CKD

SM－２３４３３２－A

INSTRUCTION MANUAL

SUPER COMPACT CYLINDER HIGH LOAD TYPE

SSD-K, SSD-KL

● Please read this instruction manual carefully before using this product, particularly the section describing safety.

● Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

The 3rd edition

For Safety Use

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

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

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

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

⚠ CAUTION :

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

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SSD−K, SSD−KL

Super Compact Cylinder
High load type

Manual No. SM-234332-A

1. UNPACKING

1) Make sure that the type No. on the nameplate of the delivered Super Compact Cylinder matches the type No. you orderd.

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

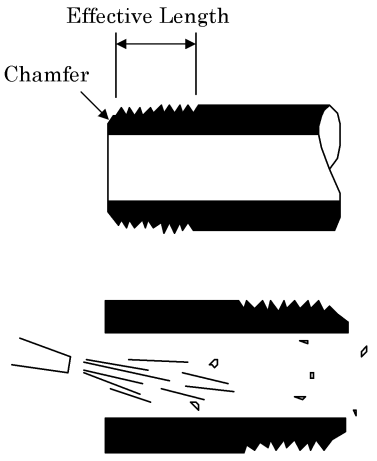
1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.

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.

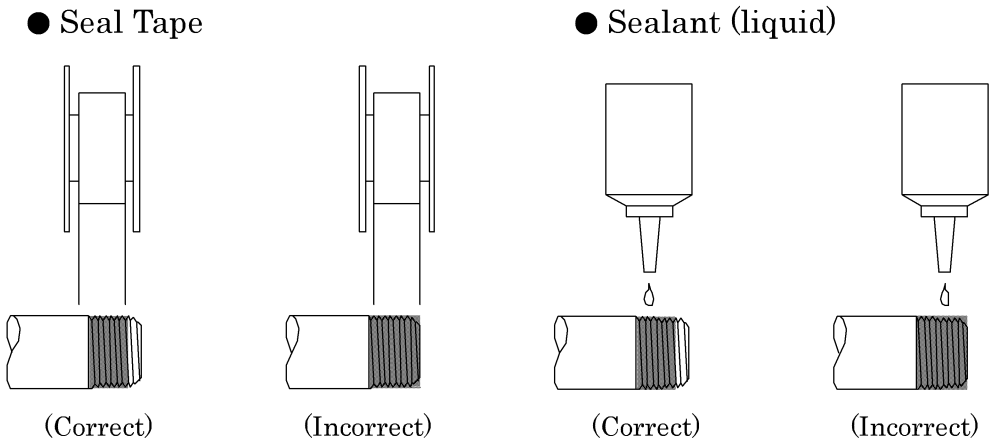
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

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

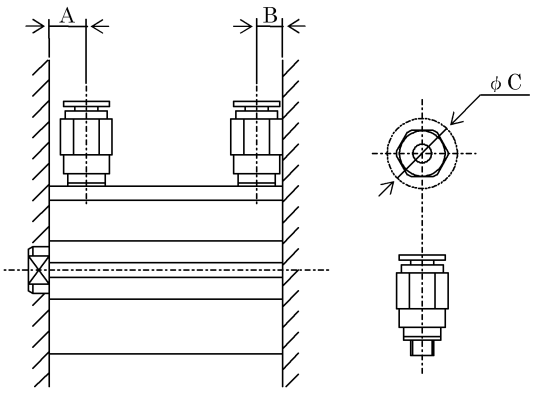
5) Flush air into the pipe to blow out foreign substances and chips before piping.



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



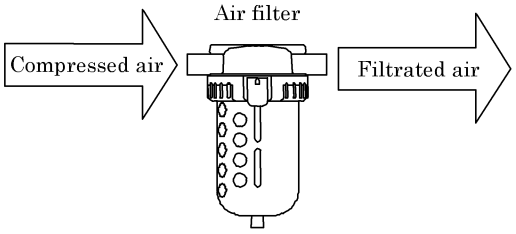
7) Because the usable piping joint has limitations, for using it, see the note below.



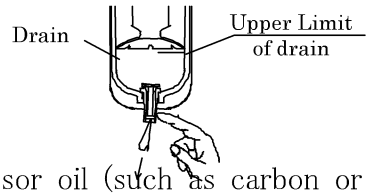
Item / Tube bore (mm)	Port diam.	Port dimension A	Port dimension B	Available joints	Joint OD C dia.	Joint unsuitable
12 dia.	M5	5.5	5.5	SC3W−M5−4, SC3W−M5−6 GWS4−M5−S, GWS4−M5 GWL4−M5, GWL6−M5	11 dia. or less	GWS6−M5
16 dia.						
20 dia.		8				
25 dia.		11	6			
32 dia.	Rc1/8	8	8	SC3W−6−4·6·8 GWS4−6, GWS6−6, GWS8−6 GWL4−6, GWL6−6	15 dia. or less	GWS10−6 GWL8−6 GWL10−6
40 dia.		12	8.5			
50 dia.	Rc1/4	10.5	10.5	SC3W−8−6·8·10 GWS4−8, GWS6−8, GWS10−8 GWL4 to 12−8	21 dia. or less	GWS12−8
63 dia.		13	11			
80 dia.	Rc3/8	16	13	SC3W−10−8·10·12 GWS6−10, GWS8−10, GWS10−10 GWL6 to 12−10		——
100 dia.		23	15			

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



2) Be sure to drain out the accumu- lation 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.

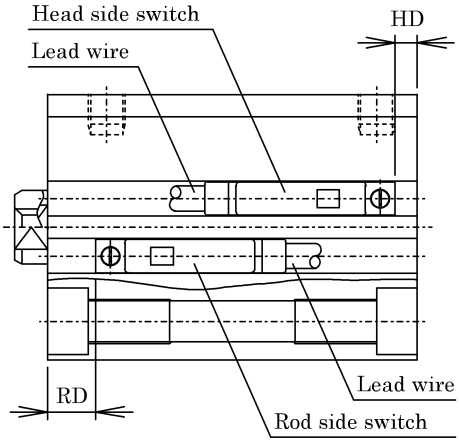
4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 as a lubricant, if and when lubrication is needed.

