CKD

SM-407191-A

INSTRUCTION MANUAL

SUPER COMPACT CYLINDER

SSD2 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

SSD2

Super Compact Cylinder

Manual No. SM-407191-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) 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.

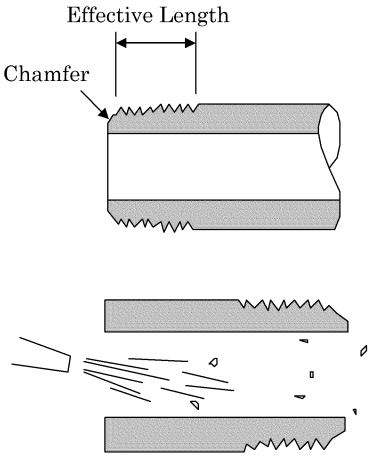
2.2 Piping

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.

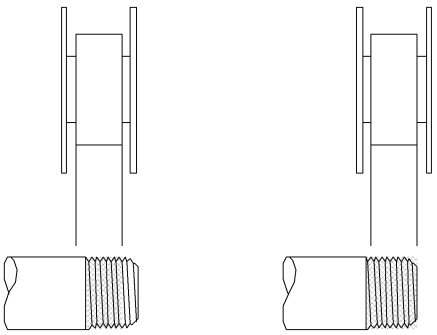
4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.

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



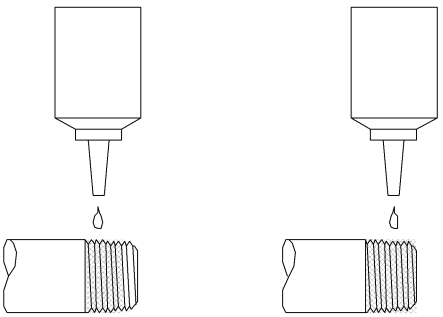
6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

● Seal Tape



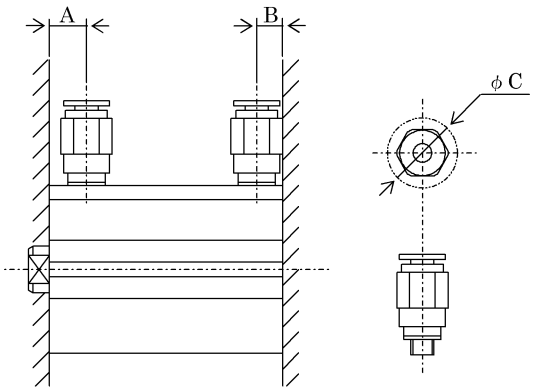
(Correct) (Incorrect)

● Sealant (liquid)



(Correct) (Incorrect)

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

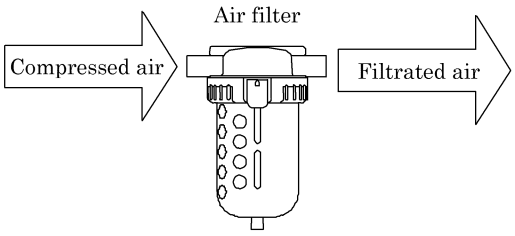


Item / Bore size (mm)	Port dia.	Port dimension A	Port dimension B	Available joints	Joint OD ϕ C	Joint unsuitable
ϕ 12	M5	5.5	5.5	SC3W-M5-4 SC3W-M5-6 GWS4-M5-S GWS4-M5 GWL4-M5 GWL6-M5	ϕ 11 or less	GWS6-M5
ϕ 16						
ϕ 20		8	5.5			
ϕ 25		11	6			
ϕ 32	Rc1/8 (Note)	8	8	SC3W-6-4,6,8 GWS4-6 GWS6-6 GWS8-6 GWL4-6 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 GWL4～12-8	ϕ 21 or less	GWS12-8
ϕ 63		13	11			
ϕ 80	Rc3/8	16	13	SC3W-10-6,8,10 GWS6-10 GWS8-10 GWS10-10 GWL6～12-10	ϕ 21 or less	-
ϕ 100		23	15			

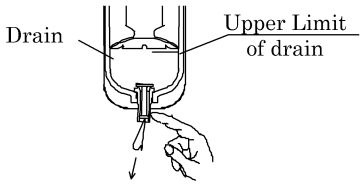
Note: As for 32 mm bore size and the stroke length 5mm the switch none, the size of the port becomes M5. Please refer to externals dimensional drawing for a positional size of the port.

