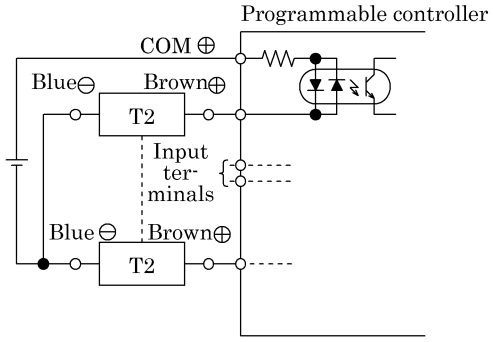


Fig.8 An example of T2 connection to source input type (an external power source)

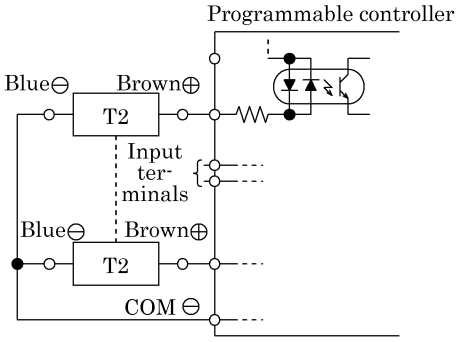


Fig.8 An example of T2 connection to source input type (an internal power source)

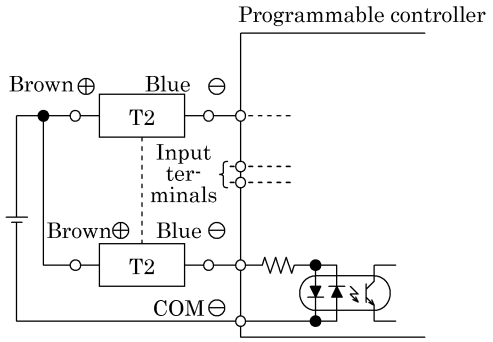


Fig.10 An example of T2 connection to source input type

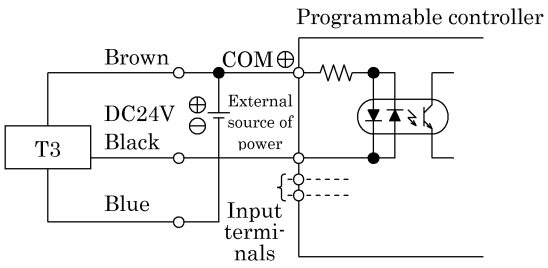


Fig.11 An example of T3 connection to source input type (an internal power source)

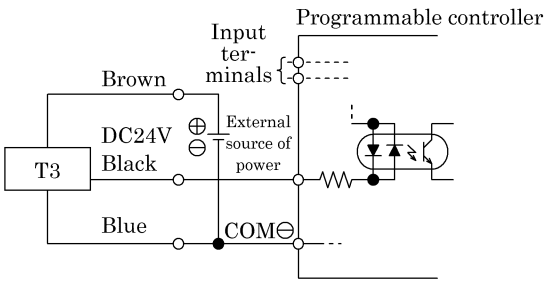


Fig.12 An example of T3 connection to source input type (an internal power source)

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 μ A, then leakage may occur. Usually dimming and failure of the indicator light do not occur.

3.3.3 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 Ⓐ, Ⓑ.

Ⓐ 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.

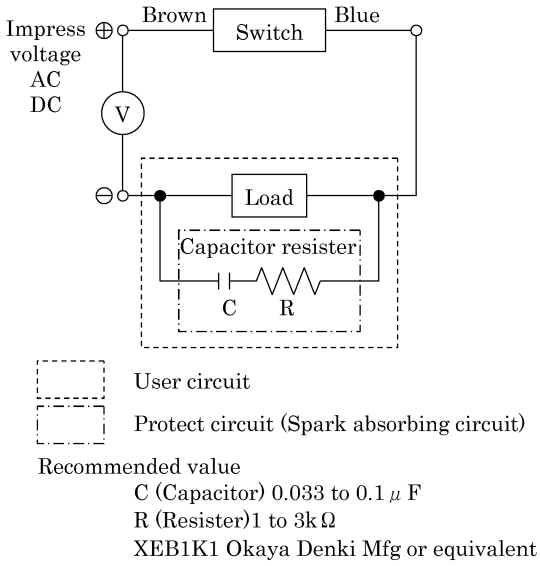
Ⓑ When the switch is connected to an AC relay or a programmable controller input, the indicator light on the switch is not lit if the half-wave rectification is performed in the connected circuit. If this occurs, reverse the polarities of the switch lead wire connection. The indicator light may then 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