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 highest sensitivity.



(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 highest sensitivity 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 most 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 most 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.

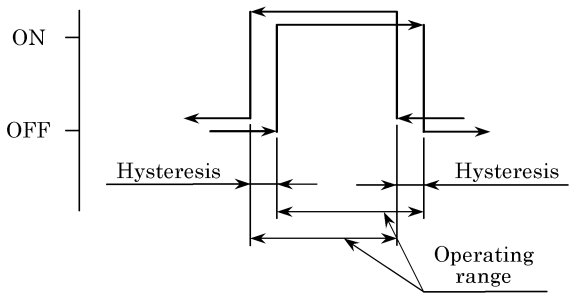


Table of best operating position (HD ・ RD), Operating range and Hysteresis (mm)

Item / Tube bore (mm)	Solid state type (T2H/V、T3HV)				Reed switch type (T0H/V、T5H/V)			
	Best operating position		Operating range	Hysteresis	Best operating position		Operating range	Hysteresis
	HD	RD			HD	RD		
12 dia.	2.5	4.5	2 to 6	1.5 or less	2.5	4.5	5 to 8	3 or less
16 dia.	3	4	2 to 5		3	4	4 to 9	
20 dia.	6(12.5)	8.5(13.5)	3 to 8		6(12.5)	8.5(13.5)	6 to 14	
25 dia.	5.5(14)	12(17)	3 to 9		5.5(14)	12(17)	5 to 14	
32 dia.	8.5(16)	14(14)	3 to 8		8.5(16)	14(14)	5 to 12	
40 dia.	9.5(19)	19.5(19.5)	3 to 9		9.5(19)	19.5(19.5)	6 to 14	
50 dia.	10(19)	20(25)	3 to 9		10(19)	20(25)	6 to 14	
63 dia.	17.5(23)	18(23)	3 to 9		17.5(23)	18(23)	7 to 15	
80 dia.	22.5(28)	20.5(25.5)	4 to 10		22.5(28)	20.5(25.5)	7 to 15	
100 dia.	28(33.5)	24.5(29.5)	4 to 10		28(33.5)	24.5(29.5)	9 to 15	

※ Switches at ex-factory shipment are positioned at the most sensitive points (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.
20 dia.: 100 mm stroke, 25 to 50 dia.: 150 mm stroke, 63 to 100 dia.: when HD, RD dimensions exceed 200 mm stroke, refer to the value in ( ).

3. OPERATION

3.1 Operating the Cylinder

1) See to it that the air supply pressure to the cylinder is as shown in the “Specification”. Operate the cylinder within this pressure 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.

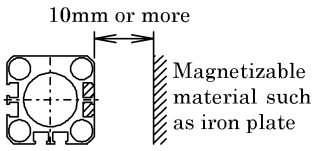
3.2 How to use the Switches

3.2.1 Common items

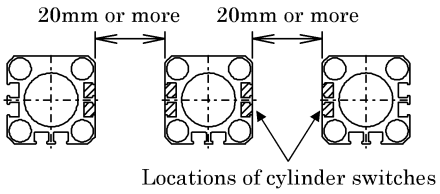
1) Magnetic environment
Do not operate this product in a place where a strong magnetic field or large current (large magnet or spot welder, etc.) exists. If a cylinder with the switch is installed in parallel to this product or the magnetic substance moves near the cylinder, the mutual interference may occur and affect the detection accuracy.

2) Protection of lead cord
Pay consideration to eliminate rapeating 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.

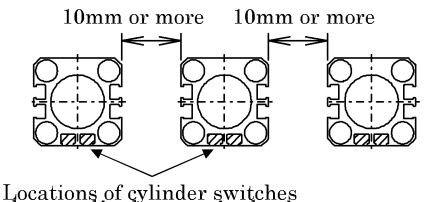
3) Operating temperature
Do not operate the product at a high temperature (60℃)
Always avoid operation of the product in a hot place due to temperature character- istics of magnetic and electronics parts.



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).

8) Changing switch lead wire colors

The colors of the switch lead wires have been changed, as shown in the following table, in response to the revision of the JIS standard and the subsequent revision of the NECA (Nippon Electric Controllers Association) standard.

		Before change	After change
M, S, R, A, T, K, V, H Series	2-wire type	White (+)	Brown (+)
		Black (−)	Blue (−)
	3-wire type	Red (+)	Brown (+)
		White (output)	Black (output)
		Black (−)	Blue (−)

3.2.2 Operational Cautions, Solid State switch (T2, T3)

1) Connection of lead cord

Comply with the color coding specified on the illustrations. Be sure to turn the power off before starting connecting work.

An erroneous wiring or short circuiting of load causes damage to not only switches, but also load side circuit. Wiring work without shutting electricity off may cause damage to the load side circuit.

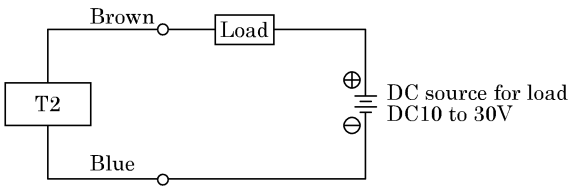


Fig.1 T2 Fundamental circuit Example

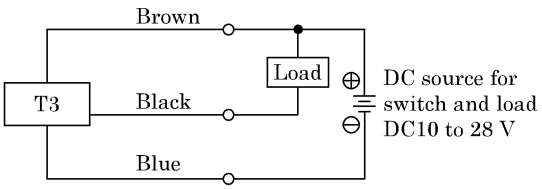


Fig.2 T3 Fundamental circuit Example(1)
(In case the same source of power is used.)

