CKD

SM-234327-A

INSTRUCTION MANUAL

SUPER COMPACT CYLINDER

SSD, SSD-L Series

- Read this manual carefully and thoroughly before using this product. In particular, read the safety notes carefully.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD

5th edition

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 and fully understand its contents for proper operation.**
Observe the precautions on handling described in this manual, as well as the following instructions:

⚠ CAUTION:

- Before performing an overhaul inspection on the actuator, release any residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- Touching the electrical wiring connection (bare charging part) of an actuator with solenoid valve, actuator with switch, etc. may cause electric shock. Perform an overhaul inspection with the power off. Also, do not touch the charging part with wet hands.

[SM-234327-A]

CONTENTS

SSD, SSD-L

Super compact cylinder
double-acting type

Instruction Manual No. SM-234327-A

1. UNPACKING

1) Check that the product model number ordered and the model number in the MODEL field on the product nameplate are the same.

2) Check the appearance for any damage.

3) Store the product with a seal plug attached to prevent foreign matter from entering the cylinder through the piping port.
Remove the seal plug when piping.

2. INSTALLATION

2.1 Installation

1) Permissible operating temperature range of the cylinder is -10 to 60°C.
Use within this temperature range.

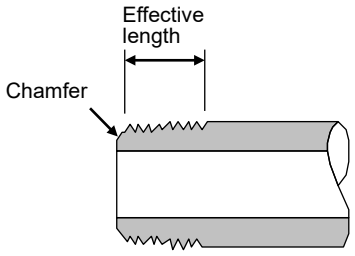
2) Install the cylinder body directly with hexagon socket head cap screws.

3) There are two types of rod end threads: female and male thread types. Please use according to your application.

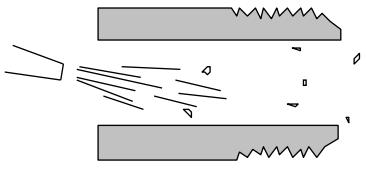
4) Provide a guide to prevent lateral load from being applied to the piston rod.
(Example) Do not apply a lateral load as a stopper.

2.2 Piping

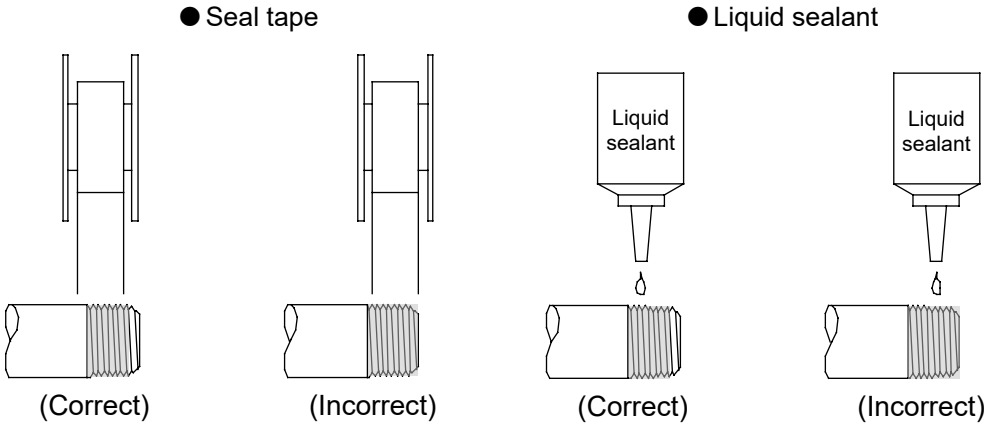
1) For piping after the filter, use corrosion-resistant piping materials such as galvanized pipes, nylon tubes, or rubber tubes.
2) The piping connecting the cylinder and solenoid valve must have an effective cross-sectional area large enough to allow the cylinder to output the specified piston speed.
3) Install the filter as close to the solenoid valve as possible to remove rust, foreign matter, and drainage from inside the pipe.
4) Observe the effective thread length of the gas pipe.
Also, chamfer the thread part about 1/2 pitch from the threaded end.



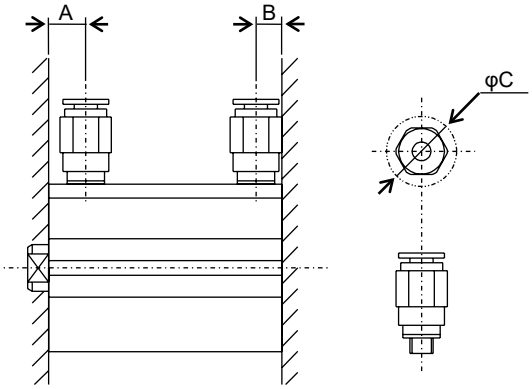
5) Before piping, flush (blow air into) the inside of the pipe to remove any foreign matter, chips, etc.



6) When using sealing tape or sealant on piping, make sure to use it about two threads back from the tip of the thread, and be careful not to let any tape scraps or sealant residue get inside the pipe or equipment.



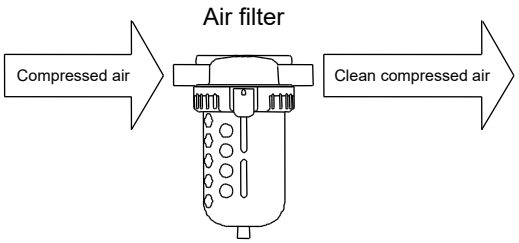
7) There are restrictions on the piping joint that can be used, so please refer to the following for details.



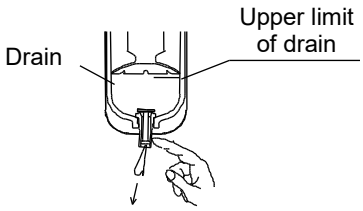
Item / Tube bore (mm)	Port size	Port position dimensions A	Port position dimensions B	Available joints	Joint outer diameter φC	Unusable joint
φ12	M5	5.5	5.5	SC3W-M5-4, SC3W-M5-6 GWS4-M5-S, GWS4-M5 GWL4-M5, GWL6-M5	φ11 or less	GWS6-M5
φ16						
φ20		8				
φ25		11	6			
φ32	Rc1/8	8	8	SC3W-6-4･6･8 GWS4-6, GWS6-6, GWS8-6 GWL4-6, GWL6-6	φ15 or less	GWS10-6 GWL8-6 GWL10-6
φ40		12	8.5			
φ50	Rc1/4	10.5	10.5	SC3W-8-6･8･10 GWS4-8, GWS6-8, GWS10-8 GWL4 to 12-8	φ21 or less	GWS-12-8
φ63		13	11			
φ80	Rc3/8	16	13	SC3W-10-8･10･12 GWS6-10, GWS8-10, GWS10-10 GWL6 to 12-10		-
φ100		23	15			

2.3 Working fluid

1) Use the compressed air that should be clean without moisture that has been passed through an air filter. Therefore, use an air filter in the pneumatic circuit, paying attention to the degree of filtration (5 μm or less is desirable), flow rate, and mounting position (close to the directional control valve).



