CKD

SM-223415-A

INSTRUCTION MANUAL

SUPER COMPACT CYLINDER

SSD-F 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.

CKD Corporation

For Safety Use

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

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

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

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

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

⚠ Precautions

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

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SSD-F
Super Compact Cylinder
(Crawling Cylinder)
Manual No. SM-223415-A

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

1. PRODUCT

1.1 Specifications

1) Specifications

Model code / Item		SSD-F SSD-LF (with switch)		SSD-KF SSD-KLF (with switch)	
Action		Double Acting		Double Acting, High load type	
Media		Compressed Air			
Max. working pressure	MPa	1.0			
Min. working pressure	MPa	0.1 ϕ63 or more ··· 0.05			
Proof pressure	MPa	1.6			
Ambient tempreature	℃	−10 to 60 (Not to be frozen)			
Tube bore	mm	ϕ12, ϕ16, ϕ20, ϕ25	ϕ32, ϕ40	ϕ50, ϕ63	ϕ80, ϕ100
Port size		M5×0.8	Rc1/8	Rc1/4	Rc3/8
Stroke tolerance	mm	+1.0 0		+2.0 0	
Working piston speed	mm/s	1 to 200			
Cushioning		Without cushioning		Rubber cushion	
Lubrication		Not required			
Option		Male thread rod end (N)			

2) Stroke

Mode code	Tube bore (mm)	Standard stroke (mm)	Maximum stroke (mm)	Minimum stroke (mm)
SSD-F SSD-LF	ϕ12, ϕ16, ϕ20	5, 10, 15, 20, 25, 30	30	1 (5 : With switch)
	ϕ25, ϕ32, ϕ40, ϕ50	5, 10, 15, 20, 25, 30, 40, 50	50	
	ϕ63, ϕ80, ϕ100	5, 10, 20, 30, 40, 50		
SSD-KF SSD-KLF	ϕ12, ϕ16, ϕ20	5, 10, 15, 20, 25, 30, 40, 50	100	
	ϕ25, ϕ32, ϕ40, ϕ50	10, 15, 20, 25, 30, 40, 50 60, 70, 80, 90, 100	150	
	ϕ63, ϕ80, ϕ100	10, 20, 30, 40, 50, 60, 70, 80, 90, 100	200	

1.2 Switch Specifications

1) Type of switches and applications

Item / Model			Purpose · Application
Non contact type switch	2-wire	T2H	DC, exclusively for Programmable Controller
		T2V	
	3-wire	T3H	DC, for Programmable Controller or Relay
		T3V	
Contact type switch	2-wire	T0H	AC/DC, for Programmable Controller or Relay
		T0V	
		T5H	AC/DC, for Programmable Controller, Relay IC circuit (no lamp), Series Wiring
		T5V	

(Note) T※H··· Lead wire straight outlet type, T※V··· Lead wire Elbow outlet type

2) Switch specifications

Class · Model code / Item	Contact type switch	
	T0H · T0V	T5H · T5V
Application	for Relay and Programmable Controller	for Programmable Controller, Relay, IC circuit (No Lamp) : Series connection
Power Voltage	——	
Load Voltage · Current	DC24V, 5 to 50mA AC100V, 7 to 20mA	DC24V, 50mA or lower AC100V, 20mA or lower
Power consumption	——	
Internal Voltage Drop	2.4V or lower	0V
Lamp	LED is lit when Power is ON.	——
Leak Current	0	
Length of Lead wire (Note 1)	Standard 1m (Oil resistance Vinyl cabtyre cord, 2-core 0.2mm^2)	
Max.Shock	294m/s^2 {30G}	
Insulation Resistance	More than 20MΩ with DC 500Vmegger tester	
Withstand voltage	Should be no abnormality for 1 minute charging AC1000V	
Ambience Temperature	−10 to + 60°C	
Protection structure	IEC Standard IP67, JIS C0920 (Splash Proof), Oil resistance	