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.

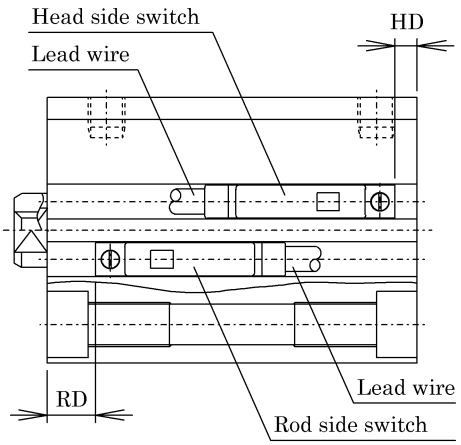


3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.

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.

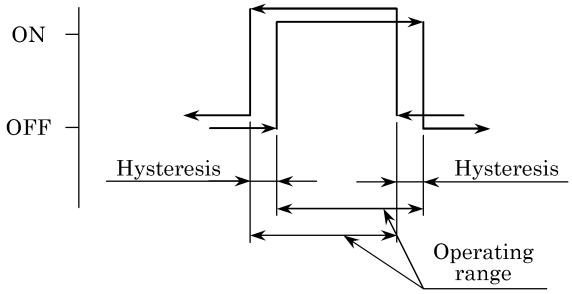
(4) Replacing switch
Take out switch out of groove after loosening mounting screws. Slide new replacing switch into groove and tighten screws upon placing the switch at the maximum sensitive position. (Apply tightening torque of 0.1 to 0.2N・m)

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.



Maximum sensitive position (HD・RD), Operating range and Hysteresis

SSD2-L,SSD2-L-※D (mm)

Item / Bore size (mm)	Solid state switch (T2H/V、T3HV)				Reed switch (T0H/V、T5H/V)			
	Maximum sensitive position		Operating range	Hysteresis	Maximum sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
φ12	0(1.5)	3(1.5)	2 to 6	1.5 or less	0(1.5)	3(1.5)	5 to 8	3 or less
φ16	0	4.5	2 to 5		0	4	4 to 9	
φ20	3	7.5	3 to 8		3	7.5	6 to 14	
φ25	4	9.5	3 to 9		4	9.5	5 to 14	
φ32	4	9.5	3 to 8		4	9.5	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	

SSD2-KL

Item / Bore size (mm)	Solid state switch (T2H/V、T3HV)				Reed switch (T0H/V、T5H/V)			
	Maximum sensitive position		Operating range	Hysteresis	Maximum sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
φ12	4.5	3.5	2 to 6	1.5 or less	4.5	3.5	5 to 8	3 or less
φ16	3	5	2 to 5		3	5	4 to 9	
φ20	6.5	9	3 to 8		6.5	9	6 to 14	
φ25	6	12.5	3 to 9		6	12.5	5 to 14	
φ32	9	15	3 to 8		9	15	5 to 12	
φ40	9.5	19.5	3 to 9		9.5	19.5	6 to 14	
φ50	10	20	3 to 9		10	20	6 to 14	
φ63	17.5	18	3 to 9		17.5	18	7 to 15	
φ80	22.5	20.5	4 to 10		22.5	20.5	7 to 15	
φ100	28	24.5	4 to 10		28	24.5	9 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.

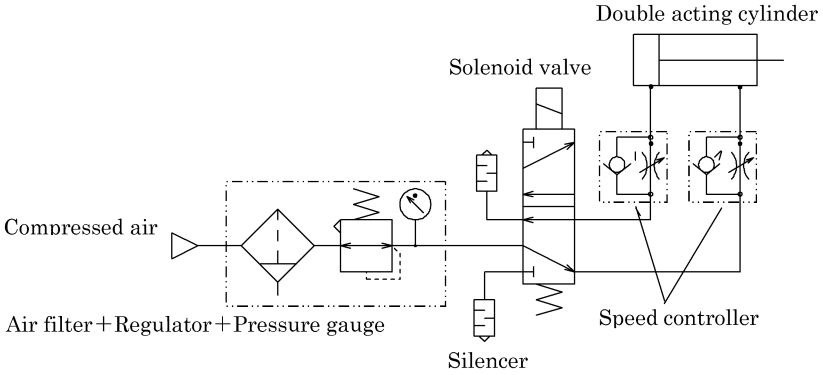
( )The size in the inside is a size with the rubber cushion.

