CKD

SM－208368－A

INSTRUCTION MANUAL

SUPER COMPACT CYLINDER

Non-Rotating Type

SSD-M, SSD-ML 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

The 2nd edition

For Safety Use

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

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

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

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

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

⚠ CAUTION :

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

INDEX

SSD-M, SSD-ML

Super Compact Cylinder
Double-acting/non-rotating type

Manual No. SM-208368-A

1. UNPACKING

1) Make sure that the type No. on the nameplate of the delivered Super Compact 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℃. Always operate the cylinder within this temperature range.

2) Install cylinder body with a hexagon socket head cap screw directly.

3) As for the rod nose screw, there are internal thread type and external thread type. Use it to application.

4) Attach a guide so that no lateral load is exerted onto the piston rod.
(Example) Apply no lateral load at all for the purpose of a stopper.

2.2 Piping

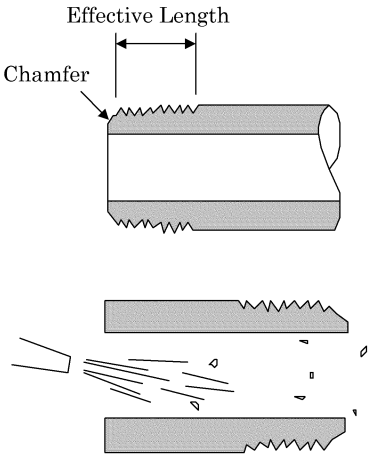
1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.

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

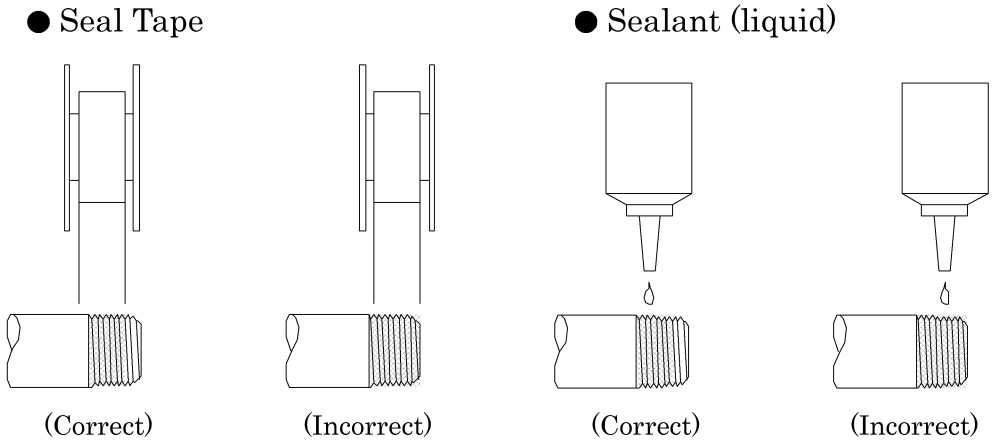
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

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

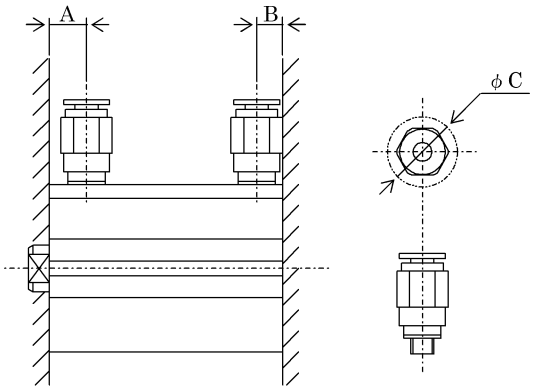
5) Flush air into the pipe to blow out foreign substances and chips before piping.



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.



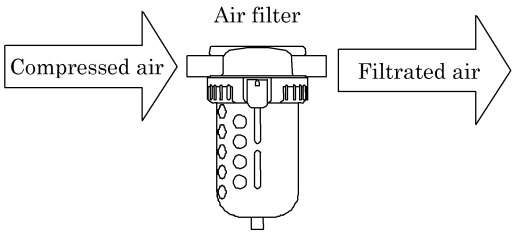
7) Because the usable piping joint has limitations, for using it, see the note below.