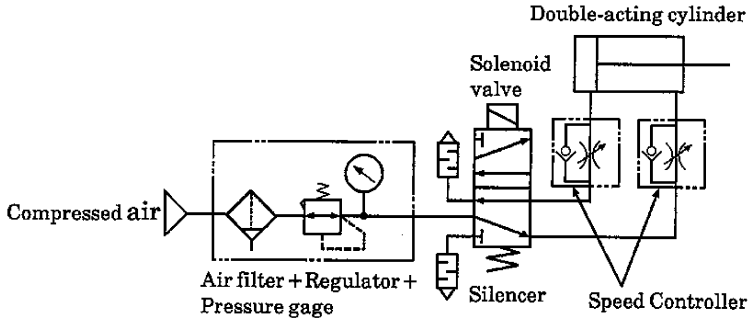
Class · Model code / Item	Proximity switch	
	T2H · T2V	T3H · T3V
Application	Exclusively for Programmable Controller	for Programmable Controller and Relay
Power Voltage	——	DC10 to 28V
Load Voltage · Current	DC10 to 30V 5 to 20mA (Note 2)	DC30V or lower 100mA or lower
Power consumption	——	10mA or lower at DC24V (Power ON)
Internal Voltage Drop	4V or lower	0.5V or lower at 100mA
Lamp	LED is lit when Power is ON	
Leak Current	1 mA or lower	10μA or lower
Length of Lead wire (Note 1)	Standard 1m (Oil resistance Vinyl cabtyre cord, 2-core 0.2mm^2)	Standard 1m (Oil resistance Vinyl cabtyre cord, 3-core 0.2mm^2)
Max.Shock	980m/s^2 {100G}	
Insulation Resistance	More than 20MΩ with DC 500V megger tester	
Withstand voltage	Should be no abnormality for 1 minute charging AC1000V	
Ambience Temperature	−10 to +60°C	
Protection structure	IEC Standard IP67, JISC0920 (Splash Proof), Oil resistance	

Note 1 : 3m, 5m optional lead wires are available beside standard length.

Note 2 : Max. Load Current (20mA) is at 25°C. It may drop lower than 20mA when ambient temperature rises higher than 25°C. for example : it may be 5 to 10mA at 60°C)

1.3 Fundamental Circuit Diagram & Selection of Related Equipment

1) Fundamental Circuit Diagram of Double-acting Cylinder (Oilless type)
Fundamental Circuit Diagram:



2) Selection of Related Equipment with the Fundamental Circuit Diagram above :

The related equipment depends on the tubes inner diameter and speed of the driving cylinder. Select equipment from the Selection Guide Table. (The table posted below is an example of related equipment.)

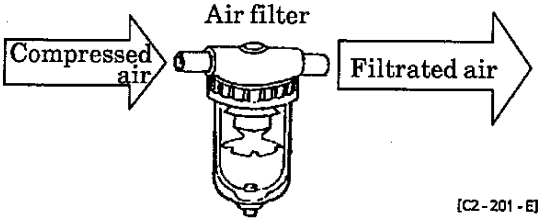
Selection Guide Table for Related Equipment (example)

Tube bore (mm)	Theoretical speed (mm/s)	Required flow ℓ/min at P=0.5MPa	Solenoid valve		Speed Controller	Silencer	Plumbing Tube
			Single Solenoid	Double Solenoid			
φ12 φ16	500	——	B5142	——	SC3W-M5-4	SLM-M5	φ4×φ2.5 Nylon Tube
φ20 φ25	400	46	4KA110	4KA120	SC3W-M5-6		φ6×φ4 Nylon Tube
φ32 φ40		180	4K210-06 4L210-06 4F110-06	4K220-06 4L220-06 4F120-06	SC3W-6-6	SLW-6A	φ8×φ6 Nylon Tube
φ50	500	350	4K210-08 4L210-08 4F110-08	4K220-08 4L220-08 4F120-08	SC3W-8-8	SLW-8A SLW-6A	φ10×φ8 Nylon Tube
φ63		560	4F210-08	4F220-08		SLW-8A	φ10×φ8 Nylon Tube
φ80		910	4P310-10 4L310-10 4F410-10 4F310-10	4K320-10 4L320-10 4F420-10 4F320-10	SC3W-10-10	SLW-10A	φ15×φ11.5 Nylon tube or Rc3/8 steel pipe
φ100		1,400	4F510-15	4F520-15	SC3W-10-12	SLW-15	Rc1/2 Steel pipe

2. CAUTION

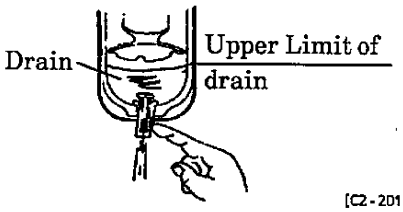
2.1 Fluid

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 5μm or less), flow rate and its mounting location (as nearest to the directional control valve as possible).



[C2-201-E]

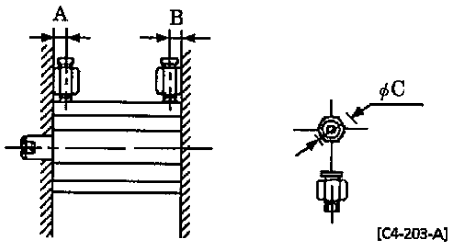
2) Be sure to drain out the accumulation in the filter periodically.



[C2-201-F]

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 cylylinder. Be sure to carry out thorough inspection and maintenance of the compressor.

4) Use this cylinder with no oil applied. If it is lubricated, crawling characteristics may change.



[C4-203-A]

5) Refer to the table, posted below, to select suitable joints because there are some restrictions for choosing appropriate plumbing joints.