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

●Fundamental circuit diagram



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.

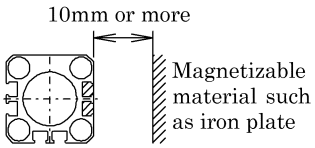
2) Protection of lead cord
Pay consideration to eliminate repeating bending stress or stretching of lead cord while laying the cord.
To the moving portion, use such cord of flexibility as for building a robot.

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.

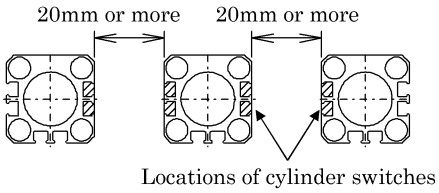
4) Intermediate position detection
When activating the switch halfway of the stroke, the relay may not respond if the piston speed is too fast.
(Example) Operate cylinder with the speed of less than 500mm/s in case the relay actuation time is 20ms.

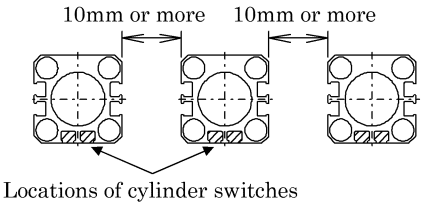
5) Shock resistance
Do not apply a large vibration or impact to the product when transporting the cylinder, or mounting or adjusting the switch.

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 (F2, F3)

1) Connection of lead cord

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

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

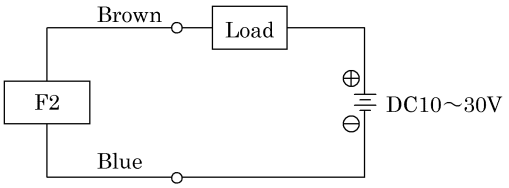


Fig.1 Fundamental circuit Example

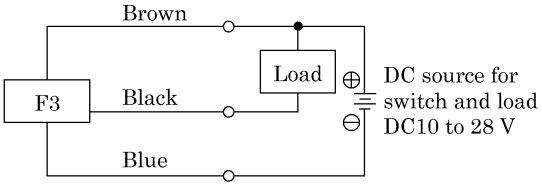


Fig.2 Fundamental circuit Example (1)
(In case the same source of power is used.)

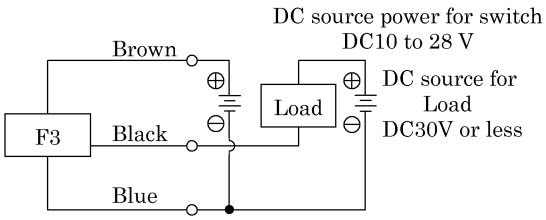


Fig.3 Fundamental circuit Example (2)
(In case individual sources of power are used.)

2) Output circuit protection

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 F2) and Fig 8 (in case of model F3).

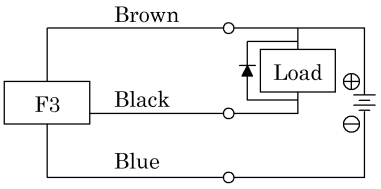
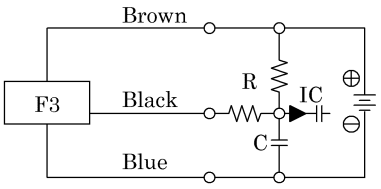


Fig.4 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



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.

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

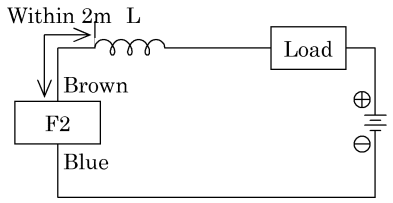


Fig.6 ・Choke coil
L＝a couple hundred μH to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

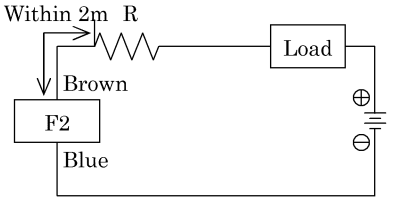


Fig.7 ・Dash current restriction resister.
R＝As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