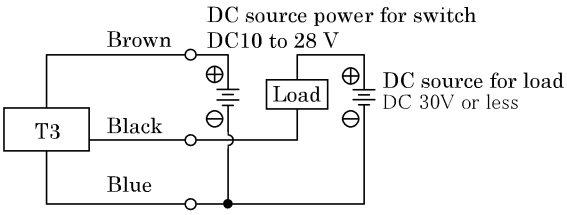


Fig.3 T3 Fundamental circuit Example(2)
(In case individual sources of power are used.)

2) Protection of output circuit

Install some protective circuit as illustrated in Fig. 4 when inducing type load (Relay or solenoid valve) are to be used because those types apt to generate surge current switch off.

Install some protective circuit as illustrated in Fig. 5 when capacitor type load (Capacitor type) are to be used, because these types apt to generate a dash current when turning the switch ON.

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

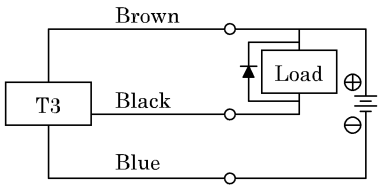
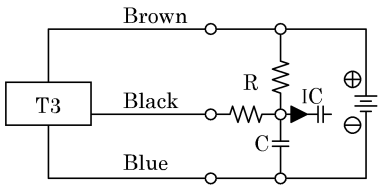


Fig.4 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



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.

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

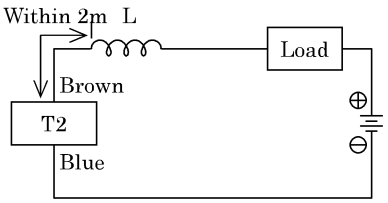


Fig.6 ・Choke coil
L= a couple hundred μH to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

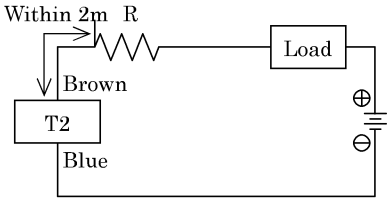


Fig.7 ・Dash current restriction resister.
R=As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

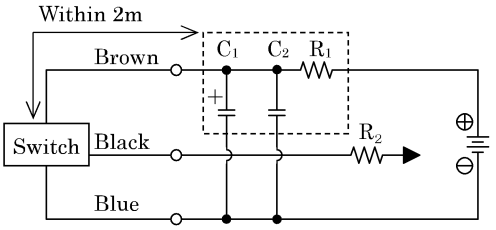


Fig8 ・Electric power noise absorptive circuit.
C_1 = 20 to 50 μF electrolytic capacitor
(Withstand voltage 50V or more)
C_2 = 0.01 to 0.1 μF ceramic capacitor
R_1 = 20 to 30 Ω

・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.

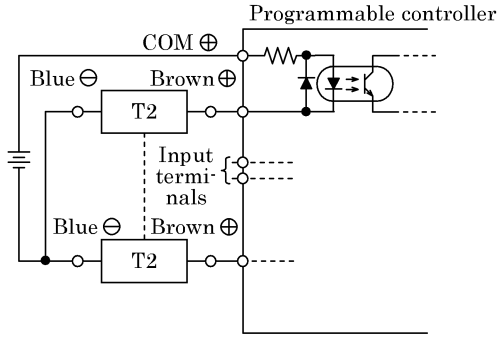


Fig.9 An example of T2 connection to source input type (an external power source)

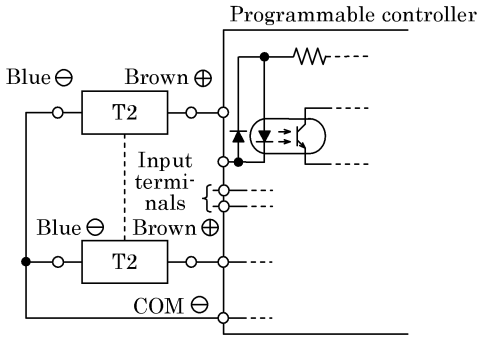


Fig10 An example of T2 connection to source input type (an internal power source)

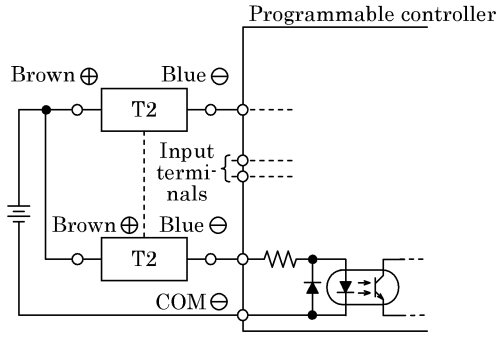


Fig.11 An example of T2 connection to sink input type

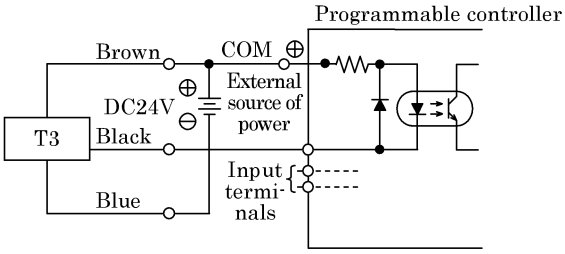


Fig.12 An example of T3 connection to source input type (an external power source)

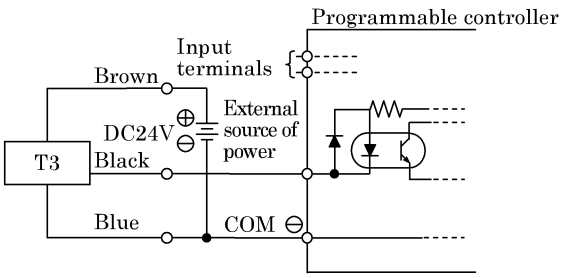


Fig.13 An example of T3 connection to source input type (an internal power source)

The T3 switch cannot be connected to the sink input.