Item / Tube bore (mm)	Port diam.	Port location A	Port location B	Available joints	Joint OD φC	Unavailable Joints
φ12	M5×0.8	5.5	5.5	SC3W-M5-4 SC3W-M5-6 GSS4-M5-S GSS4-M5 GSL4-M5 GSL6-M5	φ11 or less	GSS6-M5
φ16						
φ20		8	5.5			
φ25		11	6			
φ32	Rc1/8	8	8	SC3W-6-4·6·8 GSS4-6 GSS6-6 GSS8-6 GSL4-6 GSL6-6	φ15 or less	GSS10-6 GSL8-6 GSL10-6
φ40		12	8.5			
φ50	Rc1/4	10.5	10.5	SC3W-8-6·8·10 GSS4-8 GSS6-8 GSS10-8 GSL4~12-8	φ21 or less	GSS-12-8
φ63		13	11			
φ80	Rc3/8	16	13	SC3W10-8·10·12 GSS6-10 GSS8-10 GSS10-10 GSL6~12-10	φ21 or less	—
φ100		23	15			

2.2 Crawling Cylinder Precautions

2.2.1 Use this cylinder with pre-lubricated

If oil is applied thereto, the characteristics may change.

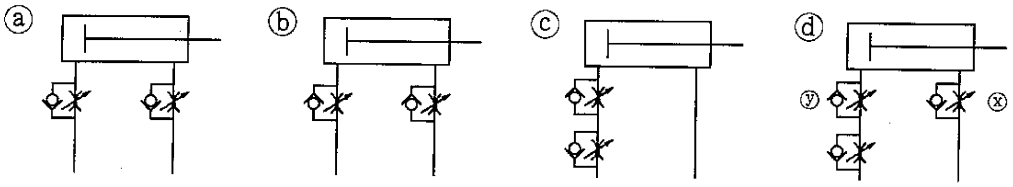
2.2.2 Assemble the speed controller near the cylinder.

(1) If it is assembled apart from the cylinder, unstable adjustment may result.

(2) For the speed controller, use SC-M3/M5, SC3 series, SC3W series or SCL series.

2.2.3 If the meter-out circuit is used for speed control, the circuit will be stabilized.

(1) Where crawling control & load resistance is small at "PUSH" in the single rod cylinder actuating direction, the cylinder will spring out at actuation start. To take action therefor, the circuits ⓑ, ⓒ, ⓓ are required. The circuit ⓓ is the most stable.



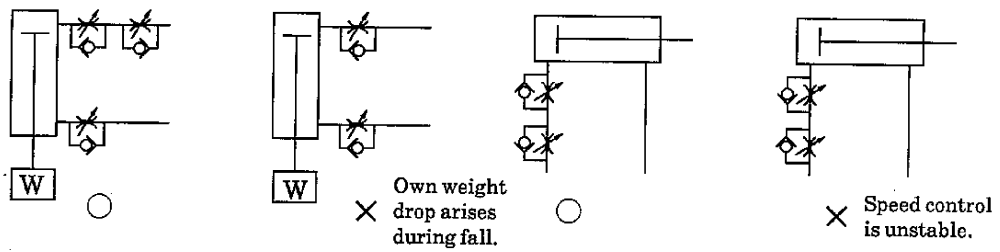
ⓐ	ⓑ	ⓒ	ⓓ
PUSH : Meter-out PULL : Meter-out	PUSH : Meter-in PULL : Meter-in	PUSH : Meter-in-out PULL : ——	PUSH : Meter-in-out PULL : Meter-out

(2) Speed control method for PUSH actuation of circuit ⓓ

1. Speed setting with ⓧ speed controller
2. Reduce the speed until the cylinder ceases to spring out, using the ⓨ speed controller.
3. Re-check the speed.

NOTE (1): In the case of vertical installation, own weight drop arises in the meter-out circuit; it is, therefore, to combine the meter-out circuit.

NOTE (2): For speed controller series connection, the circuit as illustrated below is required.



NOTE (3): When the circuits ⓑ, ⓒ, ⓓ are compared with one another, the circuit (d) is most stable in actuation.

2
CAUTION

(3) Cause of Popping Phenomena

(a) Reduce the mass flow for crawling on the exhaust side, using the meter-out circuit. Accordingly, shortly after valve changeover, the pressure becomes equal on both sides, and the thrust corresponding to the piston pressure borne area differential works in the PUSH direction, thus causing popping.

(b) Due to piston movement, the exhaust pressure increases, and the speed is reduced, then reaching the set speed.

(4) Standard occurrence of popping

This popping arises when [the rod area × area pressure > load resistance].

2.2.4 Avoid applying lateral load to the cylinder. Install the sliding guide so that it is not twisted.

(1) Fluctuations in load and resistance may result in unstable operation.

(2) The guide whose difference between static and dynamic friction is large makes operation unstable.

2.2.5 In general, the higher the air pressure is and the smaller the load factor is, the more stable the operation becomes.