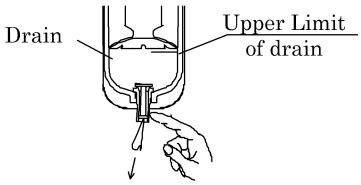
Item / Bore size (mm)	Port diam.	Port dimension A	Port dimension B	Available joints	Joint OD ϕ C	Joint unsuitable
ϕ 12	M5	5.5	5.5	SC3W-M5-4, SC3W-M5-6 GWS4-M5-S, GWS4-M5 GWL4-M5, GWL6-M5	ϕ 11 or less	GWS6-M5
ϕ 16						
ϕ 20		8				
ϕ 25		11	6			
ϕ 32	Rc1/8	8	8	SC3W-6-4･6･8 GWS4-6, GWS6-6, GWS8-6 GWL4-6, GWL6-6	ϕ 15 or less	GWS10-6 GWL8-6 GWL10-6
ϕ 40		12	8.5			
ϕ 50	Rc1/4	10.5	10.5	SC3W-8-6･8･10 GWS4-8, GWS6-8, GWS10-8 GWL4 to 12-8	ϕ 21 or less	GWS-12-8
ϕ 63		13	11			

2.3 Fluid

1) It is necessary to use dehumidified air that has been filtered from compressed air. Carefully select an adequate filter that has an adequate filtration rate (preferably 5 μ m or less), flow rate and its mounting location (as nearest to the directional control valve as possible).



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

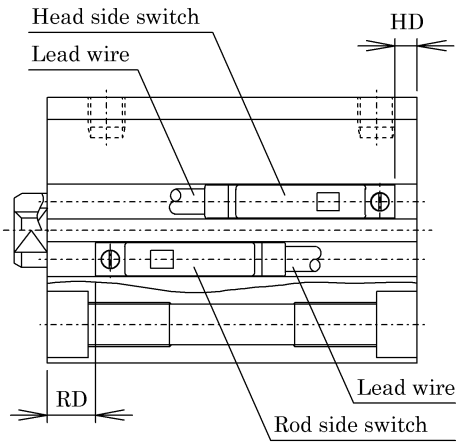


3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.

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

2.4 Location of mounting Switches on a Cylinder

1) Location of mounting switches on a cylinder.
   (1) At the stroke end
   Refer the illustration above. Mount switches within the rod side dimension RD as well as the head side dimension HD for the purpose of having switches function at the points of the maximum sensitive position.



(2) Intermediate of stroke
Move the piston where it is anticipated to stop and fix it tentatively Slide a switch carefully along the side of cylinder over the piston to find out the spot where switch turns on. This type spot should be located on both side of piston. The intermediate spot between those posits is of the maximum sensitive position and where the switch is supposed to be installed.

(3) Relocation of switch
Slide switch body along cylinder tube after loosening mounting screws and tighten screws when located the maximum sensitive position.

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

2) Operating range
The switch turns on first and turns off as the piston moves along its stroke. Precise operating range deviate slightly depending upon the direction of piston movement as shown right.
The center of the range is the mostly sensitive position. Setting switch at this point eliminates majority of external disturbance and provides the most stabile actuation of switch.

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.

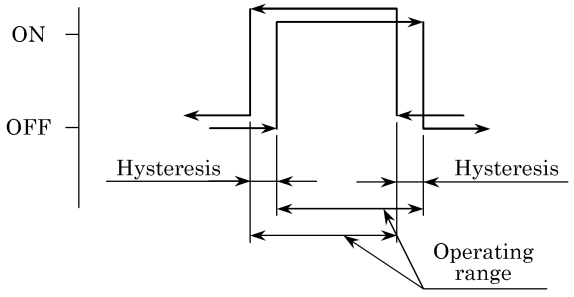


Table of maximum sensitive position (HD・RD), Operating range and Hysteresis (mm)

Item / Bore size (mm)	Solid state switch (T2H/V、T3HV)				Reed switch (T0H/V、T5H/V)			
	Best operating position		Operating range	Hysteresis	Best operating 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	

※ Switches at ex-factory shipment are positioned at the maximum sensitive position (HD and RD).
Note: HD and RD for five strokes may vary from those stated in the above table since they are set every time the cylinder is installed.

3. OPERATION

3.1 Operating the Cylinder

1) The working pressure for this type of cylinder is specified in "Product Specifications". Operate the system within this range.

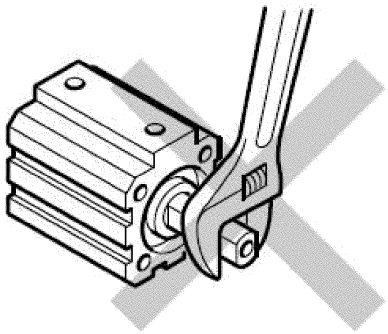
2) Install an external stopper when the dynamic energy is large, as it does not absorb the kinetic energy since it has no cushion.

3) Install an appropriate speed controller to adjust the working piston speed.

4) Check that rotary torque is not applied to the piston rod. Non-rotating bushing may deform and the life drop markedly.

5) Apply the load to the piston rod so it is in the piston rod's axial direction.

6) When fixing a work piece to the end of the piston rod, pull the piston rod into the stroke end. Attach a wrench to the section protruding outside the parallel section of the rod, and tighten while checking that tightening torque is not applied to the cylinder.



