

# **INSTRUCTION MANUAL**

## **LINEAR SLIDE CYLINDER**

**Position locking type**

**LCS-Q Series**

- 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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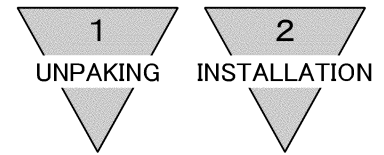
LCS-Q

Linear Slide cylinder

Position locking type

Manual No. SM-324583-A

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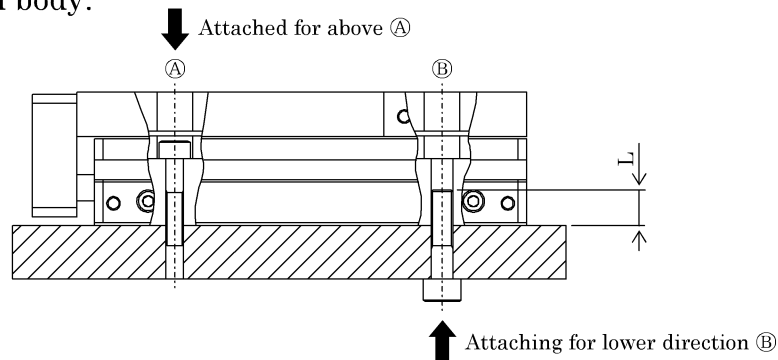
## 1. UNPACKING

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

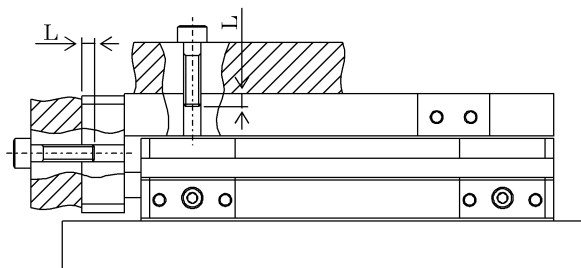
### 2.1 Installation

- 1) The Ambient temperature for this cylinder is  $-10$  to  $60^{\circ}\text{C}$  (No freezing). Always operate the cylinder within this temperature range.
- 2) Use the bolt threaded length and tightening torque below when installing the main body.



Item	A		B		
	Bolt	Torque (N·m)	Bolt	Torque (N·m)	Thread L (mm)
LCS-Q-8	M3×0.5	0.6 to 1.1	M4×0.7	1.4 to 2.4	4 to 6
LCS-Q-12	M4×0.7	1.4 to 2.4	M5×0.8	2.9 to 5.1	5 to 8
LCS-Q-16			M6×1.0	4.8 to 8.6	6 to 9
LCS-Q-20	M5×0.8	2.9 to 5.1			
LCS-Q-25	M6×1.0	4.8 to 8.6	M8×1.25	12.0 to 21.6	8 to 12

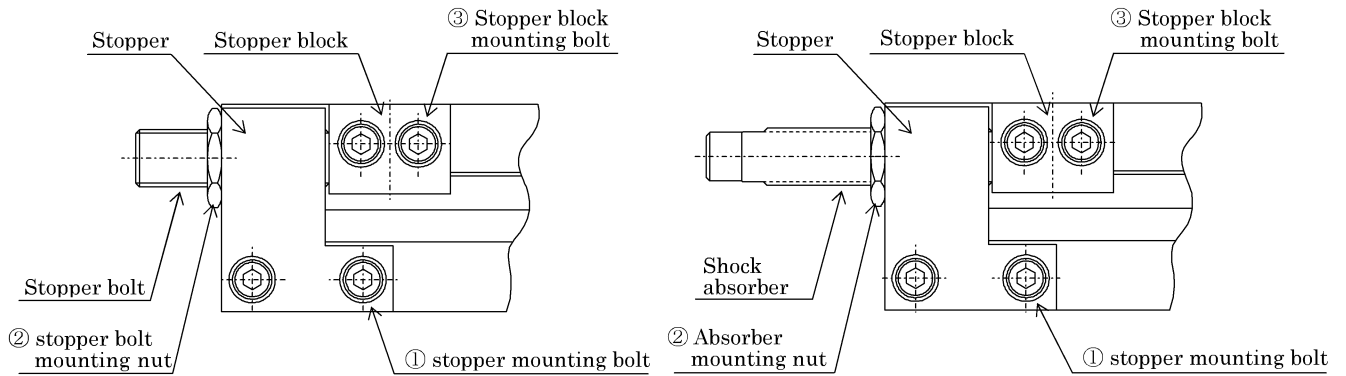
- 3) Use the bolt threaded length and tightening torque below when installing the jig onto the slide table or end plate.



Item	Slide table / End plate		
	Bolt	Torque (N·m)	Thread L (mm)
LCS-Q-8	M3×0.5	0.6 to 1.1	3 to 4.5
LCS-Q-12	M4×0.7	1.4 to 2.4	4 to 6
LCS-Q-16	M5×0.8	2.9 to 5.1	5 to 7.5
LCS-Q-20			
LCS-Q-25	M6×1.0	4.8 to 8.6	6 to 9

## 2 INSTALLATION

- 4) Use the following bolt and nut tightening torques for the stopper section.



Model	① Stopper bolt (N·m)	② Stopper bolt nut ② Absorber nut (N·m)	③ Stopper block bolt (N·m)
LCS-Q-8	0.4 to 0.5	1.2 to 2.0	0.6 to 0.8
LCS-Q-12	0.6 to 0.8		
LCS-Q-16		3.0 to 4.0	1.4 to 1.8
LCS-Q-20	2.9to 3.5	4.5 to 6.0	
LCS-Q-25			2.9 to 3.5

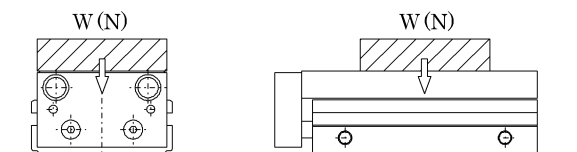
## 2.2 Allowable Load

- Calculate the load (W) mounted on the table and the affected moment (M1, M2, M3) for each direction.
- Input the calculated values into the following formula and the each value, which are shown on the following table.