Use the load factor at less than 50%.

2.2.6 Avoid using the unit in a vibrating place.

The operation becomes unstable under the influence of vibration.

3. OPERATION

1) Air pressure supplied to the cylinder is as per specified in Section 1, "Specifications" and operates it within the range.

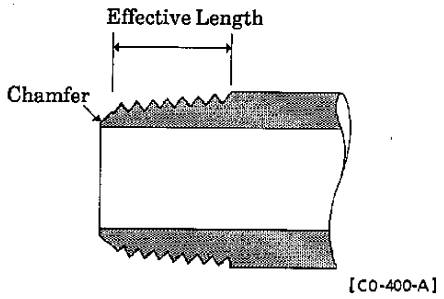
2) Since the cylinder is not provided with a cushion, no kinetic energy can be absorbed.
If the kinetic energy is large, provide an external stopper.

3) Regulate the piston speed by installing speed controllers as per illustration in the Fundamental Circuit Diagram, page 5.

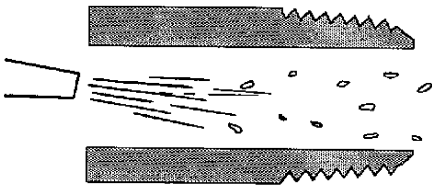
4. INSTALLATION

4.1 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc. (Refer to Selection Guide Table for Related Equipment.)
2) See to it that the pipe connecting cylinder and solenoid valve has an effective sectional area which is needed for the cylinder to drive at the specified speed. (Refer to Selection Guide Table for Related Equipment.)
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust and foreign substances in the drain of the pipe.
4) Be sure to adhere to the effective thread length of gas pipe and make a chamfer of approx. 1/2 pitch from the threaded end.
5) Flush air into the pipe to blow out foreign substances and chips before piping.

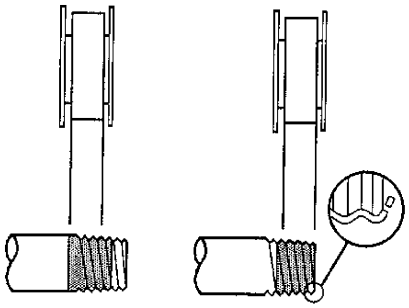


[C0-400-A]

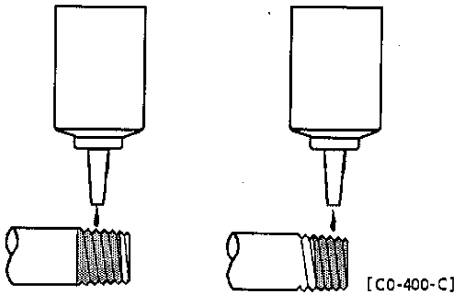

[C0-400-B]

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

● Seal Tape


Right False

● Sealant (Paste or liquid)


Right False

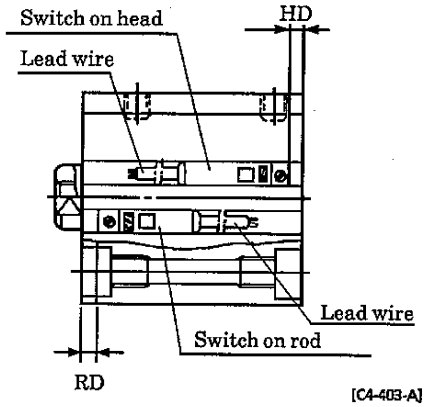
[C0-400-C]

4.2 Installation

1) Operate cylinder within the range (−10°C - +60°C, standard) of tolerance ambient temperature.
2) Install cylinder directly on the mounting plate using hex. socket headed bolts.
3) For the rod tip screw, 2 types are available: female screw type and male screw type. Use this screw according to your applications.
4) Provide a guide so that no lateral load is applied to the piston rod.
   Example: Do not apply lateral load as stopper.

4.3 Switch installation

1) Switch mounting positions



(1) Stroke end mounting
Mount it to each position of RD (rod side) and HD (head side) respectively so as to have a switch actuate at the most sensitive position.

(2) Intermediate stroke mounting
Fix piston at the position where it is expected to stop. Slide switch back and forth along cylinder beyond fixed piston to locate positions where switch turns ON respectively. The center of those two points is the most sensitive position to have switch actuated. It is best suited where to have switch installed.

- How to slide switch
  Loosen its mounting screws then slide switch back and forth along cylinder tube. Tighten screws after locating the point to have switch installed.
- How to replace 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 - 0.2N · m.)

2) Actuation range

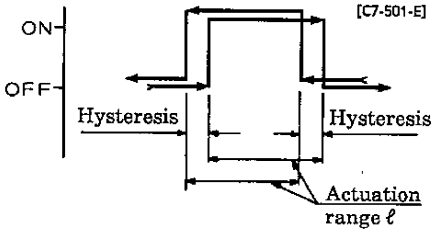
(1) It is the distance from where switch turns ON, while the piston strokes one way to the point where it turns OFF, while the piston continues to stroke in the same direction.