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

3.2.3 Reed switch type switch (T0, T5)

1) Lead wire connections

Do not connect the lead wires of the switch to the power supply directly. Always connect the loads in series. For T0 switch, carefully check following items Ⓐ,Ⓑ.

Ⓐ When using the switch for DC power supply, connect the brown and blue lines to the positive and negative sides, respectively. If these lines are connected reversely, the switch is activated, but the indicator light is not lit.

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

Note that the R4 and R5 switches have no polarities.

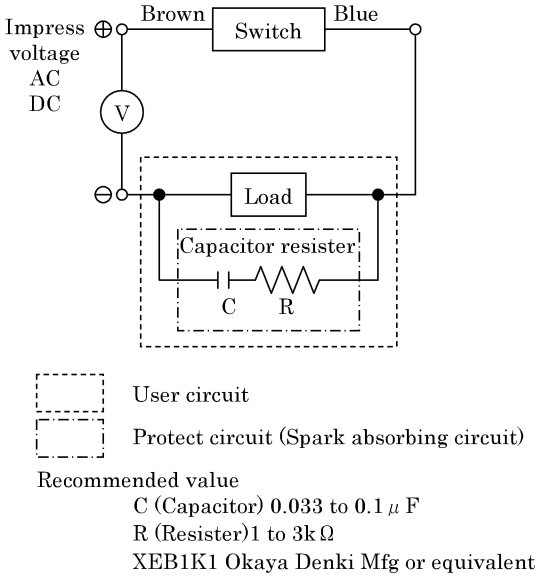
2) Contact protective measures

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

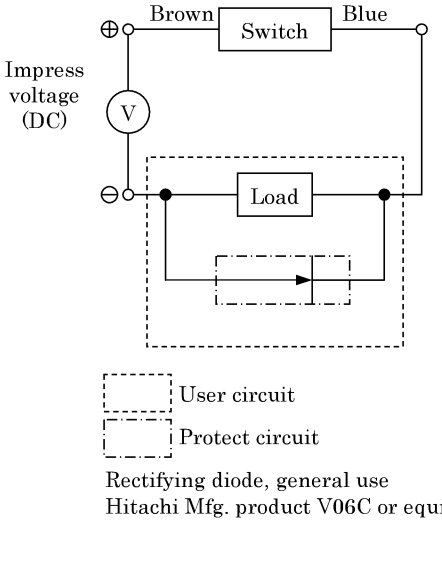
Electric power	Length of wire
DC	100m
AC	10m

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



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

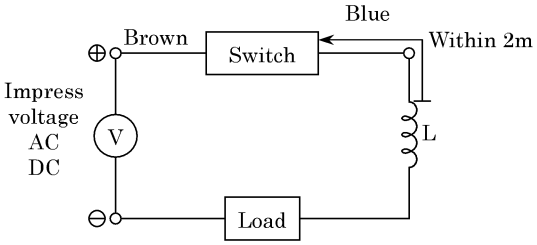
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

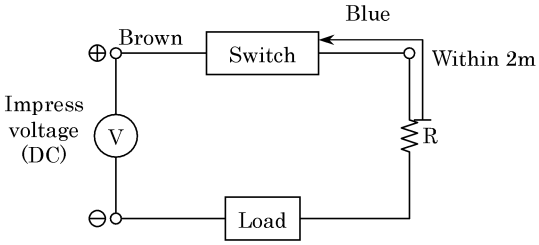
(2) Protective circuit when the wire length exceeds that stated Table 1



・ 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 indicator light may not be lit.

4) Relay

Always use the relays listed below.

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

5) Serial connection

Total voltage loss, when connected T0 switches in series, equals to the sum of respective voltage loss of each switch.

The total voltage loss becomes equivalent to one T0 (approx. 2.4V) when connecting the combination of one T0 for actuation confirming and rest of T5 switches. Indicator light is lit only when all switches turn on.

6) Parallel connection

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

4. MAINTENANCE

4.1 Periodical Inspection

1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.
2) Inspection items
   (1) Check the bolts and nuts fitting the piston rod end fittings and supporting fittings 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 bushing after removing C shape snap ring for the purpose of disassembly.

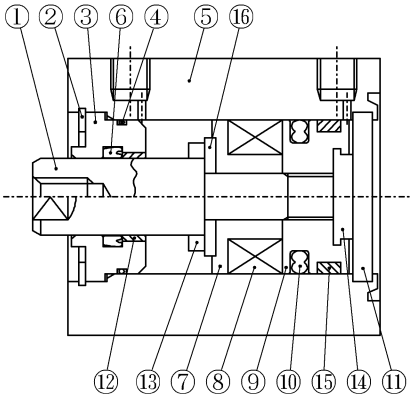
4.3 Assembly

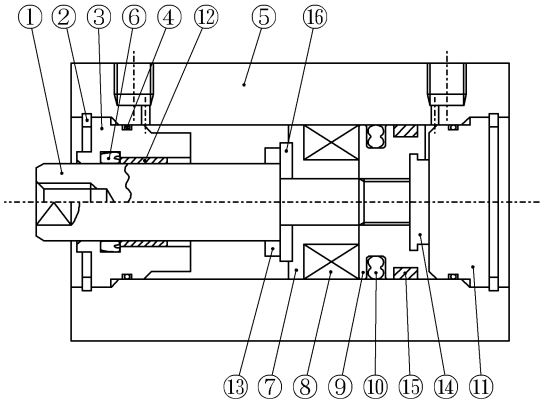
1) Clean each component parts.
2) Take reversed sequence of disassembly to assemble cylinder after cleaning parts. Carefully avoid giving damage to packings to prevent malfunction or air leakage.
3) Apply a film of high grade grease (Lithium alkali base) over the inner surface of cylinder tube, outer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

4.4 Internal structure drawings and Expendable parts list

・SSD−KL−12 to 25 (double acting/single rod high load type/with switch)