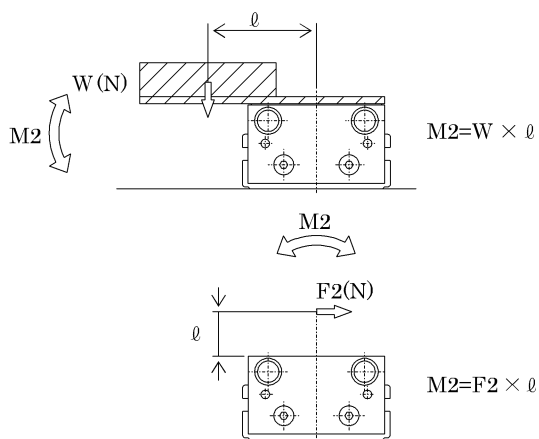
$$\frac{W}{W_{\max}} + \frac{M1}{M1_{\max}} + \frac{M2}{M2_{\max}} + \frac{M3}{M3_{\max}} \leq 1.0$$

Bore size	Stroke length (mm)	Vertical load W <sub>max</sub> (N)	Bending moment M1 <sub>max</sub> (N·m)	Radial moment M2 <sub>max</sub> (N·m)	Twist moment M3 <sub>max</sub> (N·m)
8 dia.	0 to 30	140	1.7	3.5	1.7
	40 to 75	186	10.68	5.64	10.68
12 dia.	0 to 50	220.8	5.68	9.76	5.68
	75 to 100		22.2		22.2
16 dia.	0 to 50	380.8	17.82	19.2	17.82
	75 to 125		37.28		37.28
20 dia.	0 to 50	548.8	31.14	37.6	31.14
	75 to 150		56.24		56.24
25 dia.	0 to 50	961.5	65.11	116.25	65.11
	75 to 150		127.5		127.5

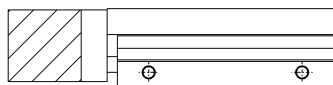
### ● Vertical load : $W(N)$



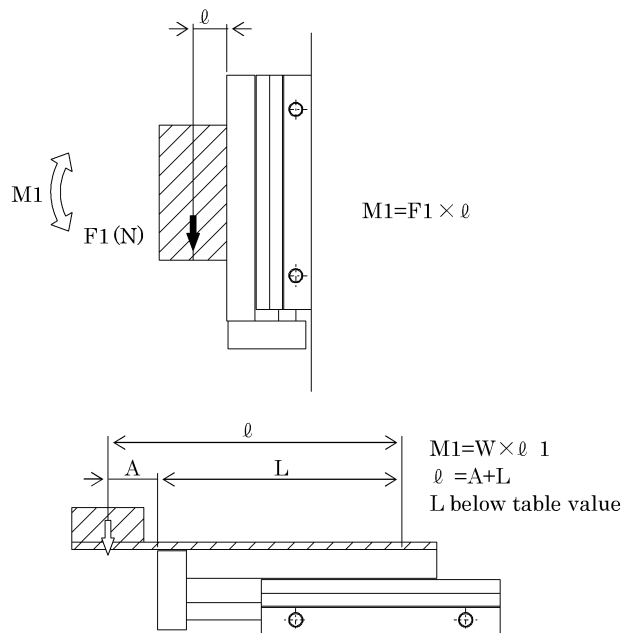
### ● Radial moment : $M2(N \cdot m)$



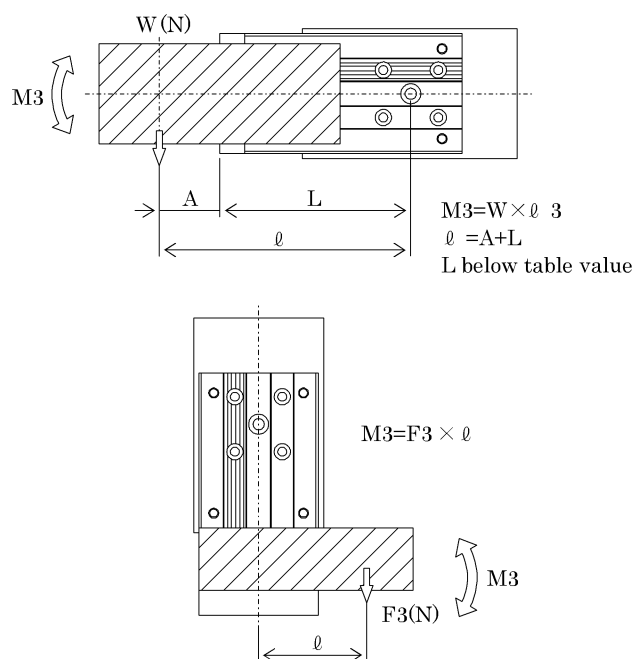
Note: The upper mentions shown under the condition with the load on the table.  
Contact our member at the case of the use with the load on End plate.



### ● Bending moment : $M1(N \cdot m)$

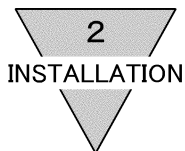


### ● Twist moment : $M3(N \cdot m)$



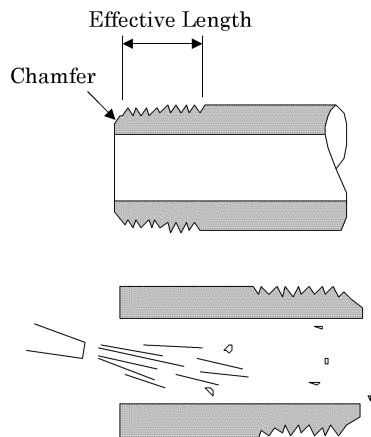
### Value L

Stroke length Model	10	20	30	40	50	75	100	125	150
LCS-Q-8	0.049	0.049	0.059	0.073	0.083	0.108	—	—	—
LCS-Q-12	0.070	0.070	0.070	0.080	0.090	0.117	0.142	—	—
LCS-Q-16	0.071	0.071	0.071	0.081	0.091	0.124	0.149	0.174	—
LCS-Q-20	0.081	0.081	0.081	0.091	0.101	0.131	0.156	0.181	0.206
LCS-Q-25	0.085	0.085	0.085	0.095	0.105	0.140	0.165	0.190	0.215



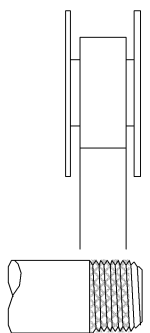
## 2.3 Piping

- 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 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.