2) Periodically discharge the drainage accumulated in the filter before it exceeds the specified line.



3) If carbides (carbon or tar-like substance) from compressor oil get into the circuit, the solenoid valves and cylinders will malfunction. Be sure to carry out thorough maintenance and inspection of the compressor.

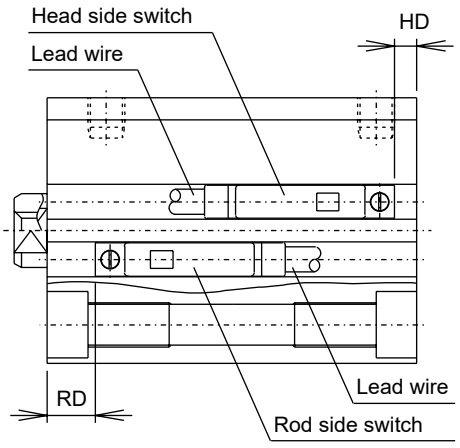
4) This cylinder can be used without lubrication. If lubricating, use turbine oil class 1 ISOVG32 lubricant.

2.4 Switch installation position

1) Switch installation position

(1) Installation at the stroke end
For activation of the switch at the most sensitive position, install the switches at the RD dimension on the rod side and at the HD dimension on the head side respectively.

(2) Installation in the middle position
If the piston stops in the middle of the stroke, fix the piston at the position where it stops and move the switches back and forth over the piston to find the position where each switch first turns ON. The middle of those two positions is the most sensitive position at that piston position, which is the installation position.



(3) How to change a switch position
Loosen the tightening screw (set screw) and move the switch body along the switch groove and tighten it in place.

(4) How to replace a switch
Loosen the set screw and pull the switch body out of the groove. Next, insert the replacement switch into the groove, position it in place, and then tighten the screw. (tightening torque for the set screw should be 0.1 to 0.2 N m.)

2) Operating range

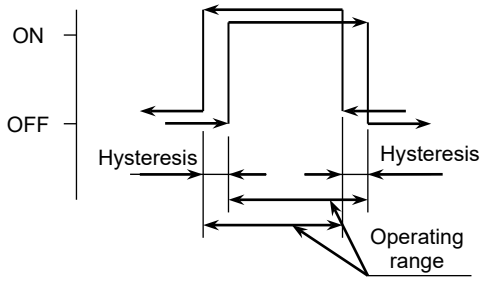
The operating range is the positional range from where the piston moves and the switch turns ON to where it moves further in the same direction and turns OFF.

The center position of the operating range provides a switch with the max. sensitivity. Setting this position as the piston-stop point stabilizes the function of the switch with the least disturbance.

3) Hysteresis

(1) Hysteresis is the distance the piston travels from the position where the switch is turned on to the position where it moves in the opposite direction and the switch is turned off.

(2) If the piston stops within this range, the switch operation becomes unstable and is susceptible to external disturbances.



Most sensitive position (HD, RD), operating range, hysteresis (Unit: mm)

Item / Tube bore (mm)	Non-contact switch (T2H/V, T3HV)				Contact switch (T0H/V, T5H/V)			
	Most sensitive position		Operating range	Hysteresis	Most sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
φ12	0	2.5	2 to 6	1.5 or less	0	2.5	5 to 8	3 or less
φ16	0	2	2 to 5		0	2	4 to 9	
φ20	3	6.5	3 to 8		3	6.5	6 to 14	
φ25	3	9.5	3 to 9		3	9.5	5 to 14	
φ32	3.5	9	3 to 8		3.5	9	5 to 12	
φ40	7	12	3 to 9		7	12	6 to 14	
φ50	7.5	12.5	3 to 9		7.5	12.5	6 to 14	
φ63	12.5	13	3 to 9		12.5	13	7 to 15	
φ80	17.5	15.5	4 to 10		17.5	15.5	7 to 15	
φ100	23	19.5	4 to 10		23	19.5	9 to 15	

* When shipped from the factory, the switches are installed in the most sensitive positions (HD, RD).
Note: The HD and RD dimensions at 5 stroke differ from these dimensions depending on the settings.

3. USAGE

3.1 How to use the cylinder

1) Supply pressure to the cylinder is as described in the product specifications. Use within this pressure range.

2) If the kinetic energy is large, install an external stopper.

3) Install a speed controller to adjust the piston speed.

3.2 How to use the switch

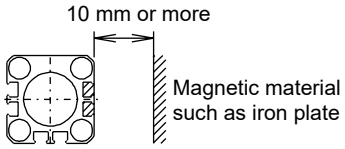
3.2.1 Common matters

1) Magnetic environment
Avoid using the product in places where there are strong magnetic fields or large currents (large magnets, spot welding machines, etc.) nearby. If multiple cylinders with switch are installed in close proximity to each other in parallel, or if there is a magnetic object traveling near the cylinders, they may interfere with each other, affecting detection accuracy.

2) Protection of lead wire
Pay consideration to eliminate repeated bending stress or stretching forth on the lead wire while laying the cord.
Use flexible wires such as robot cables to connect to the moving parts.

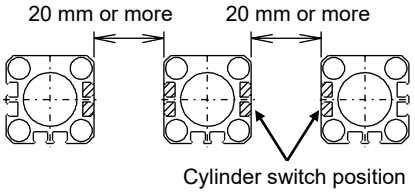
3) Operating temperature
Cannot be used at high temperatures (above 60°C).
Avoid use in high temperature environments due to thermal characteristics of magnetic and electronic parts.