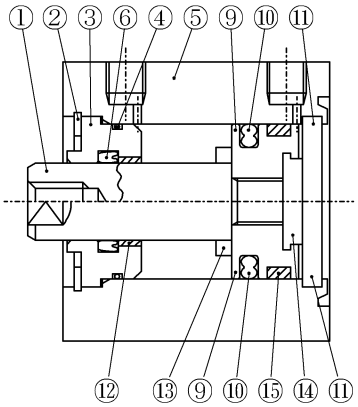
20 mm bore : 100 to 200 mm stroke
25 mm bore : 150 to 300 mm stroke

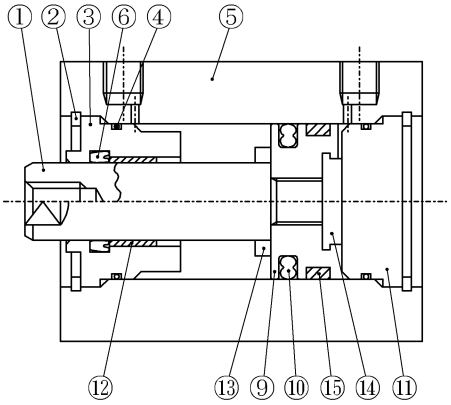




・SSD−K−12 to 25 (double acting/single rod high load type)

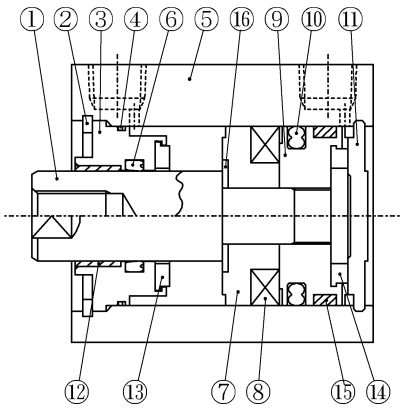
20 mm bore : 100 to 200 mm stroke
25 mm bore : 150 to 300 mm stroke

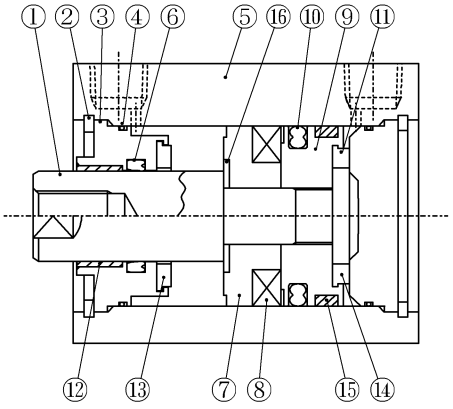




・SSD−KL−32 (double acting/single rod high load type/with switch)

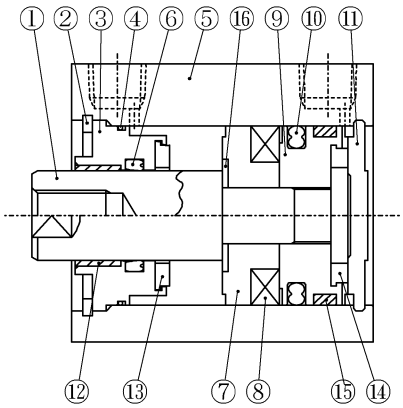
20 mm bore : 100 to 200 mm stroke
25 mm bore : 150 to 300 mm stroke

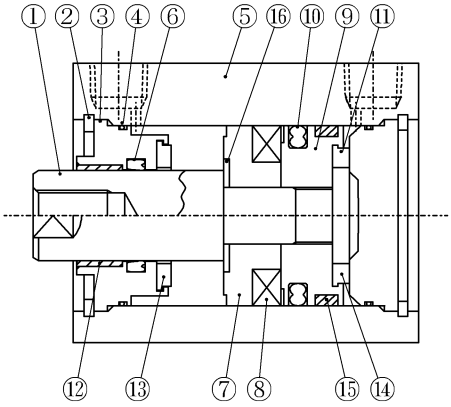




・SSD−K−32 (double acting/single rod high load type)

20 mm bore : 100 to 200 mm stroke
25 mm bore : 150 to 300 mm





No.	Parts name	Material	Remarks
1	Piston rod	12 to 25 dia. : Stainless steel, 32 dia. : Steel	12 to 25 dia. : Industrial chrome plate
2	C type snap ring	Steel	Phosphate coating
3	Rod bushing	Special aluminum	Alumite
4	Rod metal gasket	Nitrile rubber	
5	Main body	Aluminum alloy	Hard alumite disposal
6	Rod packing seal	Nitrile rubber	
7	Spacer	12 dia. : Aluminum alloy 16 to 32 dia. : Special plastic	12 dia. : Chromate
8	Piston magnet	Plastic magnet	
9	Piston	Aluminum alloy	Chromate
10	Piston packing seal	Nitrile rubber	
11	Cover	12 dia. to 25 dia. : Stainless steel 32 dia. : Aluminum alloy	32 dia. : Alumite (Note1)
12	Bush	DU dry bearing	20 to 32 dia. (Note2)
13	Cushion rubber (R)	Urethane rubber	
14	Cushion rubber (H)	Urethane rubber	
15	Wear ring	Acetar resin	
16	Spacer washer	Stainless steel	20 to 32 dia.

Note1 : For cover of long stroke type (20 to 32mm bore), materials: aluminum alloy and remarks: alumite treatment.
Note2 : For copper and PTFE free specifications, steel is used.