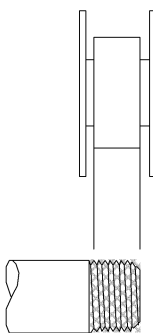


- 6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

### ● Seal Tape

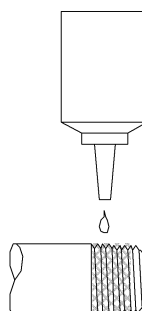


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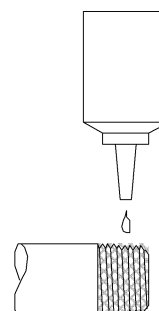


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### ● Sealant (liquid)



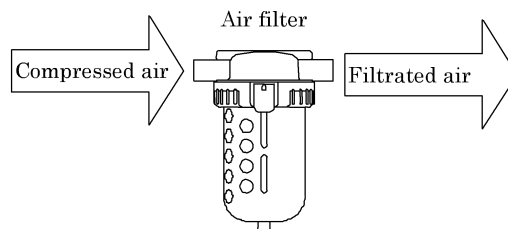
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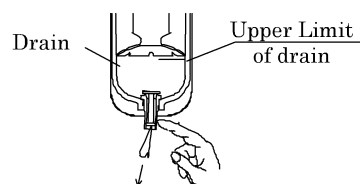
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## 2.4 Fluid

- 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).



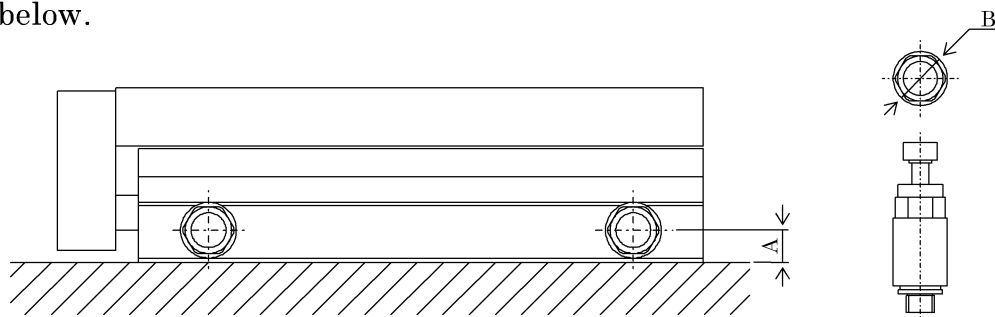
- 2) Be sure to drain out the accumulation in the filter periodically.



- 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.

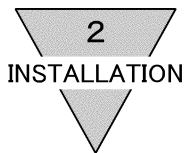
- 4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 as a lubricant, if and when lubrication is needed.

- 5) Because the usable piping joint has limitations, for using it, see the note below.



Item	Port diam.	Port dimension	Available joints	Joint OD
Bore size (mm)		A		B dia.
8 dia.	M5×0.8	5.5	SC3W-M5-3·4·6 SC3WU-M5-3·4·6	9.6 dia.
12 dia.		6.5		
16 dia.				
20 dia.	Rc1/8	8	SC3W-6-4·6·8 SC3WU-6-4·6·8	14.6 dia.
25 dia.		9		



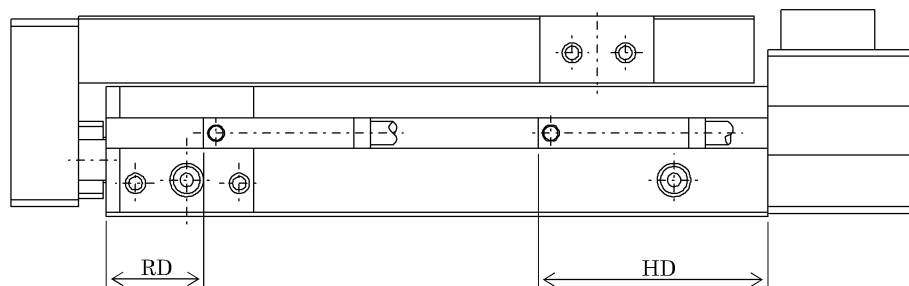


## 2.5 Location of Mounting Switches on a Cylinder

### 1) Location of mounting switches on a cylinder.

#### (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 (Refer to 9 page) for the purpose of having switches function at the points of the maximum sensitive position.



#### (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.

#### ● Moving the switch

Loosen the tightening screw (pan head small screw), and move the switch along the cylinder tube. Tighten at the required position.

#### ● Exchange the switch

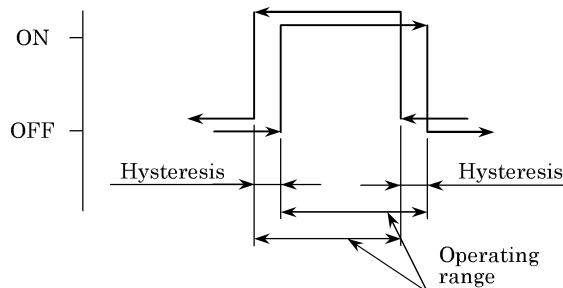
Loosen its mounting screws then slide the switch all the way out of the groove on the cylinder side. Slide new one back to the groove. Locate its setting point and tighten mounting screws. (Apply screw setting torque to 0.1 to 0.2 N·m)

### 2) 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.

### 3) 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.



Maximum sensitive position (HD • RD), operating range and hysteresis

(unit : mm)

Max. sensitive position  Bore size (mm)		Stroke length									Solid state (T2H/V, T3H/V)		Reed (T0H/V, T5H/V)	
											Operating range	Hysteresis	Operating range	Hysteresis
8 dia.	HD	27.5			36.5			—			1.5 to 4	1.5 or less	5 to 9	
	RD	18.5	8.5				—							
12 dia.	HD	32.5				41.5		—			1.5 to 5		6 to 10	
	RD	34.5	24.5	14.5				—						
16 dia.	HD	36.5				53.5			—		1.5 to 5		4 to 9	
	RD	34.5	24.5	14.5				—						
20 dia.	HD	44.5				56				3 to 8	6 to 14			
	RD	35	25	15										
25 dia.	HD	59				79.5				3 to 9	5 to 14			
	RD	35.5	25.5	15.5										

※ Cylinder is shipped ex-factory having switches mounted at HD & RD locations respectively.