3.2 How to use the Switches

3.2.1 Common items

1) Magnetic environment
If surroundings contain a strong magnetic field or large current (large magnet, spot welding machine, etc.), use a strong magnetic field proof switch. When installing the cylinder with switch nearby in parallel, or if a magnetic object is very close to the cylinder, mutual interference may occur and adversely affect detection accuracy.

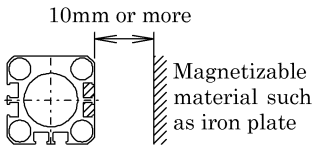
2) Protection of lead cord
Pay consideration to eliminate repeating bending stress or stretching of lead cord while laying the cord.
To the moving portion, use such cord of flexibility as for building a robot.

3) Operating temperature
Do not operate the product at a high temperature (60℃)
Always avoid operation of the product in a hot place due to temperature characteristics of magnetic and electronics parts.

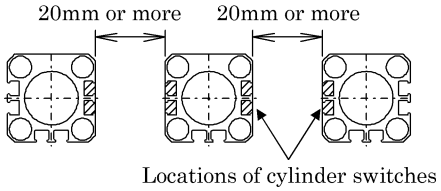
4) Intermediate position detection
When activating the switch halfway of the stroke, the relay may not respond if the piston speed is too fast.
(Example) Operate cylinder with the speed of less than 500mm/s in case the relay actuation time is 20ms.

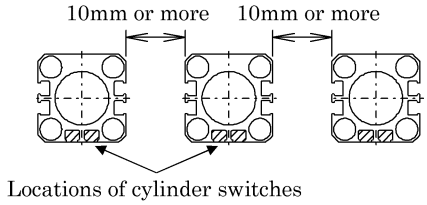
5) Shock resistance
Do not apply a large vibration or impact to the product when transporting the cylinder, or mounting or adjusting the switch.

6) Magnetizable material such as iron plate near by cylinder switch is apt to cause malfunction of cylinder switches. Keep it from cylinder surface at least10mm away (This is applicable for all bore sizes of tube).



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





3.2.2 Operational Cautions, Solid state switch (T1, 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.

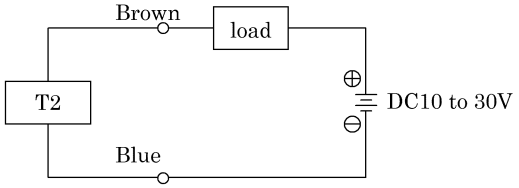


Fig.1 Fundamental circuit Example T2

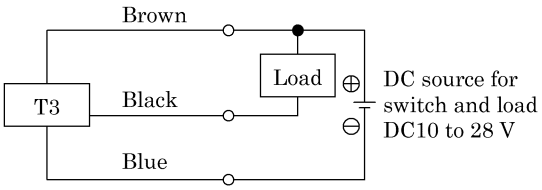


Fig.2 Fundamental circuit Example (1)
(In case the same source of power is used.)

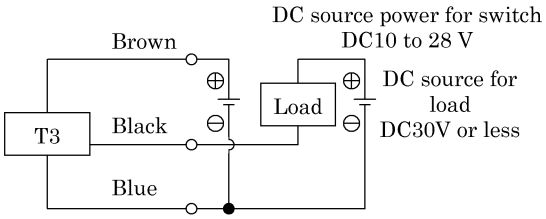


Fig.3 Fundamental circuit Example (2)
(In case individual sources of power are

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).

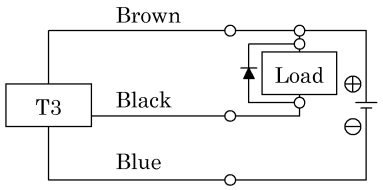
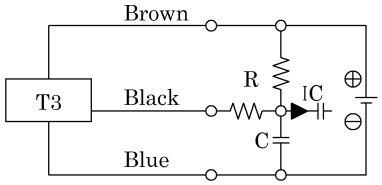


Fig.4 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



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

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

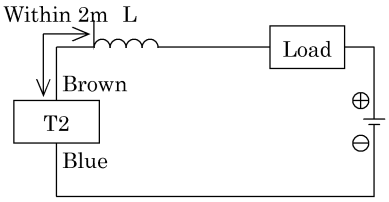


Fig.6 ・Choke coil
L= a couple hundred μ H to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

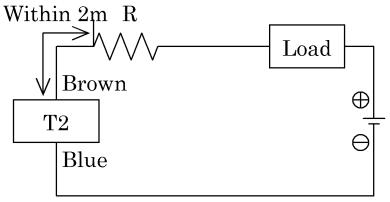


Fig.7 ・Dash current restriction resister.
R= As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