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 a piston with a speed of less than 500 mm/s in case the relay actuation time is 20 ms.

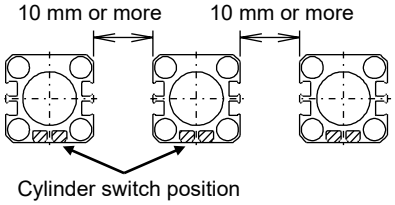


5) Impact
Avoid large impact or vibrations during transportation of the cylinder or mounting and adjusting the switch.

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



7) It usually causes malfunction of the cylinder switches when plural cylinders are laid adjacent. Keep the distance shown on the right from the cylinder surface. (Same for all port sizes)



8) Modified colors of switch leads

Currently, the colors of the switch lead wire are being changed as shown in the table below in response to the revision of the JIS standard and the subsequent revision of the NECA (Nippon Electric Control Technology Industries Association) standard.

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

3.2.2 Cautions for non-contact switches (T2, T3)

1) Connection of lead wire

Connect correctly according to the color coding of the lead wires. Be sure to turn off the power to the electrical circuit device on the connection side before performing the work.

Mis-wiring or short-circuiting of the load will result in damage not only to the switch but also to the electrical circuit on the load side. In addition, working while energized may lead to damage to the switch load electrical circuit depending on the work procedure, even if there is no mis-wiring.

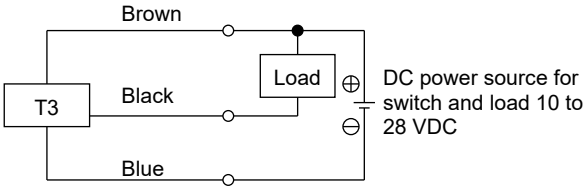


Fig. 1 T3 fundamental circuit example (1)
(When the switch power source and the load power source are the same)

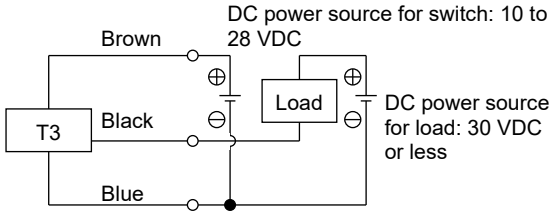


Fig. 2 T3 fundamental circuit example (2)
(When the switch power source and the load power source are different)

2) Protection of output circuit

Install the protection circuit as illustrated in Fig. 3 when an inductive load (relay or solenoid valve) is to be used because it generates surge voltage when the switch is turned off.

Install the protection circuit as illustrated in Fig. 4 when a capacitive load (capacitor) is to be used, because it generates an inrush current when the switch is turned on.

Install the protection circuit as illustrated in Fig. 5 or 6 (in case of model T2) and Fig. 7 (in case of model T3) when the lead wire length exceeds 10 m.

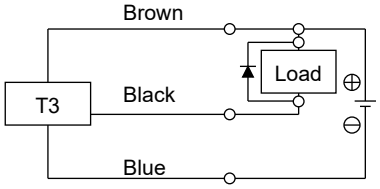


Fig. 3 An example of using a surge absorptive element (diode) for an inductive load. Use Hitachi V06C or equivalent diodes.

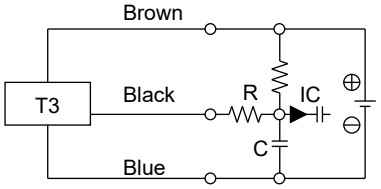


Fig. 4 An example of using a current limiting resistor R for a capacitive load. Use the following formula result or higher value for the resistance R(Ω) at this time.

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

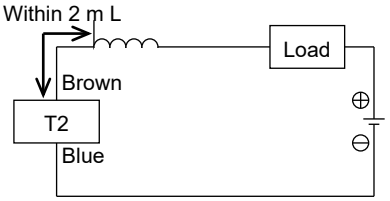


Fig. 5 ・Choke coil
L = several hundred μH to several mH
Surpassing high-frequency characteristic
・Wire nearby the switch (within 2 m)

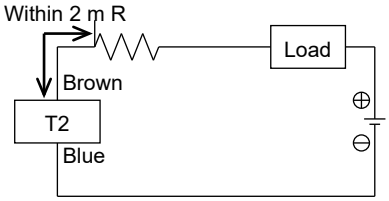


Fig. 6 ・Inrush current limiting resistor
R = Resistor as large as the load side circuit allows
・Wire nearby the switch (within 2 m)

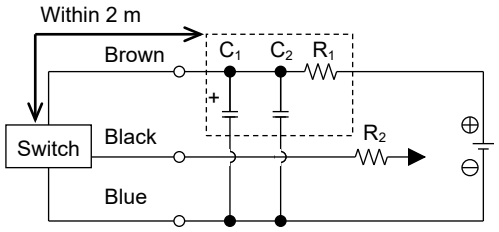


Fig. 7 ・Power source noise absorptive circuit
C_1 = 20 to 50 μF electrolytic capacitor
(Withstand voltage 50 V or more)
C_2 = 0.01 to 0.1 μF ceramic capacitor
R_1 = 20 to 30 Ω

・Inrush current limiting resistor
R_2 = Use as large a resistor as the load side circuit allows.

・Wire nearby the **switch** (within 2 m)

3) Connection to a programmable controller (sequencer)

The connection method varies depending on the type of programmable controller. Connect according to the following Fig. 8 to 12 respectively.