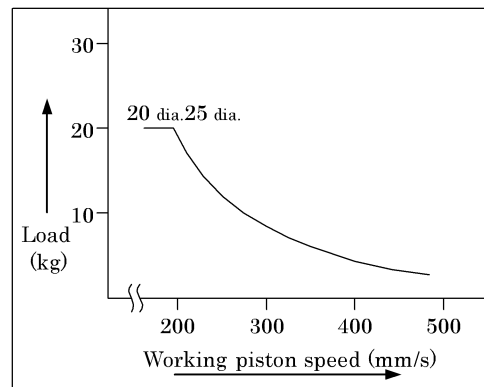
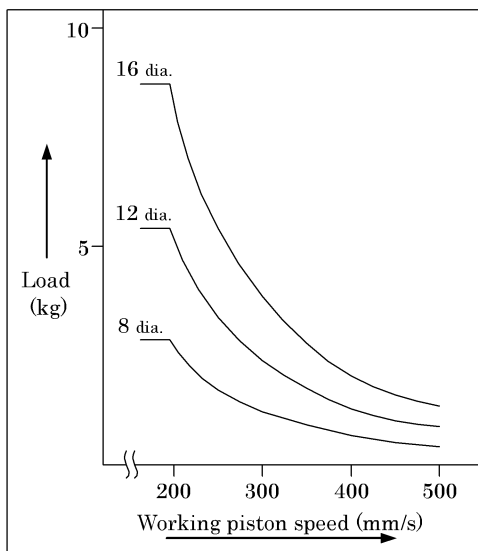


## 3. OPERATION

### 3.1 Operating the Cylinder

- 1) The working pressure for this type of cylinder is 0.05 to 1.0 MPa. Operate the system within this range.  
Let the load factor of the cylinder be 50 % or less.
- 2) Although a rubber cushion is internally provided for this type of cylinder, it is advisable to install an additional external stopper when the kinetic energy is excessive. Tolerable kinetic energy is as the graphs below indicate.
- 3) Adjust the working piston speed with the speed controller mounted.

#### ● Graphs for Tolerable kinetic energy

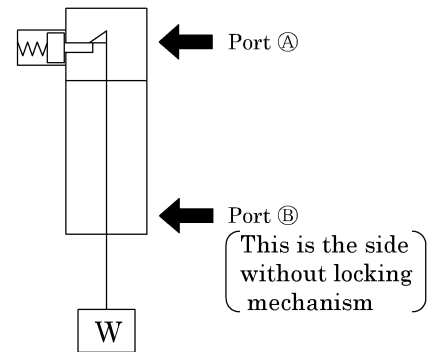


Note: The area left and under the plotted curve designates serviceable range for the cylinder.  
Additional external cushion is required to operate the cylinder within the area of right and upper plotted curve.

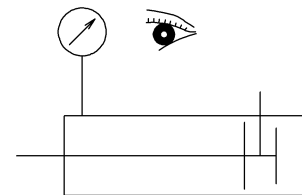


- 4) To release the locking, be sure to remove the load to locking mechanism by supplying pressure to the port B first where no locking mechanism is installed.

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.



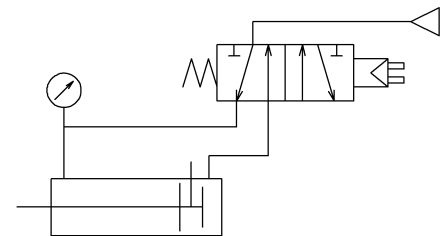
- 5) Confirm by an air gage, before starting daily operation, that the cylinder chamber where no locking device mounted (port B) is adequately pressurized.



- 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.

Do not use a 3-position valve.

Do not use this cylinder combined with a 3-position valve, especially that with a closed center metal seal. The lock will not be applied if pressure is sealed on the port having a locking mechanism. Even if the lock is applied, air that leaks from the valve may enter the cylinder or the lock may be released over time.



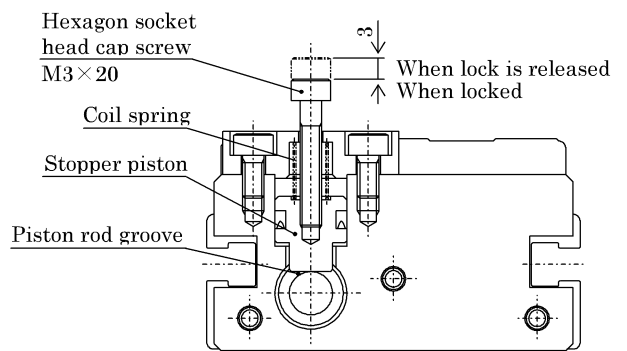
- 7) The locking mechanism functions at stroke limit, so if the stopper is applied with the external stopper in the middle of a stroke, the locking mechanism will not function and the load may drop. Check that the locking mechanism functions before setting the load.
- 8) Supply pressure exceeding the model's minimum working pressure to the port at the side on which the locking mechanism is installed.
- 9) If piping on the side with the locking mechanism is long and thin, or if the flow control valve is separated from the cylinder port, exhaust speed may drop and it may take longer for the lock to be applied. This may also occur if a silencer installed on the solenoid valve EXH. port is clogged.
- 10) There is approx. 1 mm play along piston rod axis under locking status.



- 11) If lowering speed is to be increased with the quick exhaust valve, the cylinder may move out faster than the lock pin and prevent the lock pin from being released correctly. Do not use a quick exhaust valve with a position locking type cylinder.
- 12) If back pressure is applied to the locking mechanism, the lock may be released. Use a discrete solenoid valve, or use an individual exhaust manifold.
- 13) If the locking mechanism has been manually operated, check and then return it to the original position manually. Do not use manual operation for other than adjustment, or this may be very hazardous.
- 14) Release the lock when installing or adjusting the cylinder.  
The lock may be damaged if the cylinder is installed while the lock is applied.
- 15) Do not use multiple cylinders together.  
Do not move one work piece using more than one end lock cylinder. It may not be possible to release one of the cylinder's locks.
- 16) Use the flow control valve with meter-out control.  
It may not be possible to release locks used with meter-in control.