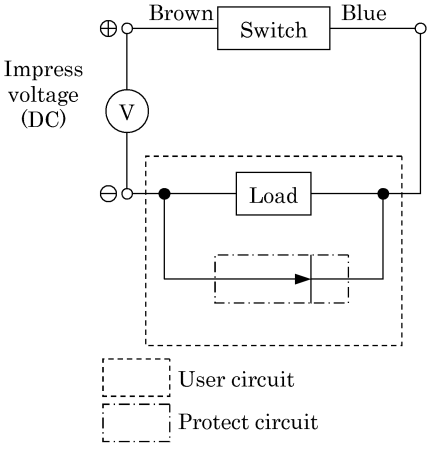
Electric power	Length of wire
DC	100m
AC	10m

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



Recommended value
C (Capacitor) 0.033 to 0.1 μ F
R (Resister)1 to 3k Ω
XEB1K1 Okaya Denki Mfg or equivalent

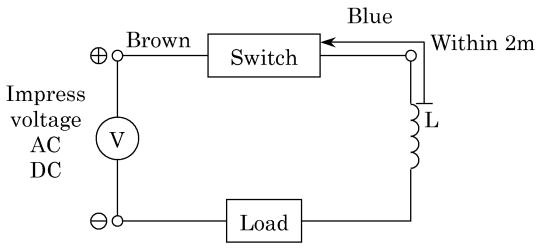
Fig.1 When capacitor resister is used.



Rectifying diode, general use
Hitachi Mfg. product V06C or equivalent

Fig.2 When diode is used.

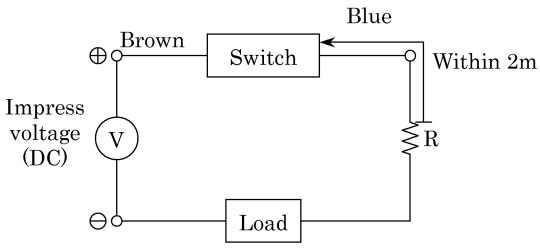
(2) Protective circuit when the wire length exceeds that stated Table 1



・ Choke coil
L=a couple hundred μH 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.

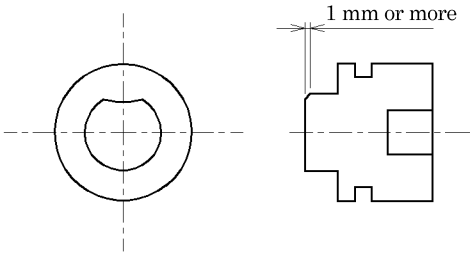
6) Parallel connection
There is no restriction in parallel connection number of switches of these types. Multi number connection of model T0, sometimes, cause a dimmed indicator light or complete indicator light failure.

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.
Before starting an inspection, take appropriate measures separately to prevent a load from falling down under its own weight.

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.
(7) Check if the position locking mechanism is securely locked.
(8) Check for scratches, wear and tear on the position locking mechanism (sleeve, stopper piston, stopper packing, coil spring, etc.)
When a permanent deformation of 1 mm or more is observed on the stopper piston, the stopper piston needs to be replaced.
Since this may be caused by a permanent deformation of the sleeve, the sleeve also needs to be checked in this case.



See “Trouble shooting”, 5 should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.
Since the position locking mechanism is a safety mechanism, disassemble it and check for scratches, wear and tear on it without fail.