(2) The center of actuation range is the most sensitive point for the actuate switch. At this point, due to being the least of external magnetic disturbance, switch actuates most stably.

3) Hysteresis

(1) Switch turns ON while piston moves one way. Switch turns OFF while piston reverses its way after stopping at the point where switch turned ON once. The distance from ON point to OFF point is called hysteresis.

(2) When piston stops within the hysteresis, switch actuation becomes unstable as it easily is disturbed by an external magnetic field. Carefully avoid making it stop here.



The table of The most sensitive positions (HD & RD), Actuation range and Hysteresis

(Unit in mm)

Item / Tube bore (mm)	Proximity switch (T2H/V、T3H/V)				Contact point switch (T0H/V、T5H/V)			
	The most sensitive position		Actuation range	Hysteresis	The most sensitive position		Actuation range	Hysteresis
	HD	RD			HD	RD		
ϕ12	0.5	3.0	2 - 6	1.5 or less	0.5	3.0	5 - 8	3 or less
ϕ16	0.5	3.0	2 - 5		0.5	3.0	4 - 9	
ϕ20	2.5	8.5	3 - 8		2.5	8.5	6 - 14	
ϕ25	3.0	10.5	3 - 9		3.0	10.5	5 - 14	
ϕ32	4.5	10.5	3 - 8		4.5	10.5	5 - 12	
ϕ40	8.0	13.5	3 - 9		8.0	13.5	6 - 14	
ϕ50	9.0	13.5	3 - 9		9.0	13.5	6 - 14	
ϕ63	13.0	14.0	3 - 9		13.0	14.0	7 - 15	
ϕ80	19.0	16.5	4 - 10		19.0	16.5	7 - 15	
ϕ100	24.5	20.5	4 - 10		24.5	20.5	9 - 15	

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

5. OPERATIONAL CAUTIONS OF SWITCHES

5.1 General Cautions

1) Magnetic environment

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

2) Protection of lead cord

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

3) Service temperature

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

4) Intermediate position sensing

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

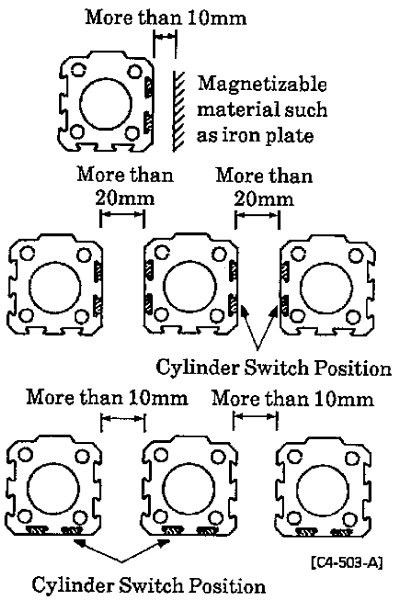
(Example) Operate cylinder with a speed of less than 500mm/s in case the relay actuation time is 20ms.

5) Shock

Carefully avoid big shocks or vibrations during transportation of the cylinder or mounting and adjusting the switch.

6) Magnetizable material such as an iron plate nearby the cylinder switch is apt to cause malfunction of the cylinder switches. Keep it at least 10mm away from the cylinder surface. (This is applicable for all bore sizes of tube.)

7) It usually causes malfunction of the cylinder switches when plural cylinders are laid adjacent. Keep a space between them as illustrated to the right.(This is applicable for all bore sizes of tube.)



5.2 Operational Cautions, Proximity switch

1) Connection of lead wire

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.

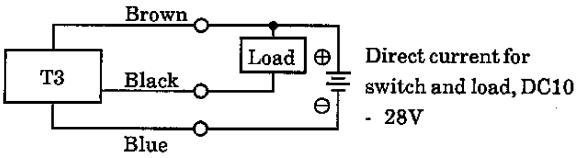


Fig.1 An example of the power for switch and load is the same.

Direct current for switch, DC10 - 28V

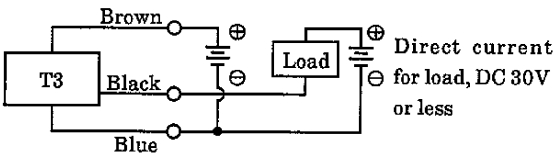


Fig.2 An example when the power for switch and load is independent.

2) Protection of output circuit

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

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

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

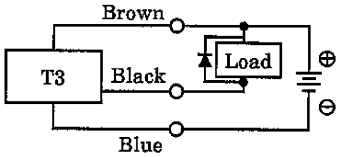


Fig.3 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.