### ●Release

Screw a hexagon socket head cap screw (M3×20) into the stopper piston, and pull the bolt up 3 mm with a force of 20 N over. The stopper piston moves and the lock is released during no-load horizontal installation or with rod port pressurized. When the hand is released, the stopper piston returns by the internal spring and enter the piston rod groove, locking the cylinder.



## 3.2 How to Use the Switches

### 3.2.1 Common Items

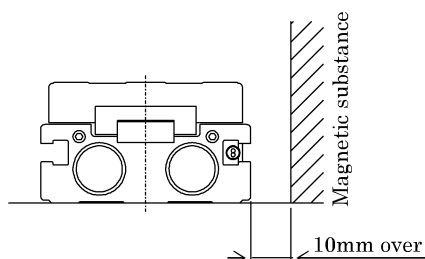
- 1) Magnetic environment  
Do not use a switch other than the strong magnetic field proof switch in a place where strong magnetic field or large current (large magnet or spot welding machine, etc.) exists around the switch mounting position. If a cylinder with the switch is installed in parallel to this product or the magnetic substance moves near the cylinder, the mutual interference may occur and affect the detection accuracy.
- 2) Lead wire wiring  
Carefully perform the wiring so that a bending stress or tensile strength does not apply to the lead wire repeatedly.  
Additionally, connect wires for robot having the bending resistance to movable parts.
- 3) Operating temperature  
Do not operate the product at a high temperature (Over than 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 setting the cylinder switch at mid-stroke and driving a load when the piston changes, if the speed is too fast, the cylinder switch will function but operation time will be too short and the load may not respond correctly.

The maximum detectable working piston speed is :

$$V(\text{mm/s}) = \frac{\text{Cylinder switch operation range (mm)}}{\text{Load operation time (s)}}$$

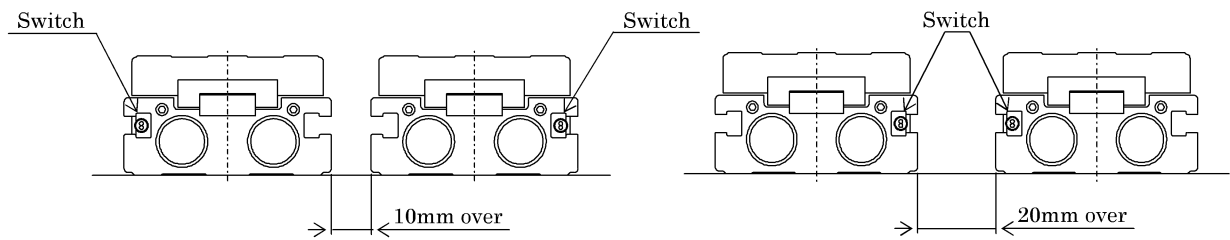
Refer to the minimum value of the table on page 7 4) about cylinder switch operating range.

- 5) Impact  
Do not apply a large vibration or impact to the product when transporting the cylinder, or mounting or adjusting the switch.
- 6) The cylinder may malfunction if a magnetic substance, such as a steel plate, is nearby. Move the magnetic substance to at least 10 mm from the cylinder. (Same clearance for all diameters)





- 7) The cylinder switch may malfunction if cylinders are installed adjacently. Separate cylinders by the following distances. (Same clearance for all bore size)



## 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

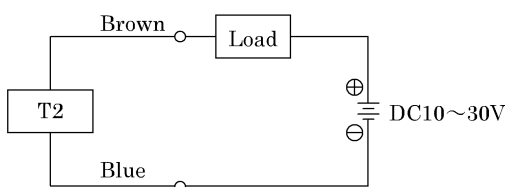


Fig.1 Fundamental circuit Example

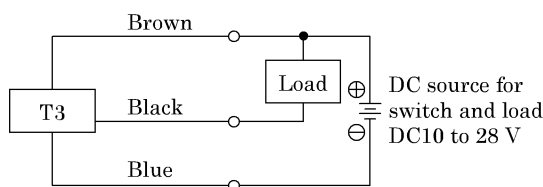


Fig.2 Fundamental circuit Example (1)  
(In case the same source of power is used.)

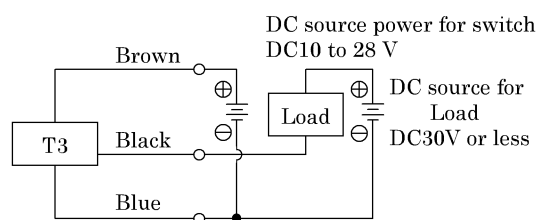


Fig.3 Fundamental circuit Example (2)  
(In case individual sources of power are used.)

### 2) Protection of output circuit

Install some protective circuit as illustrated in Fig. 4 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. 5 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. 6 or 7 (in case of model T2) and Fig 8 (in case of model T3).

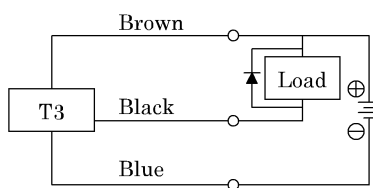


Fig.4 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)

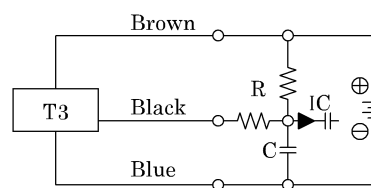


Fig.5 An example of using capacitor type load together with current regulating resistor R. Comply with the following formula to figure out required R.

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



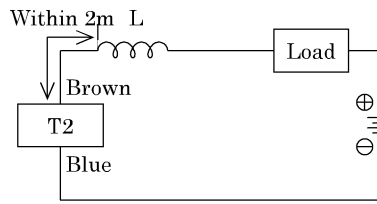


Fig.6 · Choke coil  
 L = a couple hundred  $\mu$  H to a couple mH  
 surpassing high frequency characteristic  
 · Install it near by a switch (within 2m).

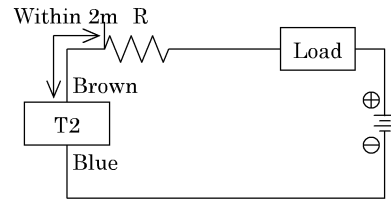


Fig.7 · Dash current restriction resistor.  
 R = As much large resistor as the load  
 circuit can afford.  
 · Install it near by a switch (within 2m).