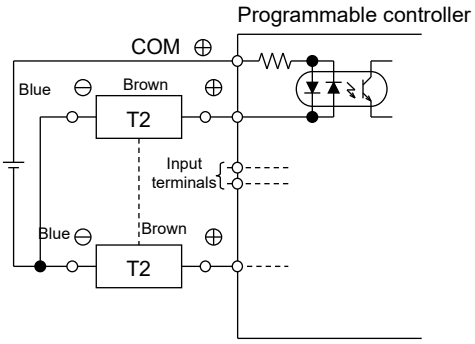


Fig. 8 An example of T2 connection to source input type (external power source)

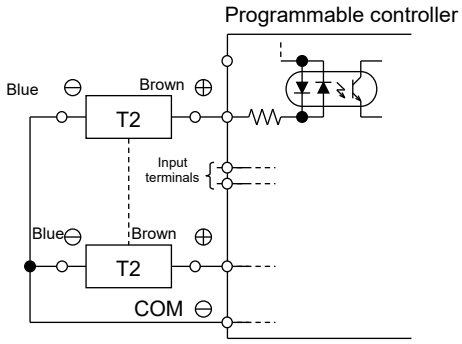


Fig. 9 An example of T2 connection to source input type (built-in power source)

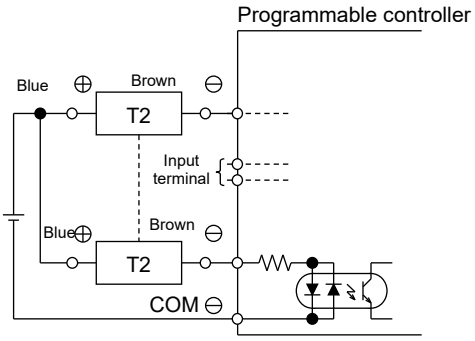


Fig. 10 An example of T2 connection to sink input type (external power source)

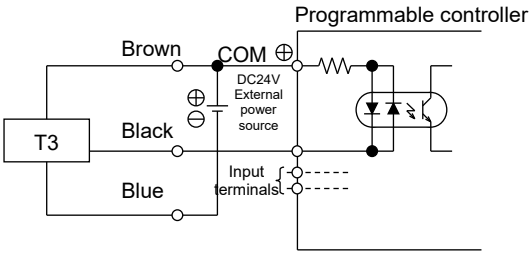


Fig. 11 An example of T3 connection to source input type (external power source)

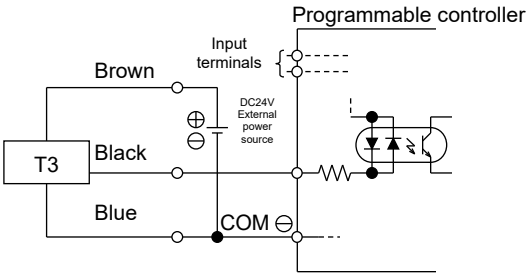


Fig. 12 An example of T3 connection to source input type (built-in power source)

4) Parallel connection

In the case of T2 switches, leakage current increases with the number of connected switches. Check the input specifications of the programmable controller as a connected load to determine the number of switches. Occasionally the indicator lights may become dimmed or may not illuminate at all.

In the case of T3 switches, leakage current increases with the number of connected switches. However, since the level of leakage current is extremely low (10 μA or less), the leakage is not a problem under normal use. The indicator light will not dim or fail to illuminate.

3.2.3 Cautions for contact switches (T0, T5)

1) Connection of lead wire
Instead of connecting the lead wire of the switch to the power source directly, always connect to the load in series. In case of model T0 connection, pay attention to the following items (1) and (2)as well.

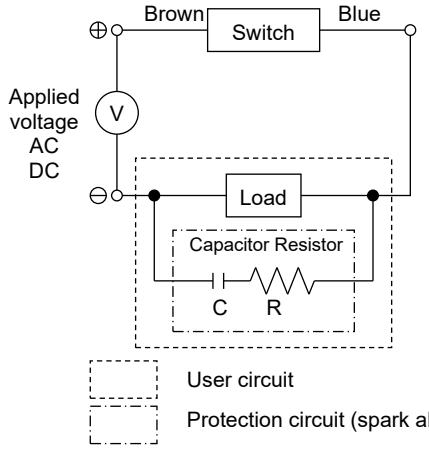
(1) When using for DC, connect the brown wire to the + side and the blue wire to the - side. If connected in reverse, the switch will operate, but the indicator light will not light up.
(2) When connecting to an AC relay or programmable controller input, if, in this circuit, half-wave rectification is being carried out, the indicator light for the switch may not be lit. In this case, when polarities of lead wires for switch is reversed, the light is lit.

2) Contact protection measures
When used with inductive loads such as relays or when the wiring length exceeds Table 1, be sure to provide a contact protection circuit.

Table 1

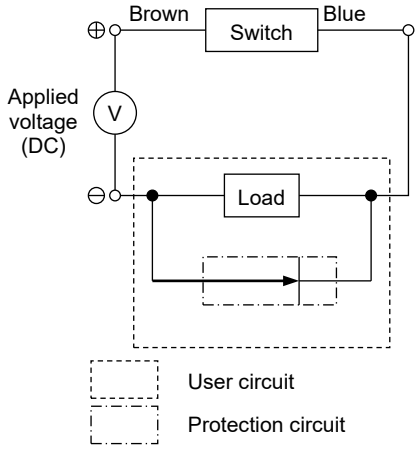
Power source	Wire length
DC	100 m
AC	10 m

(1) Protection when connecting inductive loads



Recommended value C capacitor 0.033 to 0.1 μF
R resistance 1 to 3 kΩ
XEB1K1 Okaya Denki Mfg. or equivalent

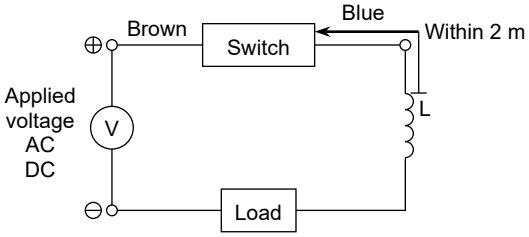
Fig. 1 When capacitors and resistors are used



Rectifying diode, general use
V06C Hitachi Mfg. or equivalent

Fig. 2 When diode is used

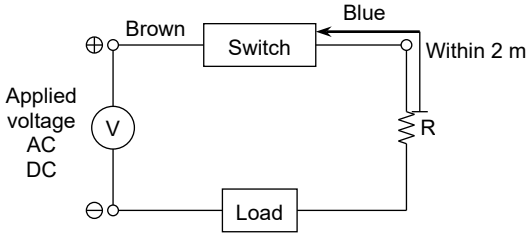
(2) Protection when wiring length exceeds Table 1



・ Choke coil
L= Several hundred μH to several mH
Surpassing high-frequency characteristic

・ Wire nearby the switch (within 2 m)

Fig. 3



・ Inrush current limiting resistor
R= Resistor as large as the load circuit side allows

・ Wire nearby the switch (within 2 m)

Fig. 4

3) Capacity of contact points

Avoid using a load exceeding the max. capacity of contact points. In addition, the indicator light may not illuminate when the current is less than the rated current value.