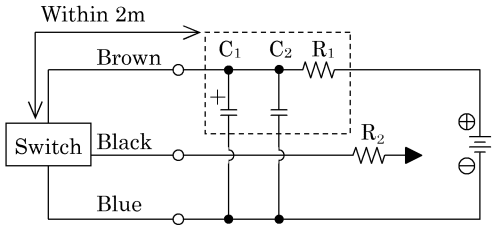


Fig8・Electric power noise absorptive circuit.
C_1=20 to 50 μF electrolytic capacitor
(Withstand voltage 50V or more)
C_2=0.01 to 0.1 μF ceramic capacitor
R_1=20 to 30Ω

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

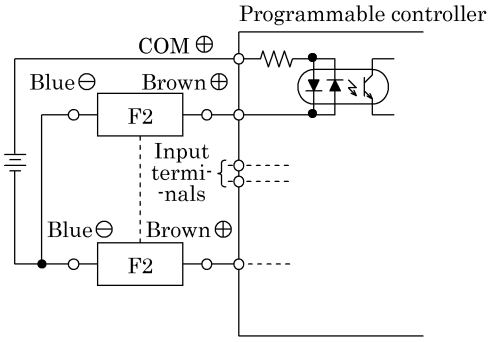


Fig.9 An example of F2 connection to source input type (an external power source)

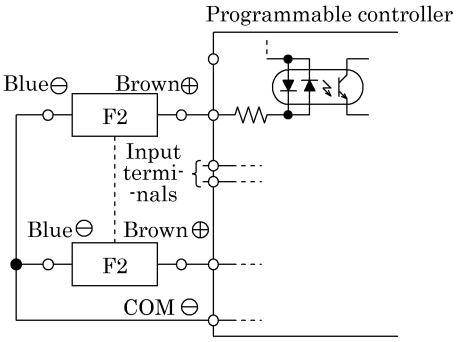


Fig.10 An example of F2 connection to source input type (an internal power source)

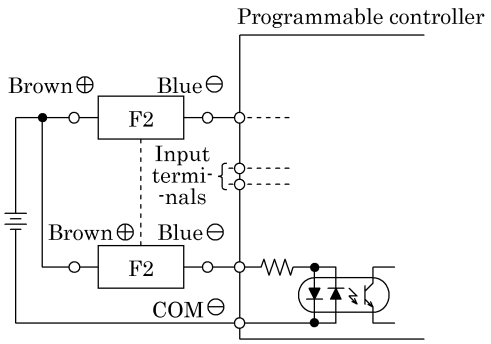


Fig.11 An example of F2 connection to sink input type

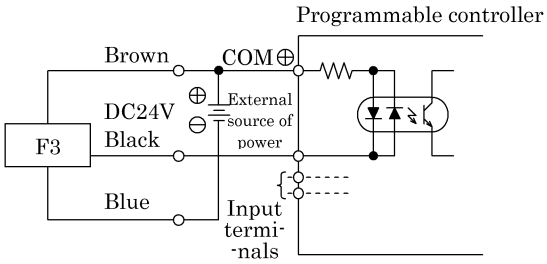


Fig.12 An example of F3 connection to source input type (an external power source)

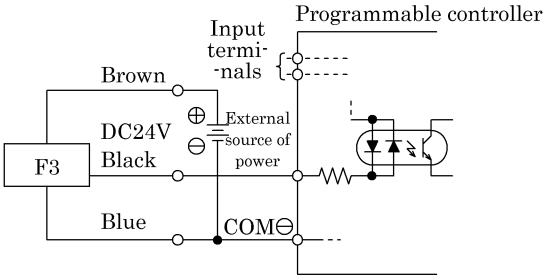


Fig.13 An example of F3 connection to source input type
(an internal power source)

4) Series connection

The total voltage will decrease when the F2 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.

F3 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 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.

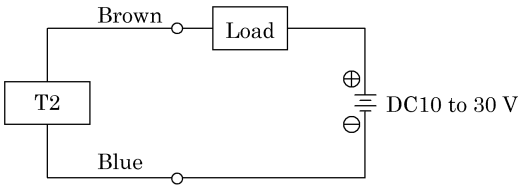


Fig.1 Fundamental circuit Example

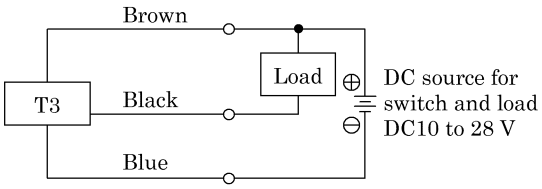


Fig.2 Fundamental circuit Example (1)
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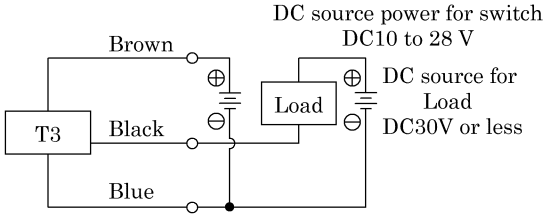