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 ⑳ 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

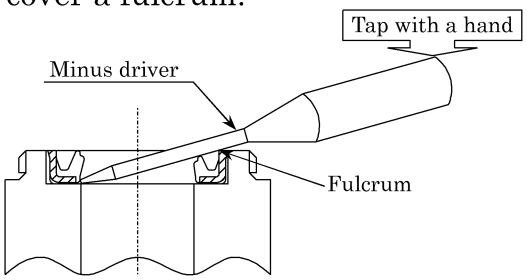
Bore size (mm)	Pair face of cover (mm)	Recommended hand tools
ϕ 20	24	Spanner 24Adjustable wrench 250 Pipe wrench 250
ϕ 25	29	〃 29 〃 250 〃 350
ϕ 32	36	〃 36 〃 375 〃 350
ϕ 40	44	〃 375 〃 450
ϕ 50	55	〃 600
ϕ 63	69	〃 900
ϕ 80	80	〃 1200
ϕ 100	100	〃 1200

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. 1.5monto the handle of spanner, adjustable wrench or pipe wrench to loosen cylinder cover.

   (5) Remove rod packing ③, piston packing ⑨・⑭, cylinder gasket ⑩ & wear ring ⑰ using sharp pointed tool such as standard driver or bodkin.

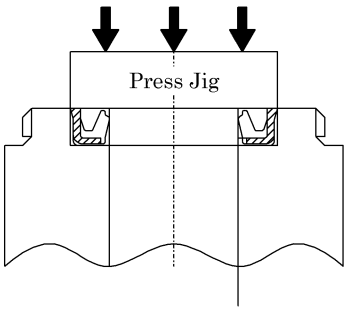
(6) To replace cushion packing on the cover with cushion which was not disassembled, tuck pair face of the cover onto a pair of vise and loosen the tube by applying pipe wrench to OD of the tube as near to the cover as possible. (Beware that cylinder tube may be scratched by pipe wrench.)

(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.



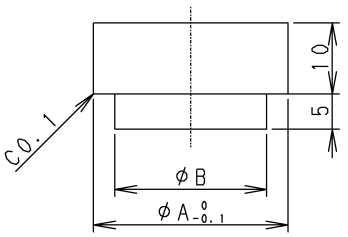


Table 6 Press Jig dimension (mm)

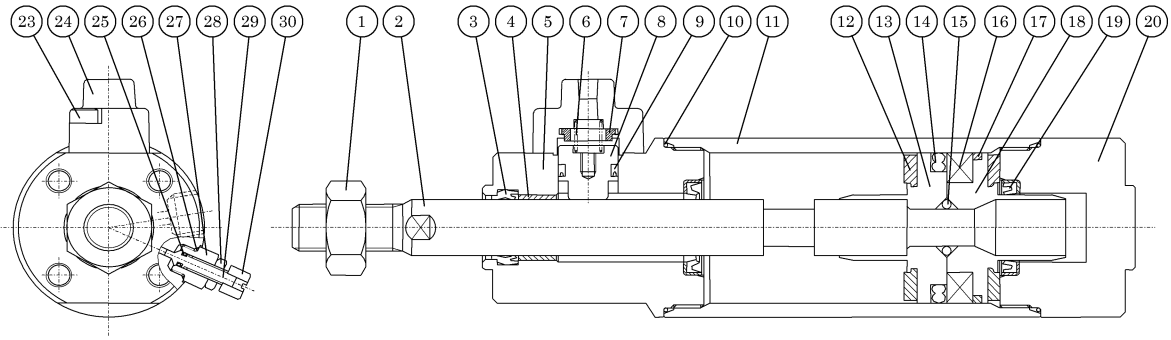
Bore size	A	B
φ20	14.5	9.5
φ25	17	12
φ32	20	14
φ40	28	20
φ50, φ63	32	24
φ80, φ100	45	35

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° 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.)