4) Relay

Use such products as specified below or equivalent.

OMRON Corporation…… Model MY
FUJI ELECTRIC CORP …… Model HH5
Matsushita Electric Works Ltd. …… Model HC

5) Series connection

Total voltage drop, when connecting T0 switches in series, equals to the sum of voltage drops of all connected switches.

When connecting one T0 switch to check operation, and t5 switches for the others, the voltage drop will be about that of one T0 (approximately 2.4 V).

The lights will illuminate only when all switches are turned on.

6) Parallel connection

There is no restriction to the number of switches in parallel. In the case of T0, the switch indication light may become dim or may not light up.

4. MAINTENANCE

4.1 Periodic inspection

1) Perform periodical inspection once or twice a year to ensure the best performance of the cylinder.

2) Inspection item
   (1) Looseness of bolts and nuts for mounting the piston rod end fittings and support fittings.
   (2) Whether it is in smooth operating condition.
   (3) Changes in piston speed and cycle time.
   (4) External and internal leaks
   (5) Scratches and deformation of piston rod.
   (6) Whether there is abnormality in stroke.

Check the above points, and if there is any abnormality, refer to "5. FAILURES AND TROUBLESHOOTING." If there is any looseness, retighten it.

4.2 Disassembly

1) This cylinder can be disassembled.
   If air leaks or other problems occur, disassemble the unit referring to the internal structural drawing and replace the parts on the consumable parts list.

2) For disassembly, remove the C-shaped snap ring, and then remove the piston rod and rod metal.

4.3 Assembly

1) Clean each part.

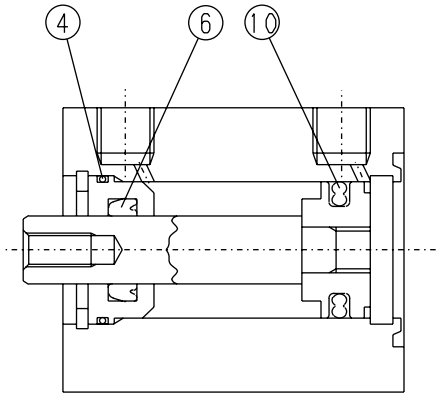
2) After cleaning, carefully assemble in the reverse order of disassembly.
   Damage to packings in particular can cause malfunctions and air leaks.

3) Apply high quality grease (lithium soap-based grease) to the inside surface of the cylinder tube, the piston outer diameter surface, and the packings.

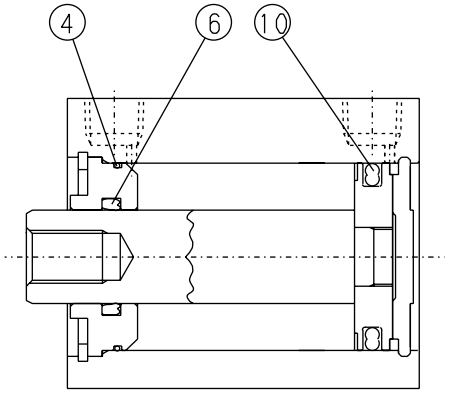
4.4 Internal structure and consumable parts list

● No cushion

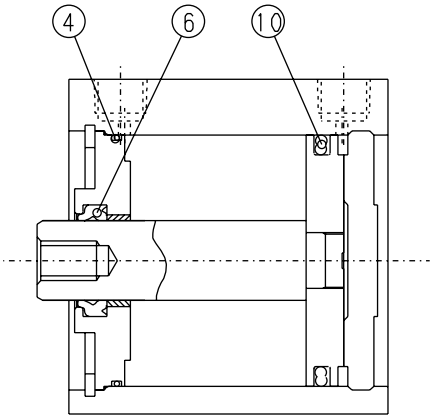
・SSD-φ12 to φ25 (double-acting, single rod type)



・SSD-φ32 to φ50 (double-acting, single rod type)



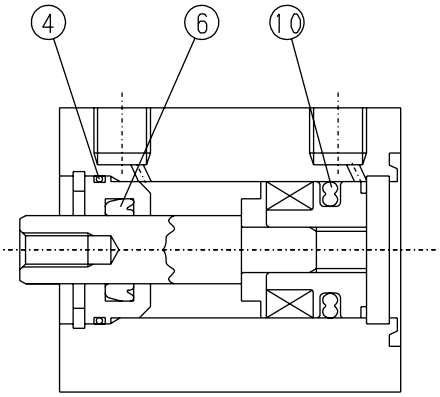
・SSD-φ63 to φ100 (double-acting, single rod type)



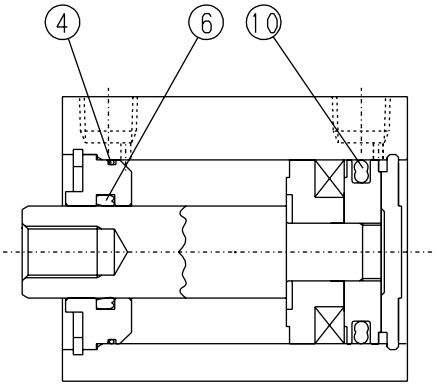
Consumable parts list (Please specify kit number when ordering.)

Part number / Part name / Tube bore (mm)	Kit No.	(4)	(6)	(10)
φ12	SSD-12K	Rod metal gasket	Rod packing	Piston packing
φ16	SSD-16K			
φ20	SSD-20K			
φ25	SSD-25K			
φ32	SSD-32K			
φ40	SSD-40K			
φ50	SSD-50K			
φ63	SSD-63K			
φ80	SSD-80K			
φ100	SSD-100K			

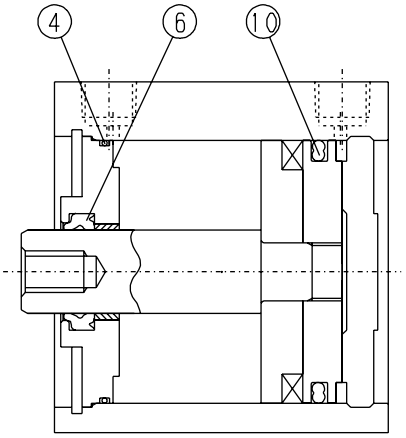
・SSD-L-φ12 to φ25
(Double-acting, single rod type with switch)



・SSD-L-φ32 to φ50
(Double-acting, single rod type with switch)



・SSD-L-φ63 to φ100
(Double-acting, single rod type with switch)

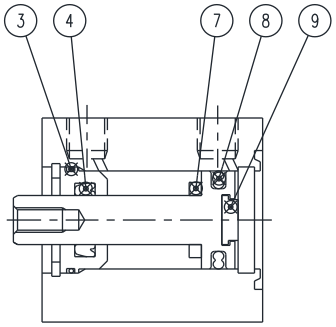


Consumable parts list (Please specify kit number when ordering.)