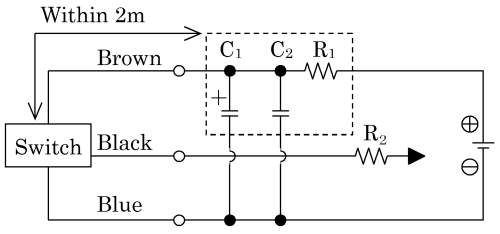


Fig8・ Electric power noise absorptive circuit.
C_1=20 to 50 μ F electrolytic capacitor
(Withstand voltage 50V or more)
C_2=0.01 to 0.1 μ F ceramic capacitor
R_1=20 to 30 Ω

・Dash current restriction resister.
R_2=As much large resister as the load circuit can afford.
・Install it nearby the switch (Within 2m)

3) Connection to a programmable controller (Sequencer).
Type of connection varies depending upon the model of the programmable controller. Refer to the following Fig. 9 to 13 respectively.

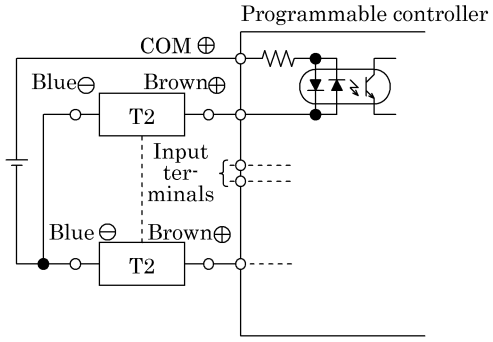


Fig.9 An example of T2 connection to source input type (an external power source)

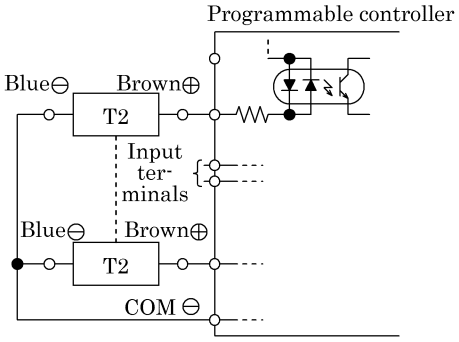


Fig.10 An example of T2 connection to source input type

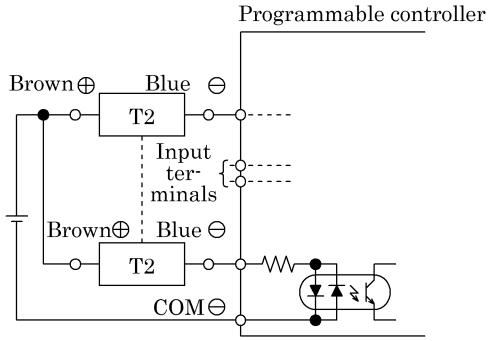


Fig.11 An example of T2 connection to source input type

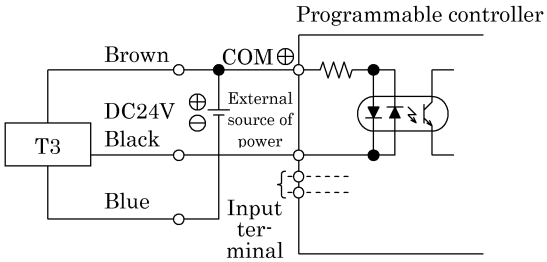


Fig.12 An example of T3 connection to source input type (an internal power source)

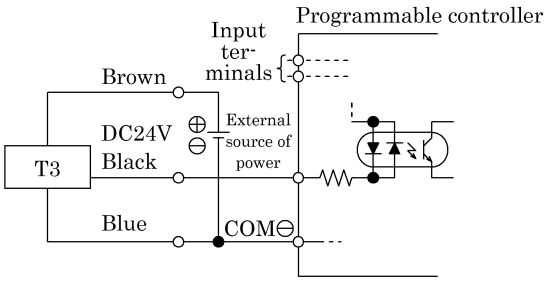


Fig.13 An example of T3 connection to source input type (an internal power source)

4) Series connection
The total voltage will decrease when the T2 switches connections have a leak. Therefore, confirm the input specifications for the programmable controllers, which are the connecting load. However, dimming or total failure of the indicator light may exist.
T3 switches hardly ever leak. When less than 10 μ A, then leakage may occur. Usually dimming and failure of the indicator light do not occur.

3.2.3 Reed switch (T0, T5, T8)

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.

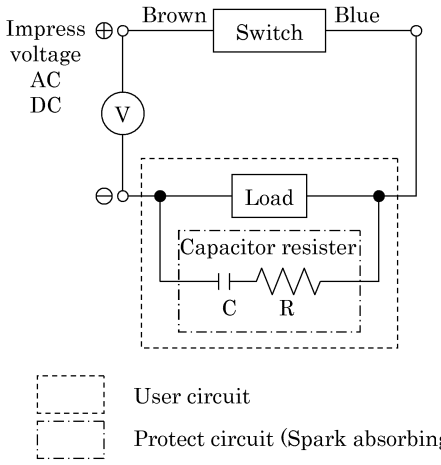
2) Contact protective measures

When an inductive load, such as relay is used or the wire length exceeds that stated in Table 1, always install a contact protective circuit.