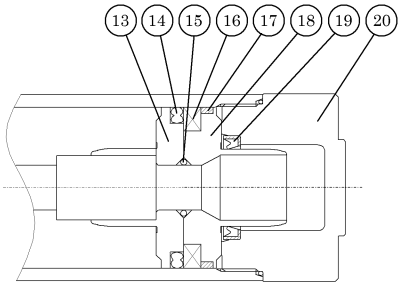
4.4 Internal structure drawings and Expendable parts list

1) Double acting, rod side position locking type : Internal structure

- φ20 to φ40

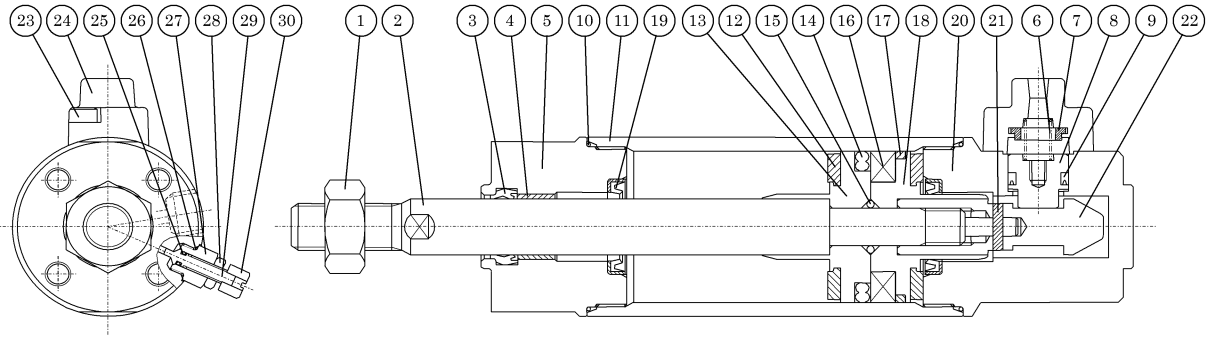


- φ50 to φ100

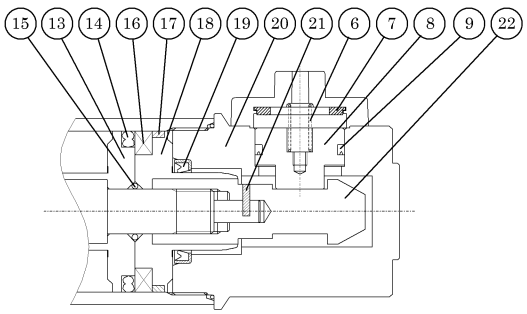


2) Double acting, head side position locking type : Internal structure

- φ20 to φ40



- φ50 to φ100



Part No.	Part Name	Material	Remarks
1	Rod nut	Steel	Nickering
2	Piston rod	φ20 to φ25 :Stainless steel φ32 to φ100 :Steel	Industrial chrome planting
3	Rod packing	Nitrile rubber	
4	Bush	Oil impregnated bearing alloy	
5	Rod cover	Aluminum alloy	Rod side position locking: Black alumite
			Head side position locking: Black alumite (φ50・φ63 only painting)
6	Spring	Steel	
7	Cushion rubber (B)	Urethane rubber	
8	Stopper piston	φ20 to φ80:Stainless steel φ100:Steel	
9	Piston seal (B)	Nitrile rubber	
10	Cylinder gasket	Nitrile rubber	
11	Cylinder tube	Aluminum alloy	Hard alumite disposal
12	Cushion rubber (A)	Urethane rubber	
13	Piston R	Aluminum alloy	
14	Piston seal (A)	Nitrile rubber	
15	Piston gasket	Nitrile rubber	
16	Magnet	Plastic	
17	Wear ring	Acetarl resin	
18	Piston H	Aluminum alloy	
19	Cushion packing seal	Nitrile rubber/steel	
20	Head cover	Aluminum alloy	Rod side position locking: Black almite (φ50・φ63 only painting)
			Head side position locking: Black almite
21	Spring pin	Steel	
22	Sleeve	φ20 to φ63:Stainless steel φ80・φ100:Steel	φ80・φ100: Industrial chrome planting
23	Hexagon socket head cap screw	Alloy steel	Blackening
24	Stopper cover	Aluminum alloy	
25	Needle gasket	Nitrile rubber	
26	Holder gasket	Nitrile rubber	
27	Needle holder	Aluminum alloy	
28	Lock nut	Steel	Nickering
29	Needle	Stainless steel	
30	Dial	Aluminum alloy	