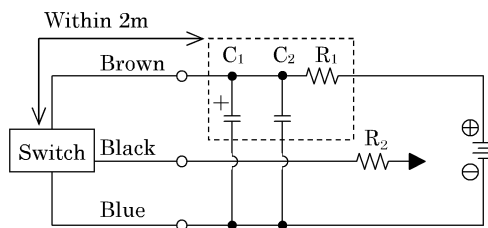


Fig8 · Electric power noise absorptive circuit.  
 $C_1$  = 20 to 50  $\mu$  F electrolytic capacitor  
 (Withstand voltage 50V or more)  
 $C_2$  = 0.01 to 0.1  $\mu$  F ceramic capacitor  
 $R_1$  = 20 to 30  $\Omega$   
 · Dash current restriction resistor.  
 $R_2$  = As much large resistor as the 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. 9 to 13 respectively.

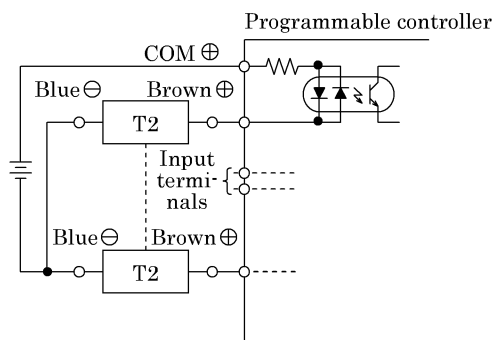


Fig.9 An example of T2 connection to source input type  
 (an external power source)

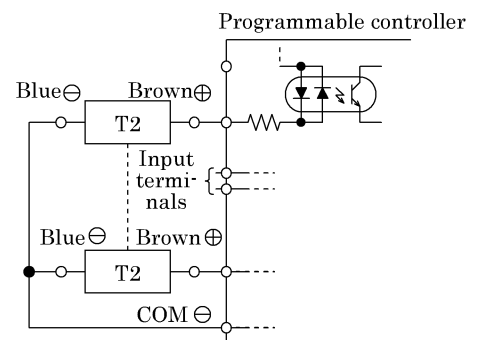


Fig.10 An example of T2 connection to source input type  
 (an internal power source)

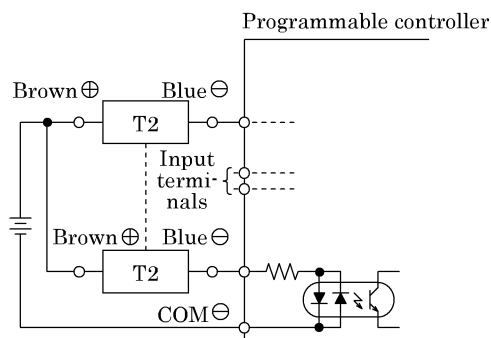


Fig.11 An example of T2 connection to source input type

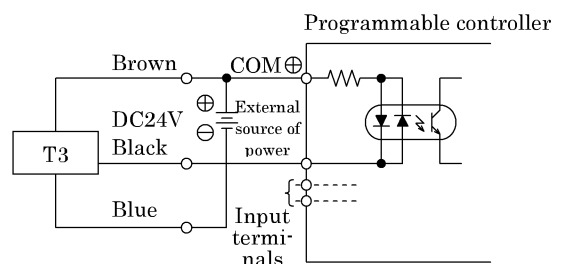


Fig.12 An example of T3 connection to source input type  
 (an internal power source)

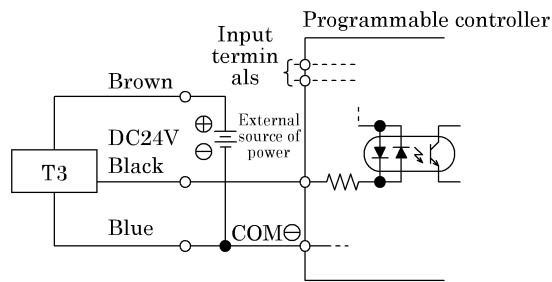


Fig.13 An example of T3 connection to source input type (an internal power source)

#### 4) Parallel 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  $10 \mu A$ , then leakage may occur. Usually dimming and failure of the indicator light do not occur.

### 3.2.3 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 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 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.

#### 3) 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

Table1	
Electric power	Length of wire
DC	100m
AC	10m



circuit.

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

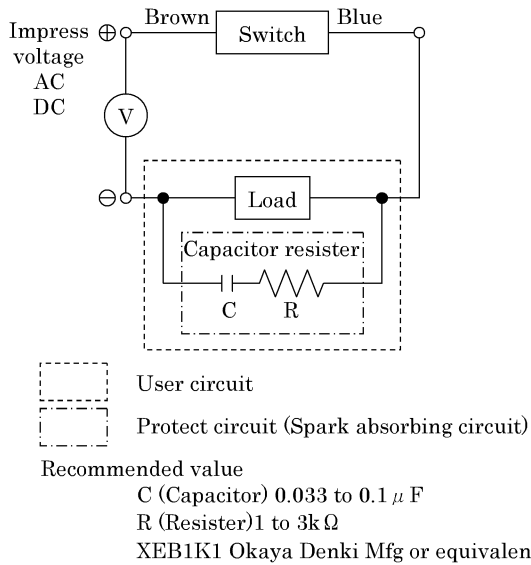


Fig.1 When capacitor resistor  
(In case the same source of power is used.)