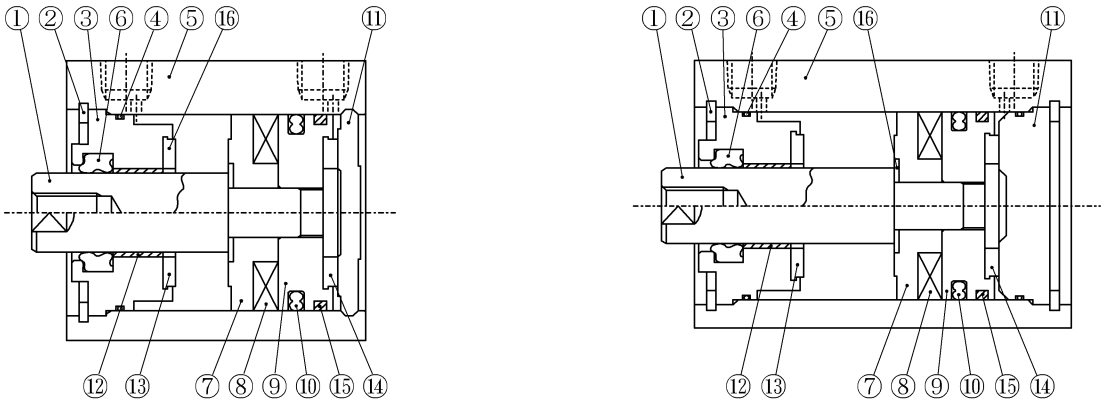
Expendable parts list (Specify the kit No. on your purchase order.)

Tube bore(mm) \ Parts name / Kit No.		Rod metal gasket	Rod packing seal	Piston packing seal
12 dia.	SSD−K−12K	④	⑥	⑩
16 dia.	SSD−K−16K			
20 dia.	SSD−K−20K			
25 dia.	SSD−K−25K			
32 dia.	SSD−K−32K			

Tube bore(mm) \ Parts name / Kit No.		Cushion rubber (R)	Cushion rubber (H)	Wear ring
12 dia.	SSD−K−12K	⑬	⑭	⑮
16 dia.	SSD−K−16K			
20 dia.	SSD−K−20K			
25 dia.	SSD−K−25K			
32 dia.	SSD−K−32K			

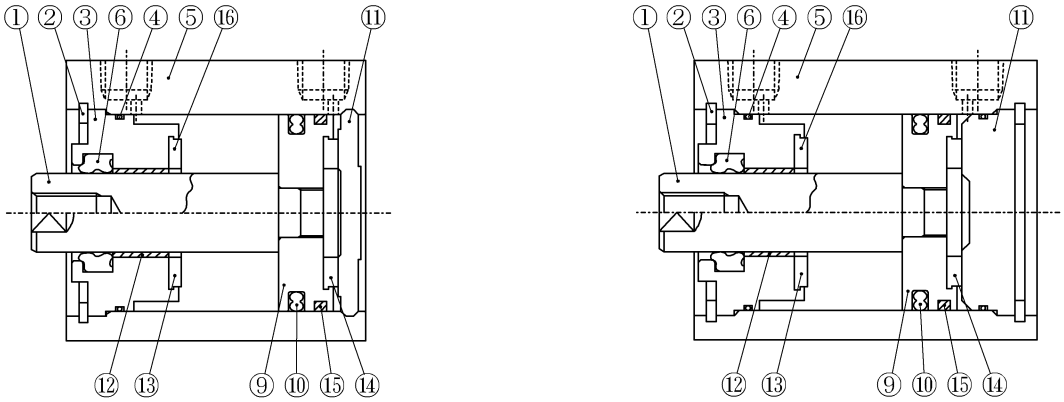
· SSD—KL—40 to 50 (double acting/single rod high load type/with switch)

40, 50 mm bore : 150 to 300 mm stroke



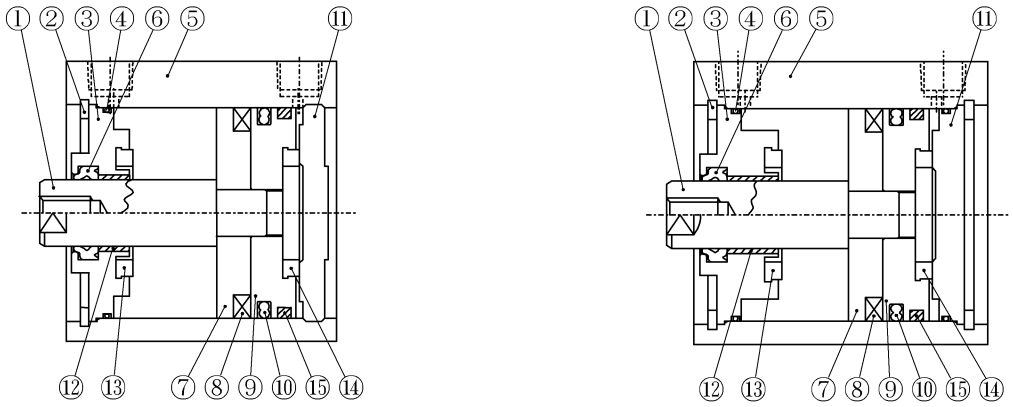
· SSD—K—40 to 50 (double acting/single rod high load type)

40, 50 mm bore : 150 to 300 mm stroke



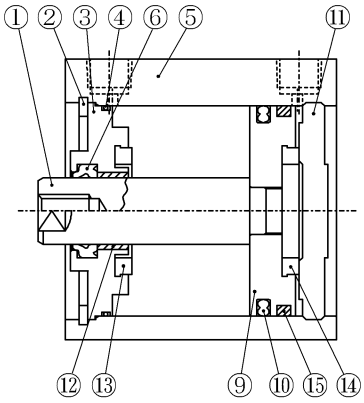
· SSD—KL—63 to 100 (double acting/single rod high load type/with switch)

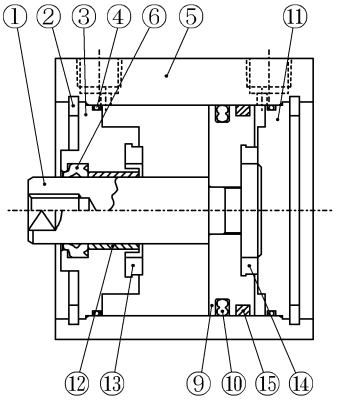
63 to 100 mm bore: 200 to 300 mm stroke



・SSD−K− 63 to 100 (double acting/single rod high load type)