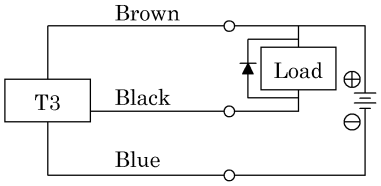
Fig.3 Fundamental circuit Example (2)
(In case individual sources of power are used.)

2) Output circuit protection

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).



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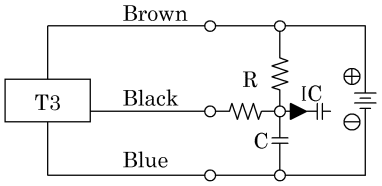


Flg.5 An example of using capacitor type load together with current regulating resister R.
Comply with the following formula to figure out required R.

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

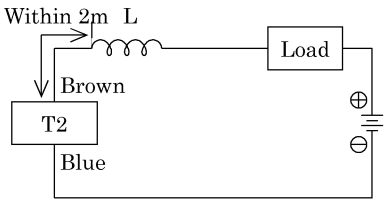


Fig.6 ・Choke coil
L = a couple hundred μH to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

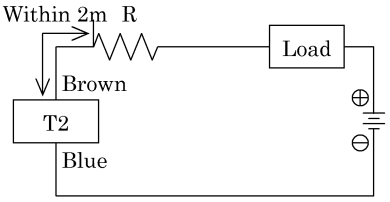


Fig.7 ・Dash current restriction resister.
R = As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

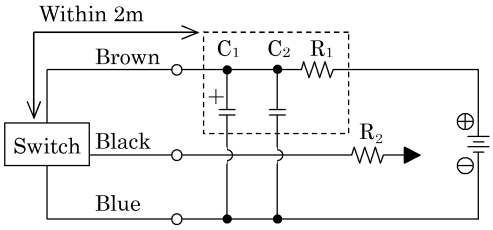


Fig8 ・Electric power noise absorptive circuit.
C_1=20 to 50 μF electrolytic capacitor
(Withstand voltage 50V or more)
C_2=0.01 to 0.1 μF ceramic capacitor
R_1=20 to 30 Ω

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

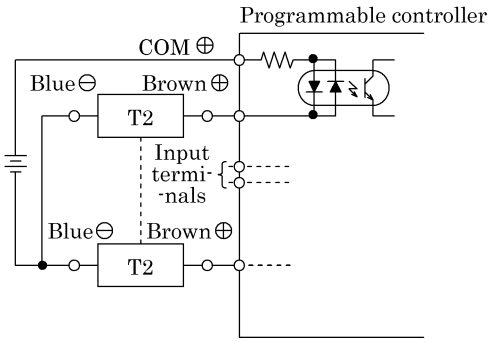


Fig.9 An example of T2 connection to source input type (an external power source)

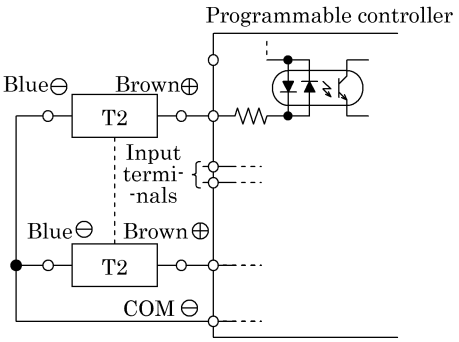


Fig.10 An example of T2 connection to source input type (an internal power source)