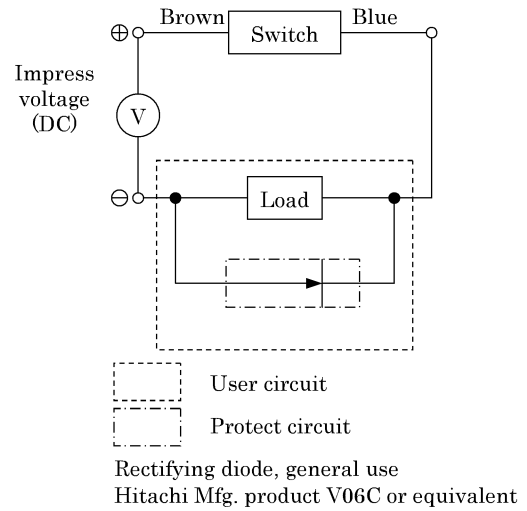
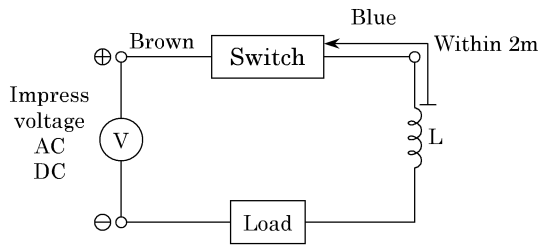


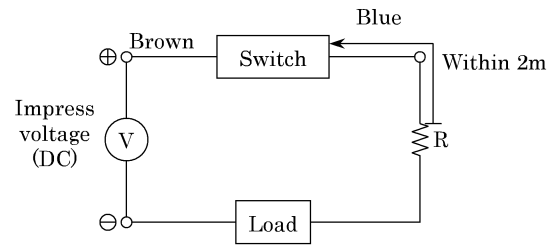
Fig.2 When diode is used.

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

Fig.4

4) Relay

Always use the relays listed below.

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

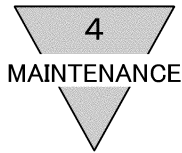
5) Serial connection

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

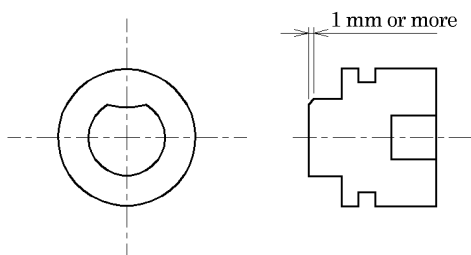
- 1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.  
Before starting an inspection, take appropriate measures separately to prevent a load from falling down under its own weight.

- 2) Inspection items

- (1) Check the bolts and nuts fitting the piston rod end brackets and mounting brackets 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.

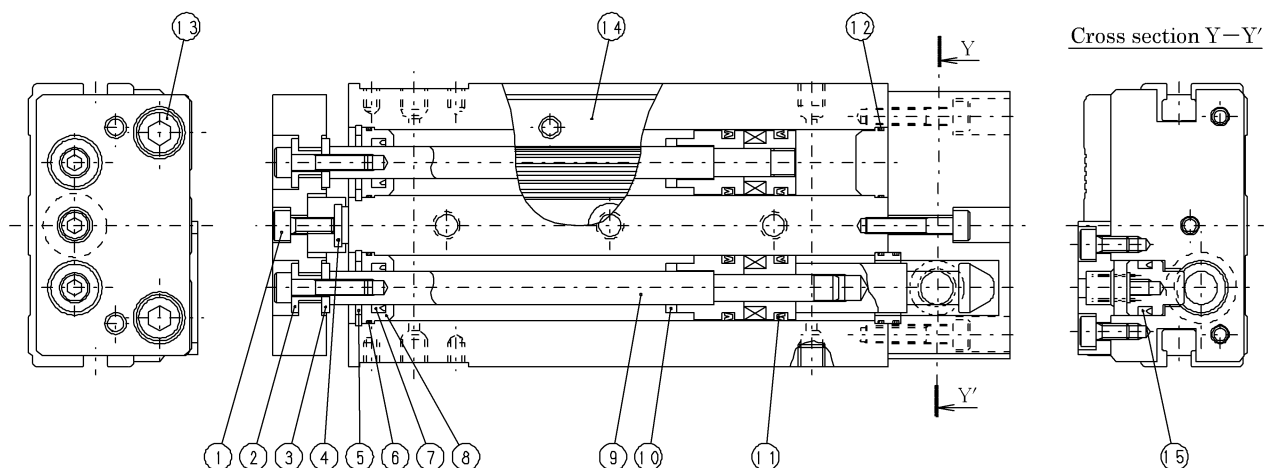


See “Trouble shooting” , 5 should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

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

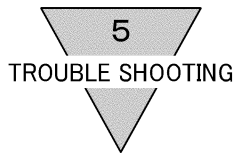
- 1) This cylinder is able to be disassembled.  
 Replace component parts listed in Expendable parts List by disassembling cylinder referring to internal structure diagram when air leakage is ever occurred.
  
- 2) Keep the cylinder rod at a pulled down position before disassembly. Remove Bolt ① (Floating bushing ② at the case of 8 dia.), Floating bushing ② and Washer ③. Fix slide table ⑭ to main body with an adhesive tape. (Because the Linear guides don't have any stopper, and it is possible to fall off.)  
 Next, remove Hex. socket headed bolt ⑬ Retaining ring-C type ⑤, and pull up Piston rod ⑨ with Rod metal ⑧.  
 Operate the reverse procedure for the assembly. Never forget to grease on packing.
  
- 3) Internal structure drawings and Expendable parts list



Expendable parts list (Designate the Kit No. when ordering)

No.		④	⑥	⑦	⑩
Parts name		Cushion rubber (H)	Metal gasket	Rod packing seal	Cushion rubber (R)
Bore size (mm)	Kit No.				
8 dia.	LCS-Q-8K	F4-160422	P12115-0900080	DTR-4K	F4-252066
12 dia.	LCS-Q-12K	F4-659142	P12115-1160070	MYR-6	F4-166347
16 dia.	LCS-Q-16K		P12115-1500100	DYR-6K	F4-160423
20 dia.	LCS-Q-20K	F4-659122	P12115-1900150	DYR-8K	F4-160424
25 dia.	LCS-Q-25K		AS568-020	DYR-10SK	F4-116102

No.		⑪	⑫	⑮
Parts name		Piston packing	Gasket	Stopper packing
Bore size (mm)	Kit No.			
8 dia.	LCS-Q-8K	MYP-8	P12115-0900080	MYP-10
12 dia.	LCS-Q-12K	MYP-12	P12115-1160070	
16 dia.	LCS-Q-16K	MYP-16	P12115-1500100	MYP-12
20 dia.	LCS-Q-20K	MYP-20	P12115-1850080	
25 dia.	LCS-Q-25K	F4-348074	P12115-2350080	



## 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.

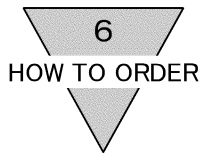
### 2) Cylinder position locking mechanism

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.