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

Parts No. / Parts name / Bore size (mm) / Kit No.	③	⑦	⑨	⑩
	Rod packing	Cuchion rubber	Piston seal(B)	Cylinder gasket
ϕ20	SCM-Q-20BK	PDU-8Z	F4-659143	MYP-12	O ring ϕ20× ϕ1.3
ϕ25	SCM-Q-25BK	PDU-10Z			O ring ϕ24.99× ϕ1.27
ϕ32	SCM-Q-32BK	PDU-12Z			O ring ϕ31.93× ϕ1.35
ϕ40	SCM-Q-40BK	PDU-16Z	F4-659049	MYN-22	AS568-030
ϕ50	SCM-Q-50BK	PDU-20Z			AS568-033
ϕ63	SCM-Q-63BK				AS568-037
ϕ80	SCM-Q-80BK	PDU-25Z			AS568-042
ϕ100	SCM-Q-100BK	PDU-30Z			AS568-155

Parts No. / Parts name / Bore size (mm) / Kit No.	⑫	⑭	⑰	⑲
	Cushion rubber(A)	Piston packing	Wear ring	Cushion packing seal
ϕ20	SCM-Q-20BK	F4-161693	PSD-20	F4-125610	F4-161817
ϕ25	SCM-Q-25BK	F4-161714	PSD-25	F4-161716	F4-161818
ϕ32	SCM-Q-32BK	F4-161731	PSD-32	F4-161733	F4-161819
ϕ40	SCM-Q-40BK	F4-161747	PSD-40	F4-650239	PCS-20
ϕ50	SCM-Q-50BK	—	PSD-50	F4-650240	PCS-24
ϕ63	SCM-Q-63BK		PSD-63	F4-650241	
ϕ80	SCM-Q-80BK		PSD-80	F4-650242	F4-436640
ϕ100	SCM-Q-100BK		PSD-100	F4-650243	

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) Cylinder position locking mechanism

Trouble	Causes	Remedies
No locking.	No operation up to the stroke end.	Operate the cylinder up to the stroke end.
	Residual pressure is present inside the cylinder room on the locking mechanism side.	Reduce the residual pressure to zero.
No lock is released	The external force is applied to the stopper piston.	After pressurizing the cylinder side on the side without position locking unit, actuate the cylinder.
	No pressure: the pressure is insufficient.	Maintain the pressure source.
Does not operate.	No pressure: the pressure is insufficient.	Maintain the pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Broken stopper packing.	Replace the piston packing.
Does not function smoothly.	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.
	Grease shortage.	Grease is spread.
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).
	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.
	Bounce on the end of stroke.	Eliminate a bounce on the end of stroke.

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℃
	Existence of a foreign magnetic field	Shield the magnetic field.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.

Note 1.Refer "2.4 Location of mounting Switches on a Cylinder" as for replacing a switch and correcting its location.

6. HOW TO ORDER

6.1 Product Number Coding

● Without switch

SCM-Q – LB – 40 B – 100 – H ——————————— J I

● With switch

SCM-Q – LB – 40 B – 100 – H – T2H※ – D – Z J I

(a) (b) (c) (d) (e) (f) (g) (h) (i) (j)

Super micro cylinder
Position locking type, equipped

(a) Mounting style (Note1)		(b) Bore size (mm)		(c) Cushion	
00	Basic type	20	φ20	B	With air cushion at both ends
LB	Foot mount type, along axis	25	φ25	R	With air cushion at rod side
FA	Rod side flange type	32	φ32	H	With air cushion at head side
FB	Head end flange type	40	φ40		
CA	Single clevis type (φ20 to φ63)	50	φ50		
CB	Double clevis type (φ80 to φ100)	63	φ63		
TA	Rod side trunnion type (φ20 to φ63)	80	φ80		
TB	Head end trunnion type (φ20 to φ63)	100	φ100		