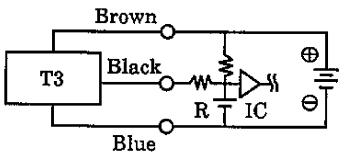


Fig. 4 An example of using capacitor type load together with current regulating resister R. Comply with the following formula to figure out required R. $\frac{V}{0.10} = R\,(\Omega)$

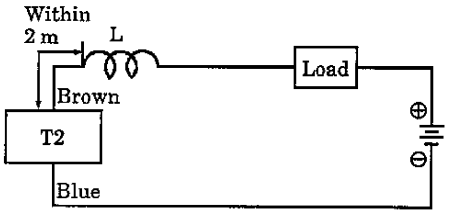


Fig. 5 • Choke coil L
L= a couple hundred μH - a couple mH surpassing high frequency characteristic
• Install it nearby the switch (within 2 m).

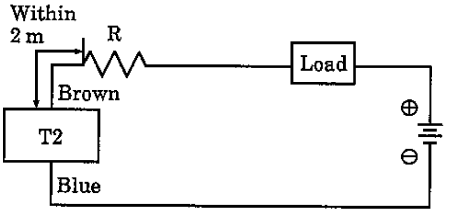


Fig. 6 • Dash current restriction resister R
R= As much large resister as the load circuit can afford.
• Install it nearby the switch (within 2 m).

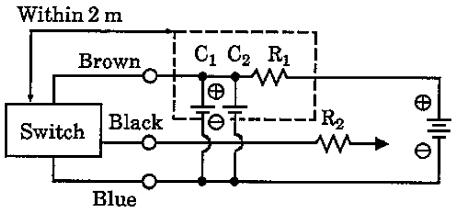


Fig. 7

- Electric power noise absorptive circuit C1
  C_1 = 20 - 50μF electrolytic capacitor (withstanding 50V or more)
  C_2 = 0.01 - 0.1μF ceramic capacitor
  R_1 = 20 - 30Ω
- Dash current restriction resister R2
  R_2 = As much large resister as the load circuit can afford.
- Install it nearby the switch (within 2 m).

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 - 12 respectively.

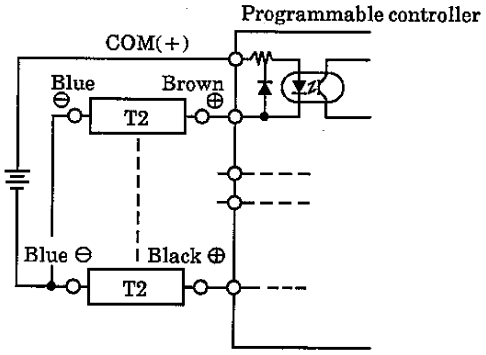


Fig. 8 An example of T2 connection to source input type (an external power source)

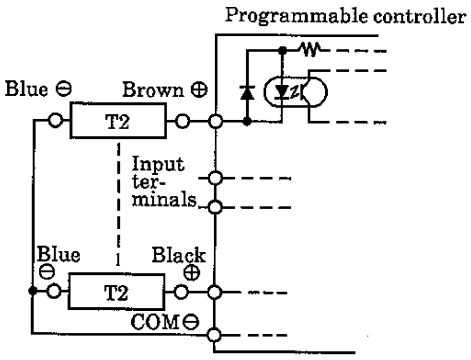


Fig. 9 An example of T2 connection to source input type (an internal power source)

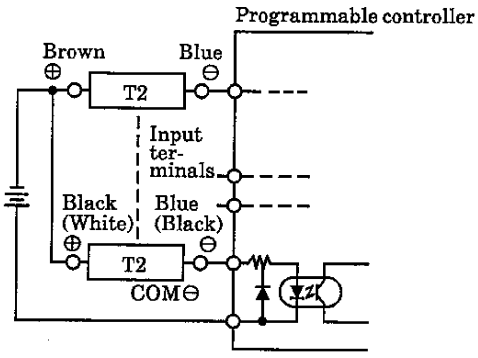


Fig. 10 An example of T2 connection to sink input type (an internal power source)

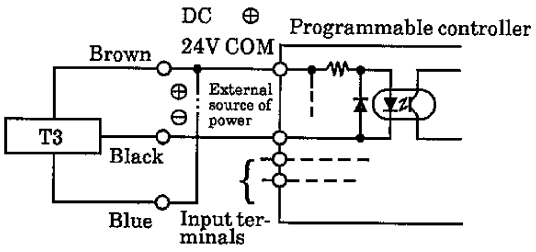


Fig. 11 An example of T3 connection to source input type (an external power source)

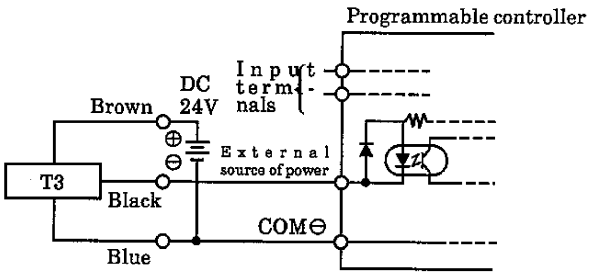


Fig. 12 An example of T3 connection to source input type (an internal power source)

4) Series connection

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

T3 switches hardly ever leak. When less than 10μA, then leakage may occur. Usually dimming and failure of the lamp do not occur.