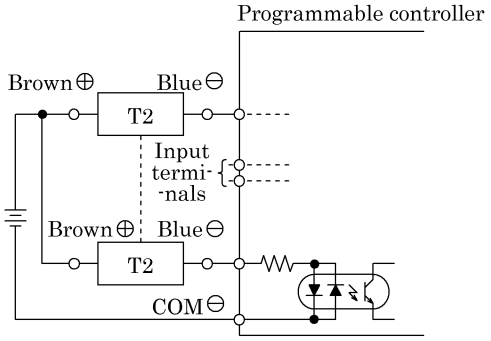


Fig.11 An example of T2 connection to source input type

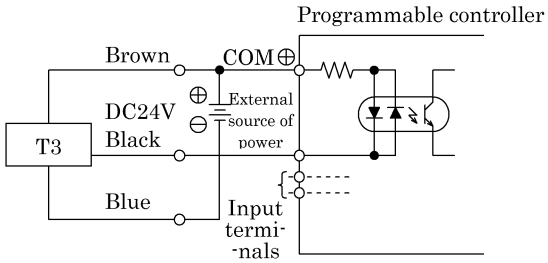


Fig.12 An example of T3 connection to source input type (an internal power source)

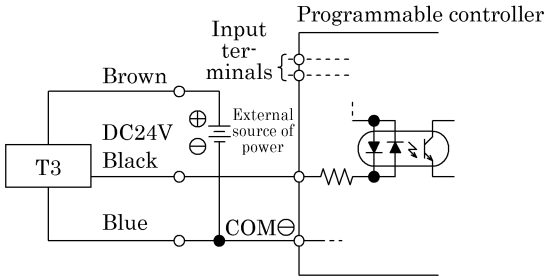


Fig.13 An example of T3 connection to source input type (an internal power source)

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

T3 switches hardly ever leak. When less than 10 μ A, then leakage may occur. Usually dimming and failure of the indicator light do not occur.

3.2.4 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 Ⓐ, Ⓑ.

Ⓐ 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.

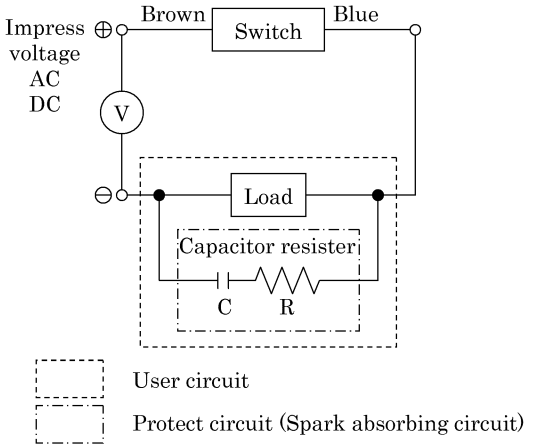
2) Contact capacity
Do not use a load exceeding the maximum contact capacity of the switch. Additionally, if the current is lower than the rated current value, the indicator light may not be lit.

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

Table1

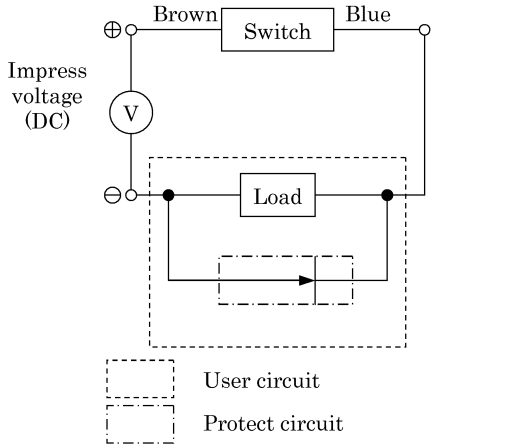
Electric power	Length of wire
DC	50m
AC	10m

(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

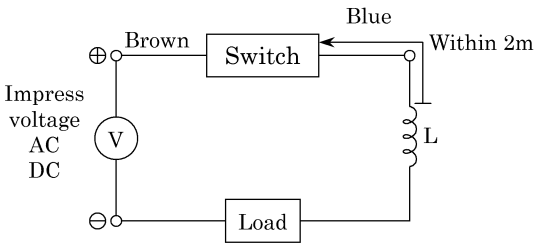
Fig.1 When capacitor resister
(In case the same source of power is used.)



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

Fig.2 When diode is used.

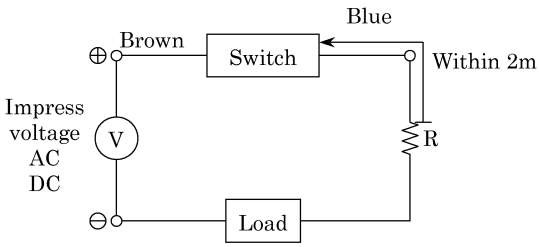
(2) Protective circuit when the wire length exceeds that stated Table 1.