63 to 100 mm bore : 200 to 300 mm stroke





No.	Parts name	Material	Remarks
1	Piston rod	Steel	Industrial chrome plated
2	C type snap ring	Steel	Phosphate coating
3	Rob bushing	Aluminum alloy	Alumite
4	Rod metal gasket	Nitrile rubber	
5	Main body	Aluminum alloy	Hard alumite disposal
6	Rod packing seal	Nitrile rubber	
7	Spacer	40, 50 dia. : Special plastic 63 to 100 dia. : Stainless steel	63 to 100 dia. : Chromate
8	Piston magnet	Plastic magnet	
9	Piston	Aluminum alloy	
10	Piston packing seal	Nitrile rubber	
11	Cover	Aluminum alloy	Alumite (Note1)
12	Bush	DU dry bearing	(Note2)
13	Cushion rubber (R)	Urethane rubber	
14	Cushion rubber (H)	Urethane rubber	
15	Wear ring	Acetar resin	
16	Spacer washer	Stainless steel	40 to 50 dia.

Note1 : For a long stroke type cover, material listed on remarks: alumite treatment is used.
Note2 : For copper and PTFE free specifications, steel is used.

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

Tube bore(mm) / Parts name / Kit No.	Rod metal gasket	Rod packing seal	Piston packing seal
ϕ 40	SSD−K−40K	④	⑥	⑩
ϕ 50	SSD−K−50K			
ϕ 63	SSD−K−63K			
ϕ 80	SSD−K−80K			
ϕ 100	SSD−K−100K			

Tube bore(mm) / Parts name / Kit No.	Cushion rubber (R)	Cushion rubber (H)	Wear ring
ϕ 40	SSD−K−40K	⑬	⑭	⑮
ϕ 50	SSD−K−50K			
ϕ 63	SSD−K−63K			
ϕ 80	SSD−K−80K			
ϕ 100	SSD−K−100K			

5. TROUBLE SHOOTING

1) Cylinder

Trouble	Causes	Remedies
Does not operate.	No pressure or inadequate pressure.	Provide an adequate pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Broken piston packing	Replace the piston packing.
Does not function smoothly.	Speed is below the low speed limit	Limit the load variation.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Exertion of transverse (lateral) load.	Install a guide. Revise the installation state and/or change the mounting style.
	Excessive load.	Increase the pressure itself and/or the inner diameter of the tube.
	Speed control valve is built in the way of "Meter in'' circuit.	Change the meter-out circuit of the speed control valve.
Breakage and / or deformation	Impact force due to high speed operation	Turn the speed down. Reduce the load and/or install a mechanism with more secured cushion effect (e.g.external cushion mechanism).
	Exertion of transverse load.	Install a guide. Reverse the installation state and/or change the mounting style.

2) 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 How to order product

● Without switch

SSD-K – 12 NN – 5 ———————— N – LB I

● With switch

SSD-KL – 12 NN – 5 – T0H – R – N – LB I

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

Model		(a) Tube bore (mm)				(b) Pipe thread type	
SSD-K	Double acting, High load type	12	12 dia.	40	40 dia.	Blank	Rc
		16	16 dia.	50	50 dia.	NN	NPT (32 dia. or more) (custom order)
SSD-KL	Double acting, High load type, with switch	20	20 dia.	63	63 dia.	GN	G (32 dia. or more) (custom order)
		25	25 dia.	80	80 dia.		
		32	32 dia.	100	100 dia.		

(c) Stroke (mm)											
	Bore size (mm)	12	16	20	25	32	40	50	63	80	100
5	5	●	●	●							
10	10	●	●	●	●	●	●	●	●	●	●
15	15	●	●	●	●	●	●	●			
20	20	●	●	●	●	●	●	●	●	●	●
25	25	●	●	●	●	●	●	●			
30	30	●	●	●	●	●	●	●	●	●	●
40	40	●	●	●	●	●	●	●	●	●	●
50	50	●	●	●	●	●	●	●	●	●	●
60	60				●	●	●	●	●	●	●
70	70				●	●	●	●	●	●	●
80	80				●	●	●	●	●	●	●
90	90				●	●	●	●	●	●	●
100	100				●	●	●	●	●	●	●

※About custom stroke length
Available per 1mm increment.(For types with switches, the stroke less than 5mm is not available)
Overall length dimensions are as same as dimensions of the following increment of standard stroke length.

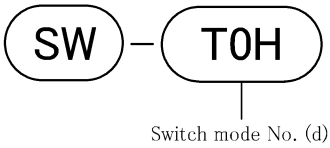
(d) Switch model No. Note1					(e) Switch quantity	
Axial lead wire	Radial lead wire	contact	Display	Lead wire	R	One on rod side
					H	One on head side
T0H※	T0V※	Reed	1 color indicator	2 wire	D	Two
T5H※	T5V※		Without indicator light			
T2H※	T2V※	Solid State	1 color indicator	2 wire	※ Lead wire length	
T3H※	T3V※			3 wire	Blank	1m (standard)
T2YH※	T2YV※		2 color indicator	2 wire	3	3m (option)
T3YH※	T3YV※			3 wire	5	5m (option)
T2JH※	T2JV※		Off delay type	2 wire	※mark shows lead wire length .	
T2YD※	—		Switch for strong magnetic field	2 wire		
T2YDT※	—					

(f) Option Note2										
Bore size (mm)		12	16	20	25	32	40	50	63	80	100
N	Rod end male thread	●	●	●	●	●	●	●	●	●	●
M	Piston rod material (stainless)	●	●	●	●	●	●	●	●	●	●
P6	Copper and PTFE free	Standard		●	●	●	●	●	●	●	●

(g) Mounting bracket Note3		(h) Accessory (When selecting rod end male thread "N") Note4	
LB	Axial foot	I	Rod eye
CB	Clevis (pin attached)	Y	Rod clevis

Note1 : For 12, 16 mm bore size cylinders, strong magnetic field proof switches are not available.
Note2 : SSD-K-12 and 16, copper and PTFE free specifications are provided as standard.
Note3 : Mounting bracket is attached shipment.
Note4 : "I" and "Y" cannot be selected simultaneously.