5) Magnetic environment

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

6) Protection of lead wire

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

5.3 Operational Cautions, Contact point switch, Model T0 & T5

1) Connection of lead wire

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

Ⓐ For DC connection, use such polarities of wires as white ⊕ and black ⊖. The switch still functions right with reversed polarities but lamp is not lit.

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

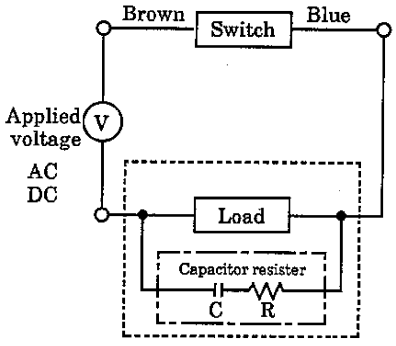
2) Capacity of contact points

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

3) Protection of contact point

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

Furthermore, install such protective circuits as illustrated in either Fig. 3 or 4, on the following page, in case the wire length exceeds the length per following table.

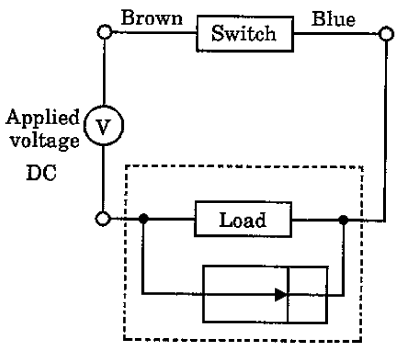


User circuit

Protective circuit (Spark absorbing circuit)

Recommended value C (Capacitor) = 0.033 - 0.1μF
R (Resister) = 1 - 3kΩ
XEB1K1 Okaya Denki Mfg. or equivalent

Fig. 1 When capacitor resister is used.

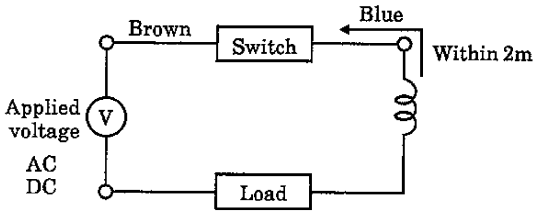


User circuit

Protective circuit

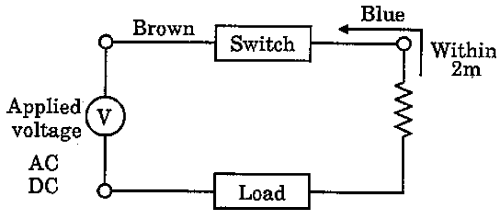
Rectifying diode, general use
Hitachi Mfg. product V06C or equivalent

Fig.2 When diode is used.



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

Fig. 3



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

Fig. 4

4) Relay

Use such products as specified below or equivalent.

OMRON Mfg.	model MY
Fuji Denki Mfg.	model HH5
Matsushita Denki Mfg.	model HC

5) Series 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 switches T5s. Lamp is lit only when all switches turn on.

6) Parallel connection

There is no restriction in parallel connection number of switches of these types. Multi number connection of model T0s, sometimes, cause a dimmed lamp or complete lamp failure.

7) Magnetic environment

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

8) Protection of lead wire

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

6. MAINTENANCE

6.1 Periodical Inspection

1) In order to upkeep the cylinder in optimum condition, carry out periodical inspection once or twice a year.

2) Inspection items

ⓐ check the bolts and nuts fitting the piston rod end fittings and supporting fittings for looseness.

ⓑ Check to see that the cylinder operates smoothly.

ⓒ Check any change of the piston speed and cycle time.

ⓓ Check for internal and external leakage.

ⓔ Check the piston rod for flaw (scratch) and deformation.

ⓕ Check the stroke for abnormality.

See "Troubleshooting", 6.2, should there be any trouble found, also carry out additional tightening if bolts, nuts, etc.are loose.