(d) Stroke (mm)	(e) Position locking mechanism	
25	R	Rod side position locking
50	H	Head side position locking
75		
100		
125		
200		
250		
300		

※ Lead wire length	
Blank	1m(standard)
3	3m(option)
5	5m(option)

(f) Switch model No. (Note2)				
Axial lead wire	Radial lead wire	Switch type	Indicator light	Lead wire
T0H※	T0V※	Reed	1 color indicator	2 wire
T5H※	T5V※			
T2H※	T2V※	Solid state	1 color indicator	3 wire
T3H※	T3V※			
T2YH※	T2YV※		2 color indicator	2 wire
T3YH※	T3YV※			
T2JH※	T2JV※		Off delay type	2 wire

(g) Switch Qty.(Note3, 4)	
R	One on rod side
H	One on head side
D	Two
T	Three
4	4

(h) Switch mounting method	
Blank	Rail method
Z	Band method

(i) Option	
Q	Switch rail attached at delivery

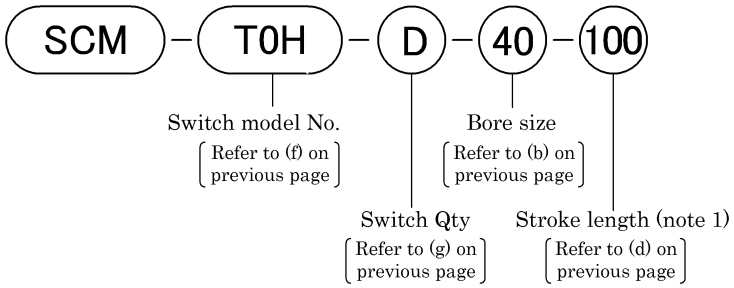
(j) Accessory	
I	Rod eye
Y	Rod clevis
B1	Eye bracket (φ80 to φ100)
B2	Clevis bracket (φ20 to φ63)

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.

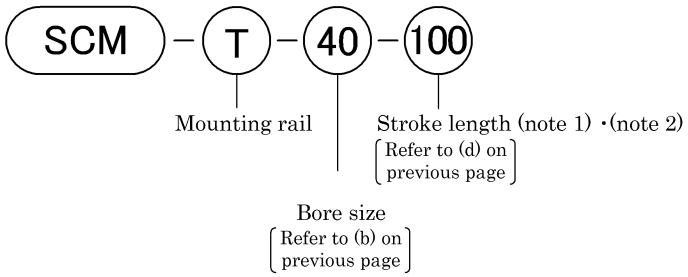
6.2 Component parts Model coding

〈Switch mounting method : Rail method〉

● Switch body + Set of mounting rail

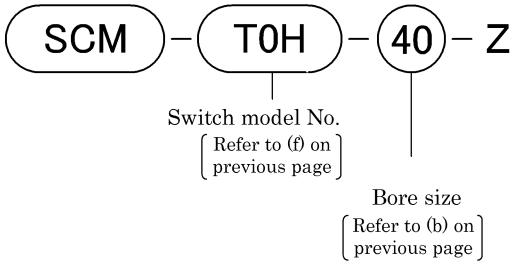


● Mounting rail only

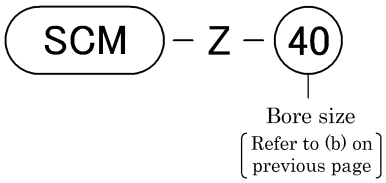


〈Switch mounting method : Band method〉

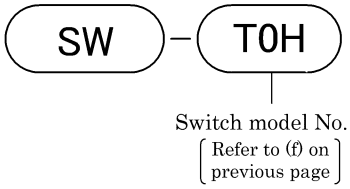
● Switch body + mounting rail + Band



● Mounting rail + Band



〈Switch body only〉



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 300mm.