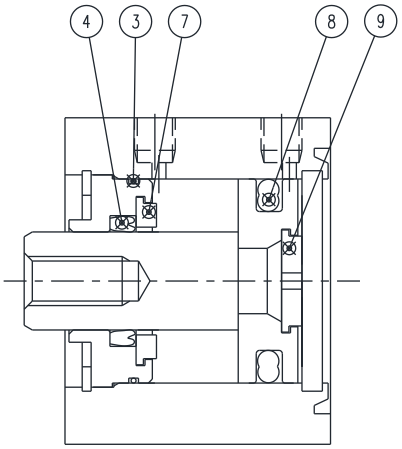
Part number / Part name / Tube bore (mm)	Kit No.	(4)	(6)	(10)
φ12	SSD-12K	Rod metal gasket	Rod packing	Piston packing
φ16	SSD-16K			
φ20	SSD-20K			
φ25	SSD-25K			
φ32	SSD-32K			
φ40	SSD-40K			
φ50	SSD-50K			
φ63	SSD-63K			
φ80	SSD-80K			
φ100	SSD-100K			

● With rubber cushion

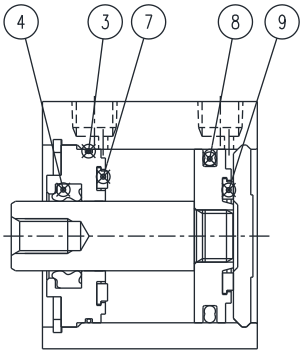
・SSD-φ12D
(Double-acting, single rod type)



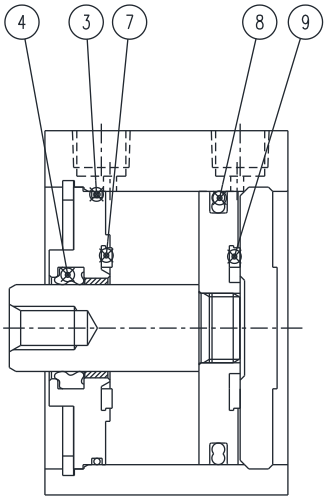
・SSD-φ16D to φ32D
(Double-acting, single rod type)



・SSD-φ40D, φ50D
(Double-acting, single rod type)



・SSD-φ63D to φ100D
(Double-acting, single rod type)

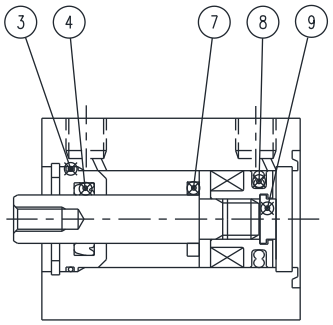


Consumable parts list (Please specify kit number when ordering.)

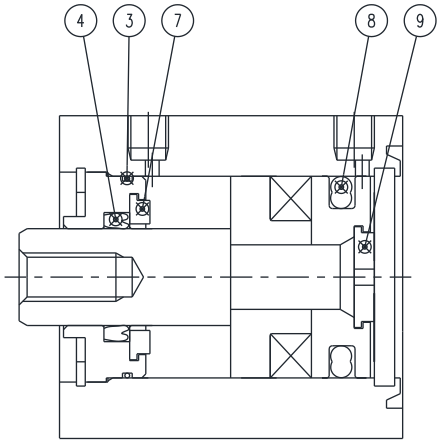
Part number / Part name / Tube bore (mm)	Kit No.	(3)	(4)	(7)	(8)	(9)
φ12	SSD-12DK	Rod metal gasket	Rod packing	Cushion rubber (R)	Piston packing	Cushion rubber (H)
φ16	SSD-16DK					
φ20	SSD-20DK					
φ25	SSD-25DK					
φ32	SSD-32DK					
φ40	SSD-40DK					
φ50	SSD-50DK					
φ63	SSD-63DK					
φ80	SSD-80DK					
φ100	SSD-100DK					

● With rubber cushion

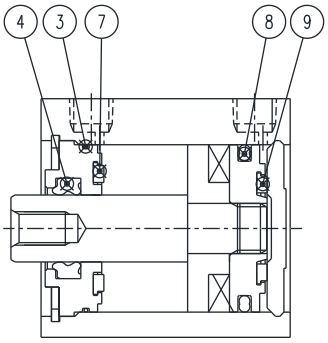
・SSD-L-φ12D
(Double-acting, single rod type with switch)



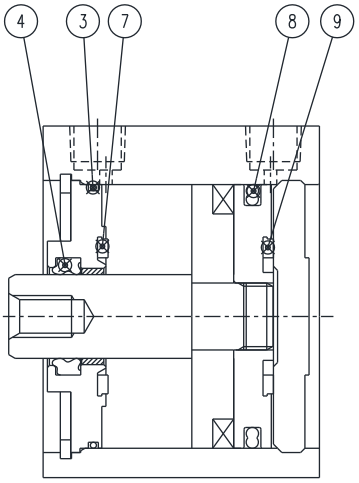
・SSD-L-φ16D to φ32D
(Double-acting, single rod type with switch)



・SSD-L-φ40D, φ50D
(Double-acting, single rod type with switch)



・SSD-L-φ63D to φ100D
(Double-acting, single rod type with switch)



Consumable parts list (Please specify kit number when ordering.)