6.2 Troubleshooting

1) Cylinder

Troubles	Causes	Countermeasures
Does not operate	No pressure or inadequate pressure	Provide an adequate pressure source.
	Signal is not transmitted to direction control valve	Correct the control circuit.
	Improper or misalignment of installation	Correct the installation state and/or change the supporting system.
	Broken packing	Replace the packing.
Does not function smoothly	Lower speed than rated	Reduce the load. Consider the use of a hydraulic cylinder.
	Improper or misalignment of installation	Correct the installation state and/or change the supporting system.
	Exertion of transverse (lateral) load	Install a guide. Revise the installation state and/or change the supporting system.
	Excessive load	Increase the pressure itself and/or the inner diameter of the tube.
	Speed control valve is built in the way of "Meter in" circuit	Change the installation direction of the speed control valve.
Breakage and/or deformation	Impact force due to high speed operation	Turn the speed down. Reduce the load. Install cushion device with more efficiency. (External cushion)
	Exertion of transverse load	Install a guide. Revise the installation state and/or change the supporting system.

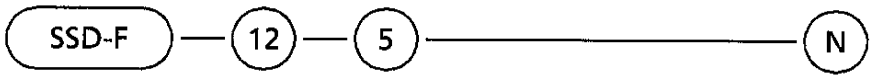
2) Switch

Troubles	Causes	Countermeasures
Lamp is not lit.	Deposited contact point	Replace the switch.
	Excessive load than rated capacity	Replace the relay (recommended one) Replace the switch
	Damage to the lamp	Replace the lamp.
	Inadequate incoming signal	Review the external signal circuit and remove the causes
Switch does not function right.	Broken circuit	Replace the switch
	Inadequate incoming signal	Review the external signal circuit and remove the causes
	Improper voltage	Correct voltage to specified.
	Incorrect location of switch	Correct its location
	Aberrant position of switch	Set it back to original position
	Incorrect direction of switch mounting	Correct the direction of the switch.
	Relay is unable to respond properly within the piston stroke	Adjust speed slow Replace the relay
	Excessive load than rated capacity	Replace the relay (recommended one) Replace the switch
Switch does not return.	Piston is not moving	Correct to have piston move.
	Deposited contact point	Replace the switch
	Excessive load (relay) than rated capacity	Replace the relay (recommended one) Replace the switch
	Improper ambient temperature	Adjust the ambient temperature within the range of −10 to 60°C
	Existence of a foreign magnetic field	Shield the magnetic field.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.

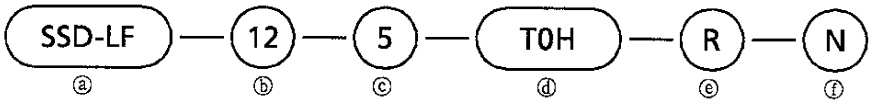
7. HOW TO ORDER

7.1 Product Code

● Cylinder without switch



● Cylinder with switch



ⓐ Model		ⓑ Tube bore		ⓒ Standard stroke		
SSD-F	Double acting, Single rod	12	φ12	φ12 to φ20	φ25 to φ50	φ63 to φ100
SSD-LF	Double acting, Single rod, with switch	16	φ16	5	5	5
		20	φ20	10	10	10
		25	φ25	15	15	20
		32	φ32	20	20	30
		40	φ40	25	25	40
		50	φ50	30	30	50
		63	φ63		40	
		80	φ80		50	
		100	φ100			

ⓓ Switch model code				ⓔ Qty of switch		ⓕ Option	
Lead wire straight type	Lead wire L-shaped type			R	1 ea., Rod end	N	Male thread lod end
				H	1 ea., Head end		
T0H※	T0V※	Reed type	2-wire	D	2 ea.		
T5H※	T5V※						
T2H※	T2V※	Proximity type	3-wire				
T3H※	T3V※						

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

● Cylinder without switch

SSD-KF — 12 — 5 ——————— N

● Cylinder with switch

SSD-KLF — 12 — 5 — T0H — R — N

ⓐ ⓑ ⓒ ⓓ ⓔ ⓕ

ⓐ Model		ⓑ Tube bore		ⓒ Standard stroke (mm)					
SSD-KF	Double acting, high load	12	ϕ12	Standard stroke			Maximum stroke		
		16	ϕ16	ϕ12 - ϕ20	ϕ25 - ϕ50	ϕ63 - ϕ100	ϕ12 - ϕ20	ϕ25 - ϕ50	ϕ63 - ϕ100
SSD-KLF	Double acting, high load, with switch	20	ϕ20	5	10	10	100	150	200
		25	ϕ25	10	15	20			
		32	ϕ32	15	20	30			
		40	ϕ40	20	25	40			
		50	ϕ50	25	30	50			
		63	ϕ63	30	40	60			
		80	ϕ80	40	50	70			
		100	ϕ100	50	60	80			
					70	90			
					80	100			
					90				
					100				

ⓓ Switch model code				ⓔ Qty of switch		ⓕ Option	
Lead wire straight type	Lead wire L-shaped type			R	1 ea., Rod end	N	Male thread lod end
T0H※	T0V※	Reed type	2-wire	H	1 ea., Head end		
T5H※	T5V※			D	2 ea.		
T2H※	T2V※	Proximity type	3-wire				
T3H※	T3V※						

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