### 3) 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.

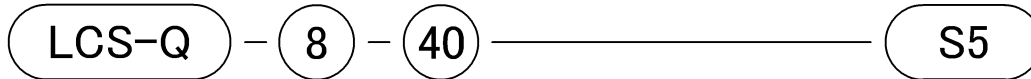




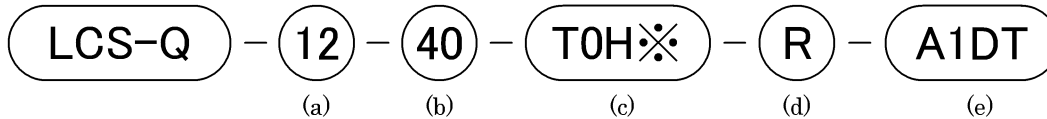
## 6. HOW TO ORDER

### 6.1 Product Number Coding

● Without switch



● With switch

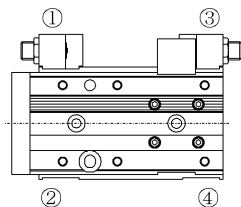


(a) Bore size (mm)		(b) Stroke length (mm)							(c) Switch model No.			
8	8 dia.	Code	Standard stroke length	Bore size					Axial lead wire	Radial lead wire	Switch type	Lead wire
12	12 dia.			8 dia.	12 dia.	16 dia.	20 dia.	25 dia.				
16	16 dia.											
20	20 dia.	10	10mm	○	○	○	○	○	T0H※	T0V※	Reed	2 wire
25	25 dia.	20	20mm	○	○	○	○	○	T5H※	T5V※		
		30	30mm	○	○	○	○	○	T2H※	T2V※	Solid state	3 wire
		40	40mm	○	○	○	○	○	T3H※	T3V※		
		50	50mm	○	○	○	○	○				
		75	75mm	○	○	○	○	○				
		100	100mm	—	○	○	○	○				
		125	125mm	—	—	○	○	○				
		150	150mm	—	—	—	○	○				

○ : Standard, — : Not available

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

(d) Switch quantity		(e) Option			
R	One on rod side	S : Stopper for adjustable stroke Adjustable stroke single 5mm (standard) (note1)		A : Shock absorber type stopper	
H	One on head side				
D	Two	S1※※	Stopper position ①	A1※※	Stopper position ①
		S2※※	Stopper position ②	A2※※	Stopper position ②

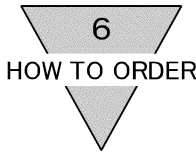


Section ※※ (note2)	
Blank	Stopper part port : No port
D	Port at stopper section : side, bottom surface port
Blank	Stopper block material : Rolled steel
T	Stopper block material : Equivalent to quenched material

Note1: Stroke adjustable range of Hexagon socket set screw with urethane type stopper (standard) is 5 mm for one direction.

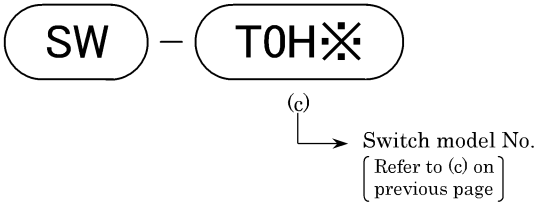
When changing adjustable stroke range, use a discrete stopper.

Note2: only available when using stopper type.



6.2 Component Parts Model Coding

- 1) Switch  
Switch alone

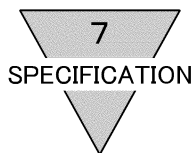


- 2) Stopper for adjustable stroke  
Discrete stopper for adjustable stroke



(a) Adjustable stroke range	
S01	Single 5mm (standard)
S02	Single 15mm
S03	Single 25mm

S03 is not available for 8 mm bore.



## 7. SPECIFICATION

### 7.1 Product Specifications

Model		LCS-Q				
Item						
Bore size	mm	8 dia.	12 dia.	16 dia.	20 dia.	25 dia.
Actuation		Double acting				
Working fluid		Compressed air				
Max. working pressure	MPa	0.7				
Min. working pressure	MPa	0.2				
Proof pressure	MPa	1.0				
Ambient temperature		-10 to 60 (No freezing)				
Port size	Main body side	M5		Rc1/8		
Stroke tolerance	mm	+ 2.0 0				
Working piston speed	mm/s	50 to 1000				
Cushion		Rubber cushion				
Lubrication		Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)				
Position locking mechanism		Head side				
Holding force	N	When PULL, theoretical thrust × 0.7				

### 7.2 Switch Specifications

#### 1) Type of switch and applications

Model			Applications (Purpose)
Descriptions			
Reed	2 wire	T2H	DC programmable controller
		T2V	
	3 wire	T3H	DC programmable controller, relay
		T3V	
Solid state	2 wire	T0H	AC / DC programmable controller, relay
		T0V	
		T5H	AC / DC programmable controller, relay, IC circuit (without indicator light), serial connection
		T5V	

Note: 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

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	DC12/24V	AC110V	DC5/12/24V	AC110V
Load current	5~50mA	7~20mA	50mA or less	20mA or less
Current consumption	—			
Internal voltage drop	2.4V or less		0V	
Indicator light	LED (ON lighting)		—	
Leakage current	0mA			
Lead wire length (Note1)	Standard 1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.2mm <sup>2</sup> )			
Shock resistance	294m/s <sup>2</sup>			
Insulation resistance	20MΩ 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℃			
Degree of protection	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance			

Type & Model	Solid state type 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 (Note2)	100mA or less
Current consumption	—	10mA or less when it is on at DC24V
Internal voltage drop	4V or less	0.5V or less
Indicator light	LED (ON lighting)	LED (ON lighting)
Leakage current	1mA or less	10 μA or less
Lead wire length (Note)	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	20MΩ 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℃	
Degree of protection	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance	

Note: Maximum value, 25mA is at 25℃ of ambient temperature. Load current decreases less than 25mA when the ambient temperature exceeds 25℃. For example: it may be 5 to 10mA at 60℃.