Note2: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) 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 / Item			SCM-Q			
Bore size		mm	ϕ 20	ϕ 25	ϕ 32	ϕ 40
Actuation			Position locking type			
Working fluid			Compressed Air			
Max. working pressure		MPa	1.0			
Min. working pressure		MPa	0.15			
Proof pressure		MPa	1.6			
Ambient temperature		℃	-10 to 60 (No freezing)			
Port size			M5		Rc1/8	
Stroke tolerance		mm	$^{+1.4}_{0}$ (less than 1000)			$^{+1.4}_{0}$ (less than1500)
Working piston speed		mm/s	30 to 500 (Set the speed within the range of allowable energy absorption.)			
Cushion			Air cushioned			
Lubrication			Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)			
Position locking mechanism			Rod side or head side			
Holding force		N	Max. thrust × 0.7			
Allowable energy absorption	With air cushion	J	0.8	1.2	2.5	3.7
	Without cushion		—	—	—	—

Model / Item			SCM-Q			
Bore size		mm	ϕ 50	ϕ 63	ϕ 80	ϕ 100
Actuation			Position locking type			
Working fluid			Compressed Air			
Max. working pressure		MPa	1.0			
Min. working pressure		MPa	0.1			
Proof pressure		MPa	1.6			
Ambient temperature		℃	-10 to 60 (No freezing)			
Port size			Rc1/4		Rc3/8	Rc1/2
Stroke tolerance		mm	$^{+1.4}_{0}$ (less than 1000), $^{+1.8}_{0}$ (less than 1500)			
Working piston speed		mm/s	30 to 500 (Set the speed within the range of allowable energy absorption.)			
Cushion			Air cushioned			
Lubrication			Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)			
Position locking mechanism			Rod side or head side			
Holding force		N	Max. thrust × 0.7			
Allowable energy absorption	With air cushion	J	8.0	14.4	25.4	45.6
	Without cushion		0.057	0.057	0.112	0.153

7.2 Switch Specifications

Descriptions	Reed 2 wire			
	T0H/V		T5H/V	
Applications	Programmable controller, relay		Programmable controller, relay, IC circuit (without indicator light), series connection	
Power supply voltage	—			
Load Voltage	DC12/24V	AC110V	DC5/12/24V	AC110V
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 less		0V	
Indicator light	LED (ON lighting)		Without indicator light	
Leakage current	0mA			
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2mm²)			
Shock resistance	294m/s²			
Insulation resistance	20MΩ over at DC500V megger			
Withstand voltage	No failure impressed at AC1000V for one minute			
Ambient temperature	-10 to 60℃			
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance			

Descriptions	Solid state 2 wire		
	T2H/V	T2JH/V	T2YH/V
Applications	Programmable controller		
Power supply voltage	—		
Load Voltage	DC10 to 30V		
Load Current	5 to 20mA (Note 2)		
Current consumption	—		
Internal voltage drop	4V or less		
Indicator light	LED (ON lighting)		Red/green LED (ON lighting)
Leakage current	1 mA or less		
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2mm)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm)	
Shock resistance	980m/s²		
Insulation resistance	20MΩ over at DC500V meggeer	100MΩ over at DC500V megger	
Withstand voltage	No failure impressed at AC1000V for one minute		
Ambient temperature	-10 to 60℃		
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance		

Descriptions	Solid state 3 wire	
	T3H/V	T3YH/V
Applications	Programmable controller, relay	
Power supply voltage	DC10 to 28V	
Load Voltage	DC30V or less	
Load Current	100 mA or less	50mA or less
Current consumption	10mA or less at DC24V	
Internal voltage drop	0.5V or less	
Indicator light	LED (ON lighting)	Red/green LED (ON lighting)
Leakage current	10μA or less	
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.2mm²)	
Shock resistance	980m/s²	
Insulation resistance	20MΩ over at DC500V meggeer	100MΩ over at DC500V megger
Withstand voltage	No failure impressed at AC1000V for one minute	
Ambient temperature	-10 to 60℃	
Degree of protection	IEC Standards 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 ℃. The current will be lower if the temperature around switch is higher than 25 ℃. (50% at 60℃)