Table 1

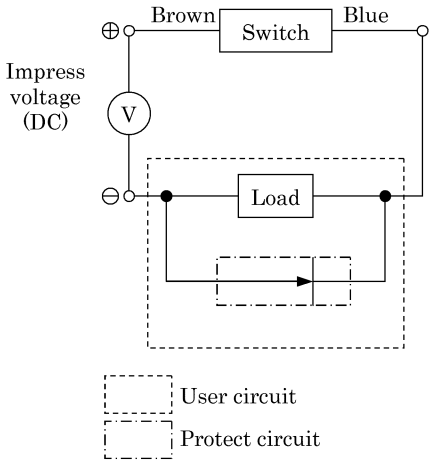
Electric power	Length of wire
DC	50m
AC	10m

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



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

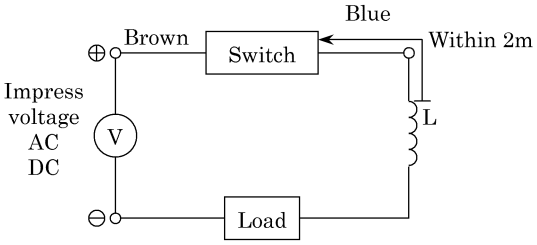
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

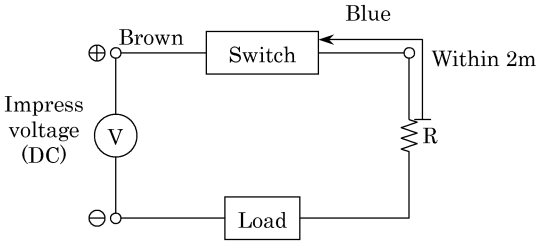
(2) Protective circuit when the wire length exceeds that stated Table 1



・ Choke coil
L=a couple hundred μH to a couple mH
surpassing high frequency characteristic

・ Install it near by a switch (within 2m).

Fig.3



・ Dash current restriction resister
R=As much large resister as the load circuit can afford.

・ Install it near by a switch (within 2m).

Fig.4

3) Contact capacity
Do not use a load exceeding the maximum contact capacity of the switch. Additionally, if the current is lower than the rated current value, the lamp may not be lit.

4) Relay
Always use the relays listed below.
Omron Corporation ····· MY type
Fuji Electric Co., Ltd. ····· HH5 type
Panasonic, Ltd. ····· HC type

5) Serial connection
Total voltage loss, when connected T0 switches in series, equals to the sum of respective voltage loss of each switch.
The total voltage loss becomes equivalent to one T0 (approx. 2.4V) when connecting the combination of one T0 for actuation confirming and rest of T5 switches. Indicator light is lit only when all switches turn on.

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

4. MAINTENANCE

4.1 Periodical Inspection

1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.
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 piston speed and cycle time.
   (4) Check for internal and/or external leakage.
   (5) Check the piston rod for flaw (scratch) and deformation.
   (6) Check the stroke for abnormality.

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

4.2 Disassembly

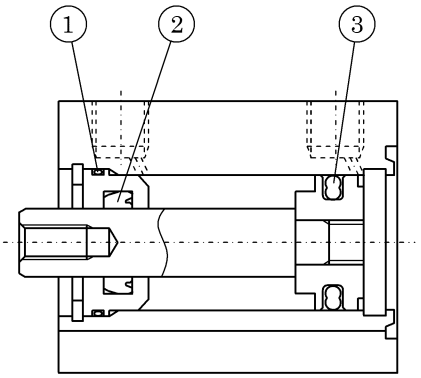
1) This cylinder is able to be disassembled.
   Replace component parts listed in Expendable parts List by disassembling cylinder referring to internal structure diagram when air leakage is ever occurred.
2) Remove piston rod and rod metal after removing C shape snap ring for the purpose of disassembly.

4.3 Assembly

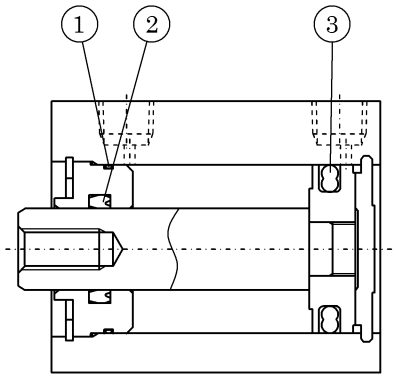
1) Clean each component parts.
2) Take reversed sequence of disassembly to assemble cylinder after cleaning parts. Carefully avoid giving damage to packings to prevent malfunction or air leakage.
3) Apply a film of high grade grease (Lithium alkali base) over the inner surface of cylinder tube, outer surface of piston and packings.