Part number / Part name / Tube bore (mm)	Kit No.	(3)	(4)	(7)	(8)	(9)
φ12	SSD-12DK	Rod metal gasket	Rod packing	Cushion rubber (R)	Piston packing	Cushion rubber (H)
φ16	SSD-16DK					
φ20	SSD-20DK					
φ25	SSD-25DK					
φ32	SSD-32DK					
φ40	SSD-40DK					
φ50	SSD-50DK					
φ63	SSD-63DK					
φ80	SSD-80DK					
φ100	SSD-100DK					

5. FAILURES AND TROUBLESHOOTING

1) Cylinder

Problem	Cause	Countermeasure
Not operate	No pressure, or insufficient pressure	Ensure a pressure source
	The directional control valve does not receive any signal.	Correct the control circuit.
	Misalignment of installation	Correct the installation state. Change the mounting style
	Broken piston packing	Replace the packing.
Not operate smoothly	Speed is below the lower speed limit	Mitigate the load fluctuations
	Misalignment of installation	Correct the installation state. Change the mounting style
	Transverse load is applied	Install a guide Correct the installation state. Change the mounting style
	Excessive load	Increase the pressure Use a tube of a larger inner diameter.
	The speed control valve functions as a meter-in circuit.	Mount the speed control valve in a different direction.
Breakage/deformation	Impact force due to high-speed operation.	Reduce the speed. Reduce the load. Use a cylinder with a more reliable cushion mechanism (External cushion mechanism)
	Transverse load is applied	Install a guide Correct the installation state. Change the mounting style

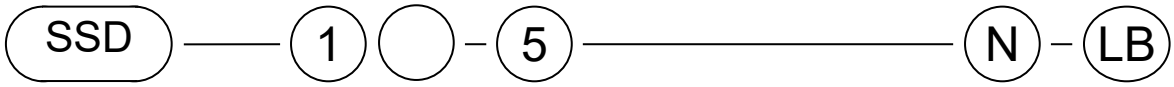
2) Switch

Problem	Cause	Countermeasure
Indicator light does not blink	The contact is melted and stuck	Replace the switch.
	The load exceeds the rating.	Replace with recommended relay or switch
	Damage to indicator light	Replace the switch.
	An external signal error occurs.	Recheck the external circuit.
The switch does not operate.	The wiring is disconnected.	Replace the switch.
	An external signal error occurs.	Recheck the external circuit.
	The voltage is not proper.	Make the indicated voltage
	Incorrect mounting position.	Install the switch in the proper position.
	The switch is dislocated.	Replace the switch in the proper position, and retighten the mounting screws.
	The switch is not installed in the proper direction.	Install the switch in the proper direction.
	The load (relay) cannot respond during detection in the middle of the stroke.	Reduce the speed. Replace with recommended relay
	The load exceeds the rating.	Replace with recommended relay or switch
The switch cannot be reset.	The piston does not move.	Move the piston
	The contact is melted and stuck	Replace the switch.
	The relay exceeds the rating.	Replace with recommended relay or switch
	Ambient temperature outside specification range	Keep the ambient temperature within the range of -10 to 60°C
	There is a magnetic field near the switch.	Provide magnetic shielding
	An external signal error occurs.	Recheck the external circuit.

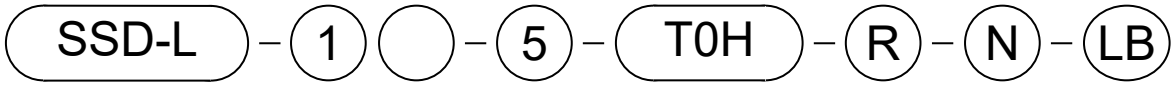
6. MODEL NUMBER CODING

6.1 Product model number coding

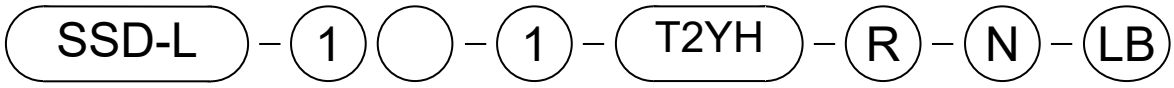
● Without switch



● With switch



● 2-color indicator type, with preventive maintenance output switch (φ12 and φ16 only)



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

(a) Model number	
SSD	Double-acting, single rod type
SSD-L	Double-acting, single rod type, with switch
SSD-L1	φ12/φ16, 2-color indicator, off-delay type, with T1* switch

(b) Tube bore (mm)		(c) Cushion		(d) Standard stroke		
12	φ12	No symbol	No cushion	φ12 to φ16	φ20 to φ50	φ63 to φ100
16	φ16	D	With rubber cushion on both sides	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					

(e) Switch model number				* Lead wire length		
Lead wire straight type	Lead wire L-shaped type	Contact point	Indicator light	Lead wire	No symbol	1 m (standard)
					3	3 m (optional)
T0H*	T0V*	Contact point	1-color indicator type	2-wire	5	5 m (optional)
T5H*	T5V*		No indicator light		The * mark shows the lead wire length.	
T8H*	T8V*		1-color indicator type			
T1H*	T1V*	Non-contact	1-color indicator type	2-wire		
T2H*	T2V*					
T3H*	T3V*			3-wire		
T3PH*	T3PV*		1-color indicator (PNP output) (make-to-order)			
T2YH*	T2YV*		2-color indicator type	2-wire		
T3YH*	T3YV*			3-wire		
T2WH*	T2WV*			2-wire		
T3WH*	T3WV*			3-wire		
T2YD*	-		2-color indicator type for AC magnetic field	2-wire		
T2YDT*	-					
T2JH*	T2JV*		Off delay type	2-wire		

Notes on model number selection

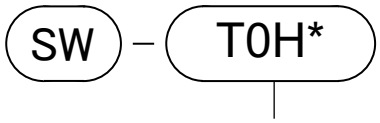
Note 1: T0* and T5* switches cannot be mounted on 5 mm stroke of φ12 and φ16 .

Note 2: T2YD* switch cannot be mounted on φ12 and φ16.

Note 3: T8* switch cannot be mounted on φ12 to φ32.

(f) Number of switches		(g) Option											(h) Mounting type	
R	With 1 switch at rod side	Tube inner diameter (φ)		12	16	20	25	32	40	50	63	80	100	LB	Axial foot
H	With 1 switch at head end	N	Rod tip: male thread	●	●	●	●	●	●	●	●	●	●	CB	Double clevis
D	With 2 switches	P6	Non-purple	Supported by standard							●	●	●		

6.2 Part model number coding



Switch model No.