6.2 How to order switch



7. SPECIFICATION

7.1 Product Specifications

Model code / Item		SSD−K SSD−KL (with switch)									
Tube bore	mm	12 dia.	16 dia.	20 dia	25 dia	32 dia	40 dia	50 dia.	63 dia.	80 dia.	100 dia.
Operating method		Double−acting type									
Media		Compressed Air									
Max. working pressure	MPa	1.0									
Min. working pressure	MPa	0.1							0.05		
Proof pressure	MPa	1.6									
Ambient temperature	℃	−10 to 60 (to be unfrozen)									
Port size		M5				Rc1/8		Rc1/4		Rc3/8	
Stroke tolerance	mm	+2.0 0									
Working piston speed	mm/s	50 to 500							50 to 300		
Cushioning		Rubber−air cushion									
Lubrication		Not required (when lubrication, use turbine oil ISO VG 32.)									
Tolerable energy absorption	J	0.04	0.09	0.16	0.16	0.40	0.63	0.98	1.56	2.51	3.92

7.2 Switch Specification

1) Type of switches and applications

Item / Model			Purpose・Application
Reed	2−wire	T0H	AC/DC, for programmable controller, relay
		T0V	
		T5H	AC/DC, for programmable controller, relay, IC circuit (without indicator light), serial connection
		T5V	
Solid State	2−wire	T2H	DC, exclusively for programmable controller
		T2V	
	3−wire	T3H	DC, for programmable controller, relay
		T3V	
	2−wire	T2YH	DC, exclusively for programmable controller
		T2YV	
	3−wire	T3YH	DC, for programmable controller, relay
		T3YV	
	2−wire	T2JH	DC, for programmable controller, relay
		T2JV	
		T2YD	DC, for programmable controller, relay
		T2YDT	

Note : T※H…Axial lead wire type, T※V…Radial lead wire type.

2) Switch Specification

Type & Model	Reed switch type switch			
Item	T0H, T0V		T5H, T5V	
Application	For use with relay, programmable controller		For use with programmable controller relay, IC circuit (without indicator light), series connection	
Load Voltage	DC12/24V	AC110V	DC5/12/24V	AC110V
Load Current	5～50mA	7～20mA	50mA or less	20mA or less
Consumption current	—			
Internal voltage drop	2.4V or less		0V	
Indicator light	Lit when LED is on		—	
Leak current	0mA			
Lead wire length (Note1)	Standard 1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.2mm^2)			
Shock resistance	294m/s^2			
Insulation resistance	20MΩ or more measuring with DC500V megger tester			
Dielectric strength	No abnormalities should occur after applying AC1,000V for 1 minute			
Ambient temperature	−10 to 60℃			
Degree of protection	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance			

Type & Model	Solid state type switch		
Item	T2H, T2V	T2YH, T2YV	T2JH, T2JV
Application	For use exclusively with programmable controller		
Voltage of source of power	—		
Load Voltage	DC10 to 30V		
Load Current	5 to 20mA (Note2)		
Current consumption	—		
Internal voltage drop	4V or less		
OFF delay time	—		200±50ms
Indicator light	Lit when LED is on	Red／Green LED is lit when switch is ON	Lit when LED is on
Leak current	1mA or less		
Lead wire length (Note 1)	Standard 1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.2mm^2)	Standard 1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.3mm^2)	
Shock resistance	980m/s^2		
Insulation resistance	20MΩ or more measuring with DC500V megger tester	100MΩ or more measuring with DC500V megger tester	
Dielectric strength	No abnormalities should occur after applying AC1,000V for 1 minute		
Ambient temperature	−10 to 60℃		
Degree of protection	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance		

Type & Model	Solid state type switch	
Item	T3H, T3V	T3YH, T3YV
Application	For use with programmable controller, relay	
Voltage of source of power	DC10 to 28V	
Load Voltage	DC30V or less	
Load Current	100mA or less	50mA or les
Current consumption	10mA or less when it is on at DC24V	
Internal voltage drop	0.5V or less	
OFF delay time	—	
Indicator light	Lit when LED is on	Red／Green LED is lit when switch is ON
Leak current	10μA or less	
Lead wire length (Note 1)	Standard 1m (Oil-proof vinyl cabtyre cord, 3-wire, 0.2mm^2)	
Shock resistance	980m/s^2	
Insulation resistance	20MΩ or more measuring with DC500V megger tester	100MΩ or more measuring with DC500V megger tester
Dielectric strength	No abnormalities should occur after applying AC1,000V for 1 minute	
Ambient temperature	−10 to 60℃	
Degree of protection	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance	

Type & Model / Item	Solid state type switch	
	T2YD	T2YDT
Application	For use exclusively with programmable controller	
Indicator light	Red／Green LED is lit when switch is ON	
Load voltage	DC24V±10%	
Load current	5 to 20mA	
Internal voltage drop	6V or less	
Leak current	1.0mA or less	
Output delay time (Note3) (ON delay、OFF delay)	30 to 60ms	
Lead wire length (Note1)	Standard 1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.5mm^2)	Standard 1m (Non-flammable cabtyre cord, 2-wire, 0.5mm^2) (Option)
Shock resistance	980m/s^2	
Insulation resistance	100MΩ or more measuring with DC500V megger tester	
Dielectric strength	No abnormalities should occur after applying AC1,000V for 1 minute	
Ambient temperature	−10 to 60℃	
Degree of protection	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance	

Note 1: 3m or 5m long lead wire is optionally available.

Note 2: Maximum value, 25mA is at 25℃ of ambient temperature. Load current decreases less than 25mA when the ambient temperature exceeds 25℃. For example: it may be 5 to 10mA at 60℃

Note 3: This shows a period of time between detection of the piston magnet by the magnetic sensor and sending of switch output.