4.4 Internal structure drawings and Expendable parts list

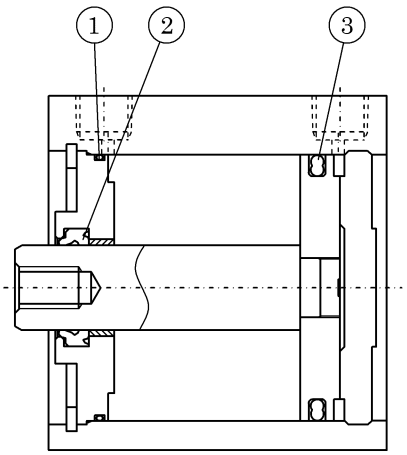
・SSD-M- φ12 to φ25
(Double acting, non-rotating type)



・SSD-M- φ32 to φ50
(Double acting, non-rotating type)



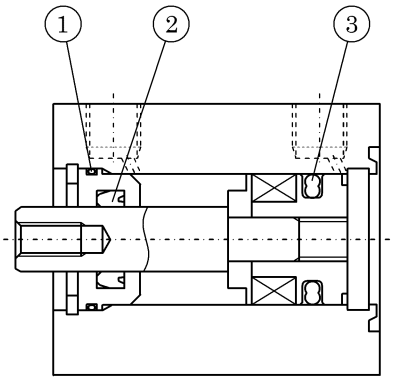
・SSD-M- φ63
(Double acting, non-rotating type)



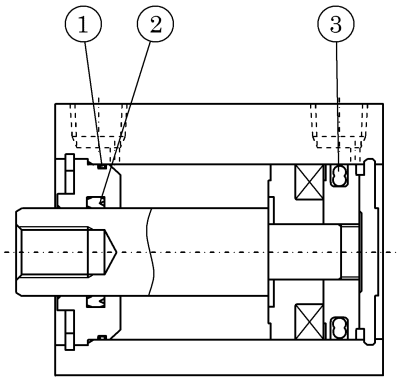
Expendable parts list (Specify the kit No. on your purchase order.)

Parts No / Parts name / Bore size (mm) / Kit No.	①	②	③
	Rod metal gasket	Rod packing	Piston packing
φ12	SSD-M-12K	F3-657972	F4-667705	PSD-12
φ16	SSD-M-16K	F3-657973	F4-164542	PSD-16
φ20	SSD-M-20K	F3-657968	F4-650200	PSD-20
φ25	SSD-M-25K	F3-657969	F4-650201	PSD-25
φ32	SSD-M-32K	F3-657975	F4-164776	PSD-32
φ40	SSD-M-40K	F3-657976	F4-164776	PSD-40
φ50	SSD-M-50K	F3-657977	F4-164777	PSD-50
φ63	SSD-M-63K	AS568-035	F4-164777	PSD-63

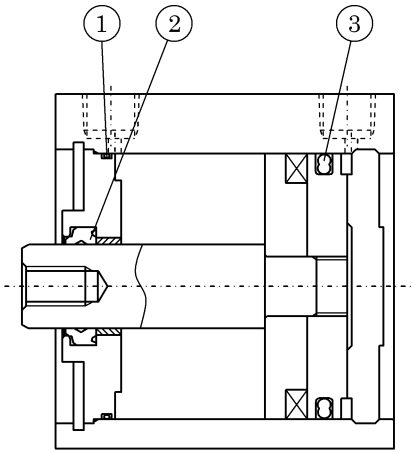
・SSD-L-M- ϕ 12 to ϕ 25
(Double acting,
non-rotating type with switch)



・SSD-L-M- ϕ 32 to ϕ 50
(Double acting,
non-rotating type with switch)



・SSD-L-M- ϕ 63 (Double acting, non-rotating type with switch)



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

Parts No. / Parts name / Bore size (mm) / Kit No.	①	②	③
	Rod metal gasket	Rod packing	Piston packing
ϕ 12	SSD-ML-12K	F3-657972	F4-667705	PSD-12
ϕ 16	SSD-ML-16K	F3-657973	F4-164542	PSD-16
ϕ 20	SSD-ML-20K	F3-657968	F4-650200	PSD-20
ϕ 25	SSD-ML-25K	F3-657969	F4-650201	PSD-25
ϕ 32	SSD-ML-32K	F3-657975	F4-164776	PSD-32
ϕ 40	SSD-ML-40K	F3-657976	F4-164776	PSD-40
ϕ 50	SSD-ML-50K	F3-657977	F4-164777	PSD-50
ϕ 63	SSD-ML-63K	AS568-035	F4-164777	PSD-63

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.
Rod rotates	The rod takes revolving torque.	Take off the revolving torque.
	The rod rotates with spanners at the case of tightening some work.	Hold the rod to prevent the rotation with spanners, and tighten the work to the rod.