(Previous page(e))

7. PRODUCT SPECIFICATIONS

7.1 Product specifications

Model / Item		SSD SSD-L (with switch)									
Tube bore mm		φ12	φ16	φ20	φ25	φ32	φ40	φ50	φ63	φ80	φ100
Operating method		Double-acting type									
Working fluid		Compressed air									
Max. working pressure MPa		1.0									
Min. working pressure MPa		0.1							0.05		
Proof pressure MPa		1.6									
Ambient temperature ºC		-10 to 60 (no freezing)									
Port size		M5				Rc1/8		Rc1/4		Rc3/8	
Stroke tolerance mm	No cushion	+1.0 0									
	With rubber cushion	+2.0 0									
Working piston speed mm/s		50 to 500							50 to 300		
Cushion		Selection of no cushion or rubber cushion available									
Lubrication		Not required (use turbine oil ISOVG32 for lubricating)									
Option		Rod tip: male thread (N)									
Allowable absorption energy J	No cushion	0.004	0.01	0.016	0.021	0.025	0.092	0.1	0.12	0.27	0.56
	With rubber cushion	0.03	0.05	0.10	0.16	0.16	0.44	0.75	0.78	2.51	3.92

7.2 Switch specifications

Type and model number	Contact point 2-wire type						
Item	T0H/V		T5H/V		T8H/V		
Use	Relay, programmable controller		Programmable controller, relay, IC circuit (not including indication light), for series connection		Relay, programmable controller		
Power supply voltage	-						
Load voltage	12/24 VDC	110 VAC	12/24 VDC	110 VAC	12/24 VDC	110 VAC	220 VAC
Load current	5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less	5 to 50 mA	7 to 20 mA	7 to 10 mA
Current consumption	-						
Internal voltage drop	3 V or less		0.1 V or less		3 V or less		
Indicator lamps	Red LED (Lights while power is ON)		No indicator light		Red LED (Lights while power is ON)		
Leak current	0Ma						
Lead wire length (Note 1)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.2 mm^2)				Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.3 mm^2)		
Shock resistance	294 m/s^2						
Insulation resistance	20 MΩ or more by 500 VDC megger				100 MΩ or more by 500 VDC megger		
Withstand voltage	No abnormalities upon applying 1000 VAC for one minute.				No abnormalities upon applying 1500 VAC for one minute.		
Ambient temperature	-10°C to 60°C						
Degree of protection	IEC Standard IP67, JIS C 0920 (enclosure protection type), oil proof						

Type and model number	Non-contact 2-wire type			
Item	T1H/V	T2H/V	T2JH/V	T2YH/V
Use	Programmable controller, relay, small solenoid valve	Programmable controller, exclusive		
Power supply voltage	-			
Load voltage	85 to 265 VAC	10 to 30 VDC		
Load current	5 to 100 mA	5 to 20 mA (Note 2)		
Current consumption	-			
Internal voltage drop	10% or less of load voltage	4 V or less		
Indicator lamps	Red LED (Lights while power is ON)		Yellow LED (Lights while power is ON)	Red/Green LED (Lights while power is ON)
Leak current	1 mA or less at 100 VAC 2 mA or less at 200 VAC	1 mA or less		
Lead wire length (Note 1)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.3 mm)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.2 mm)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.3 mm^2)	
Shock resistance	980 m/s^2			
Insulation resistance	100 MΩ or more by 500 VDC megger	20 MΩ or more by 500 VDC megger	100 MΩ or more by 500 VDC megger	
Withstand voltage	No abnormalities upon applying 1500 VAC for one minute.	No abnormalities upon applying 1000 VAC for one minute.		
Ambient temperature	-10°C to 60°C			
Degree of protection	IEC Standard IP67, JIS C 0920 (enclosure protection type), oil proof			

Type and model number	Non-contact 3-wire type		
Item	T3H/V	T3PH/V	T3YH/V
Use	Programmable controller, relay		
Output method	NPN output	PNP Output	NPN output
Power supply voltage	10 to 28 VDC		
Load voltage	30 VDC or less		
Load current	100 mA or less		50 mA or less
Current consumption	10 mA or less at 24 VDC (while power is ON)	12 mA or less at 24 VDC (while power is ON)	10 mA or less at 24 VDC (while power is ON)
Internal voltage drop	0.5 V or less		
Indicator lamps	Red LED (Lights while power is ON)	Yellow LED (Lights while power is ON)	Red/green LED (Lights while power is ON)
Leak current	10 μA or less		
Lead wire length (Note 1)	Standard 1 m (oil proof vinyl, Cabtyre cord, 3-core, 0.2 mm^2)		
Shock resistance	980 m/s^2		
Insulation resistance	20 MΩ or more by 500 VDC megger		100 MΩ or more by 500 VDC megger
Withstand voltage	No abnormalities upon applying 1000 VAC for one minute.		
Ambient temperature	-10°C to 60°C		
Degree of protection	IEC Standard IP67, JIS C 0920 (enclosure protection type), oil proof		

Type and model number	Non-contact 2-wire type	
Item	T2YD	T2YDT
Use	Programmable controller, exclusive	
Load voltage	24 VDC ± 10%	
Load current	5 to 20 mA	
Internal voltage drop	6 V or less	
Indicator lamps	Red/Green LED (Lights while power is ON)	
Leak current	1.0 mA or less	
Output delay time (Note 3) (ON delay, OFF delay)	60 ms or less	
Lead wire length (Note 1)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.5 mm^2)	Standard 1 m (frame-resistant vinyl, Cabtyre cord, 2-core, 0.5 mm^2)
Shock resistance	980 m/s^2	
Insulation resistance	100 MΩ or more by 500 VDC megger	
Withstand voltage	No abnormalities upon applying 1000 VAC for one minute.	
Ambient temperature	-10°C to 60°C	
Degree of protection	IEC Standard IP67, JIS C 0920 (enclosure protection type), oil proof	

Note 1 : Lead wires of 3 m and 5 m are also available as options.

Note 2 : The maximum load current value: 20 mA is at 25°C.
If the ambient temperature at which the switch is used is higher than 25°C, the current will be lower than 20 mA. (5 to 10 mA at 60°C)

Note 3 : Indicates the time between the detection of piston magnet by magnetic sensor and the switch output.