2) Switch

Troubles	Causes	Remedies
Indicator light is not lit.	Deposited contact point	Replace the switch.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	Damaged indicator light	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
Switch does not function right.	Broken circuit	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
	Improper voltage	Correct voltage to specified.
	Incorrect location of switch	Correct its location.
	Aberrant position of switch	Set it back to original position and tighten the mounting device.
	Incorrect direction of switch mounting	Correct the direction of the switch mounting.
	Relay is unable to respond properly	Turn the speed down. Replace the relay with a recommended one.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
Switch does not return.	Piston is not moving	Make the piston move.
	Deposited contact point	Replace the switch
	Excessive load (relay) than rated capacity	Replace the relay with a recommended one or replace the switch.
	The ambient temperature is out of the specification range	Adjust the ambient temperature within the range of -10 to 60℃
	Existence of a foreign magnetic field	Shield the magnetic field.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.

6. HOW TO ORDER

6.1 Product Number Coding

● Without switch

SSD-M – 12 – ○ – 5 ——————— N – LB – I

● With switch

SSD-ML – 12 – ○ – 5 – T0H – R – N – LB – I

● 2 color indicator/preventive maintenance output switch (12, 16mm bore only)

SSD-ML1 – 12 – ○ – 10 – T2YH – R – N – LB – I

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

(a) Model		(b) Bore size (mm)				(c) Port thread type	
SSD-M	Double acting/non-rotating type	12	φ12	32	φ32	Blank	Rc thread
SSD-ML	Double acting/ non-rotating type /With switch	16	φ16	40	φ40	NN	NPT thread (Custom order)
		20	φ20	50	φ50		
SSD-ML1	φ12, φ16, 2 color indicator, preventive maintenance switch	25	φ25	63	φ63	GN	G thread (Custom order)

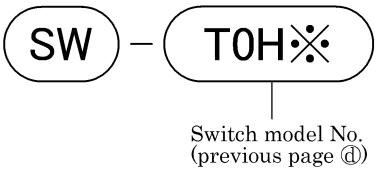
(d) Stroke length (mm)			(e) Switch model No.				
φ12 to φ20	φ25 to φ50	φ63	Axial lead type	Radial lead type	Switch type	Indicator light	Lead wire
5	5	5					
10	10	10	T0H※	T0V※	Reed	1 color indicator	2 wire
15	15	20	T5H※	T5V※			
20	20	30	T8H※	T8V※			
25	25	40	T1H※	T1V※	Solid state	2 color indicator	
30	30	50	T2H※	T2V※			2 wire
	40		T3H※	T3V※			3 wire
	50		T2YH※	T2YV※			2 wire
			T3YH※	T3YV※			3 wire
			T2WH※	T2WV※			2 wire
			T3WH※	T3WV※			3 wire
			T2JH※	T2JV※		Off delay type	2 wire
			T2YD※	—		Strong magnetic field proof Proximity	
			T2YDT※	—			

※Lead wire length		(f) Switch quantity		(g) Option	
Blank	1m (standard)	R	One on rod side	Bore size (mm)	
3	3m (option)	H	One on head side	N	Rod end male thread
5	5m (option)	D	Two	M	Piston rod material (stainless steel)

※mark shows lead wire length.

(h) Mounting bracket		(i) Accessories	
LB	Axial foot	I	Rod eye
LB2	Axial foot (small type)	I2	Rod eye (small type)
CB	Clevis (pin and snap ring attached)	Y	Rod clevis (pin and snap ring attached)
CB2	Clevis (small type) (pin and snap ring attached)	Y2	Rod clevis (small type) (pin and snap ring attached)
FA	Rod end flange type		
FB	Head end flange type		

6.2 How to order switch



7. SPECIFICATION

7.1 Product Specifications

Descriptions		SSD-M SSD-ML (with switch)							
Bore size	mm	φ12	φ16	φ20	φ25	φ32	φ40	φ50	φ63
Actuation		Double acting							
Working fluid		Compressed Air							
Max. working pressure	MPa	1.0							
Min. working pressure	MPa	0.1							
Proof pressure	MPa	1.6							
Ambient temperature	℃	-10 to 60 (No freezing)							
Port size		M5				Rc1/8		Rc1/4	
Stroke length tolerance	mm	+1.0 0							
Working piston speed	mm/s	50 to 500							
Cushion		None							
Lubrication		Not required (When lubrication, use turbine oil ISO VG 32.)							
Option		Rod end male thread (N)							
Revolvable angle tolerance		±2°		±1.5°			±1°		
Allowable energy absorption	J	0.004	0.01	0.016	0.021	0.025	0.092	0.1	0.12

7.2 Switch Specification

Descriptions	Reed 2 wire			
	T0H/V		T5H/V	
Applications	Programmable controller, relay		Programmable controller, relay, IC circuit (with out indicator light), serial connection	
Load Voltage	12/24VDC	100/110VAC	5/12/24VDC	100/110VAC
Load Current	5 to 50mA	7 to 20mA	50mA or less	20mA or less
Internal voltage drop	2.4V or less		0V	
Indicator light	LED (ON lighting)		Without indicator light	
Leakage current	0mA			
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2mm²)			
Shock resistance	294m/s²			
Insulation resistance	20MΩ over at 500VDC megger			
Withstand voltage	No failure impressed at 1000VAC for one minute			
Ambient temperature	−10 to 60℃			
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance			

Descriptions	Reed 2 wire			Solid state 2 wire
	T8H/V			T1H/V
Applications	Programmable controller and			Programmable controller, relay and small solenoid valve
Load Voltage	12/24VDC	110VAC	110VAC	85 to 265 VAC
Load Current	5 to 50mA	7 to 20mA	7 to 10mA	5 to 100mA
Internal voltage drop	3V or less			7V or less
Indicator light	LED (ON lighting)			
Leakage current	0mA			1mA or less at 100VAC 2mA or less at 200VAC
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm²)			
Shock resistance	294m/s²			980m/s²
Insulation resistance	100MΩ over at 500VDC megger			
Withstand voltage	No failure impressed at 1500VAC for one minute			
Ambient temperature	−10 to 60℃			
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance			

Descriptions	Solid state 2 wire		
	T2H/V	T2JH/V	T2YH/V
Applications	Programmable controller		
Load Voltage	10 to 30VDC		
Load Current	5 to 20mA (Note 2)		
Internal voltage drop	4V or less		
Delay hour off	—	20±50m/s	—
Indicator light	LED (ON lighting)		Red/green LED (ON lighting)
Leakage current	1 mA or less		
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2mm²)	Standard 1m (Oil resistant cabtire cord 2 conductor 0.3 mm²)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3 mm²)
Shock resistance	980m/s²		
Insulation resistance	20MΩ over at 500V DC meggeer	100MΩ over at 500VDC megger	
Withstand voltage	No failure impressed at 1000VAC for one minute		
Ambient temperature	-10 to 60℃		
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance		

7 SPECIFICATION

Descriptions	Solid state 3 wire	
	T3H/V	T3YH/V
Applications	Programmable controller, relay	
Power supply voltage	10 to 28VDC	
Load Voltage	30VDC or less	
Load Current	100 mA or less	50mA or less
Current consumption	10mA or less at 24VDC	
Internal voltage drop	0.5V or less	
Indicator light	LED (ON lighting)	Red/green LED (ON lighting)
Leakage current	10 μA or less	
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.2mm^2)	
Shock resistance	980m/s^2	
Insulation resistance	20MΩover at 500VDC meggeer	100MΩ over at 500VDC megger
Withstand voltage	No failure impressed at 1000VAC for one minute	
Ambient temperature	-10 to 60℃	
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance	

Descriptions	Solid state 2 wire	Solid state 3 wire
	T2WH/V	T3WH/V
Applications	Programmable controller	
Power supply voltage	—	
Load Voltage	24VDC ±10%	30VDC or less
Load Current	5 to 20 mA or less	50mA or less
Current consumption	—	10mA or less at 24VDC
Internal voltage drop	4V or less	0.5V or less
Indicator light	Red/green LED (ON lighting)	
Leakage current	1mA or less	10 μA or less
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm^2)	Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.2mm^2)
Shock resistance	980m/s^2	
Insulation resistance	20MΩover at 500VDC meggeer	
Withstand voltage	No failure impressed at 1000VAC for one minute	
Ambient temperature	-10 to 60℃	
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance	

Descriptions	Proximity 2 wire	
	T2YD	T2YDT
Applications	Programmable controller	
Load voltage	24VDC±10%	
Load current	5 to 20mA	
Internal voltage drop	6V or less	
Indicator light	Red/green LED (ON lighting)	
Leakage current	1.0mA or less	
Output delay time (Note3) (ON delay, OFF delay)	30 to 60ms	
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.5mm)	Standard 1m (Flame resistant vinyl cabtire cord 2 conductor 0.5mm)
Shock resistance	980m/s^2	
Insulation resistance	100MΩ over at DC500V megger	
Withstand voltage	No failure impressed at AC1000V for one minute	
Ambient temperature	-10 to 60℃	
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance	

Note1 : 3m or 5m long lead wire is optionally available.
Note2 : Maximum value, 20mA is at 25℃ of ambient temperature. Load current decreases less than 20mA when the ambient temperature exceeds 25℃. (For example: it may be 5 to 10mA at 60)
Note3 : The time until the magnetic sensor outputs a switch signal after detected the piston magnet is shown.