・ 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

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.

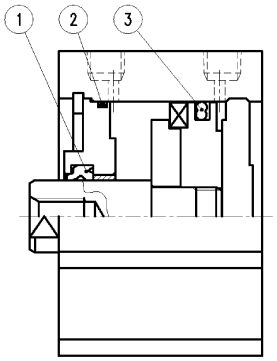
4.2 Disassembly

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.
3) Assemble the product in the reverse order of disassembly. Apply a film of high grade grease (Lithium alkali base) over the inner surface of cylinder tube, outer surface of piston and packings.

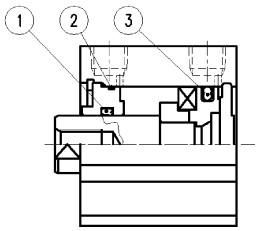
4.4 Internal structure drawings and Expendable parts list

●No cushion

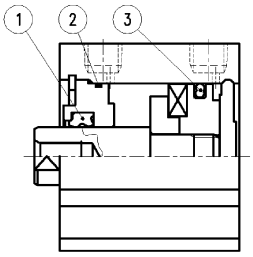
SSD2-L-63～100



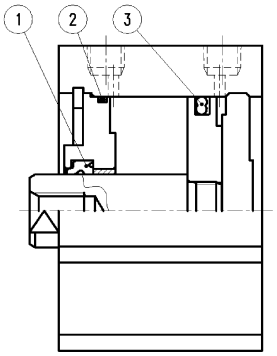
SSD2-L-12～32



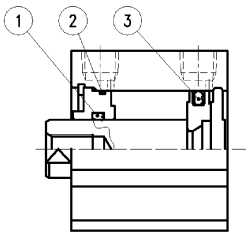
SSD2-L-40,50



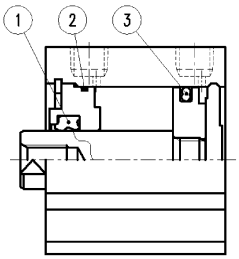
SSD2-63～100



SSD2-12～32



SSD2-40,50

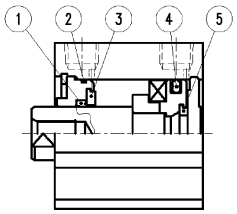


Expendable parts list (Specify the kit No. on your purchase order.)

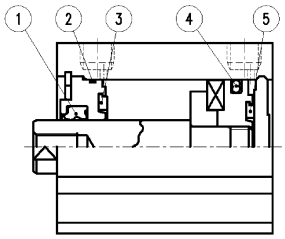
Parts No / Parts name / Bore size (mm) / Kit No.	①	②	③
	Rod packing	Rod metal gasket	Piston packing
φ12	SSD2-12K	MYR-6	F3-657972	PSD-12
φ16	SSD2-16K	MYR-8	F3-657973	PSD-16
φ20	SSD2-20K	MYR-10	F3-657968	PSD-20
φ25	SSD2-25K	MYR-12	F3-657969	PSD-25
φ32	SSD2-32K	MYR-16	F3-657975	PSD-32
φ40	SSD2-40K	F4-428463	F3-657976	PSD-40
φ50	SSD2-50K	F4-428464	F3-657977	PSD-50
φ63	SSD2-63K	F4-428464	AS568-035	PSD-63
φ80	SSD2-80K	F4-428465	AS568-041	PSD-80
φ100	SSD2-100K	F4-428466	AS568-044	PSD-100

●Rubber cushioned

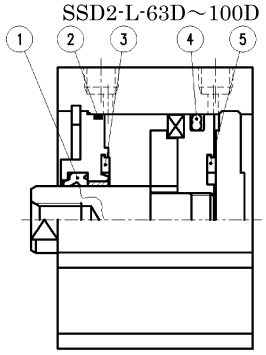
SSD2-L-12D～32D



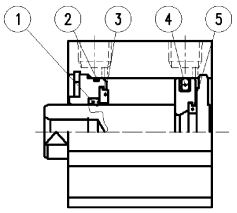
SSD2-L-40D,50D



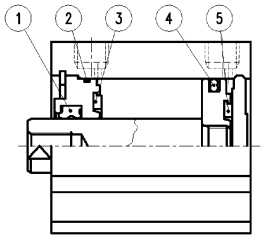
SSD2-L-63D～100D



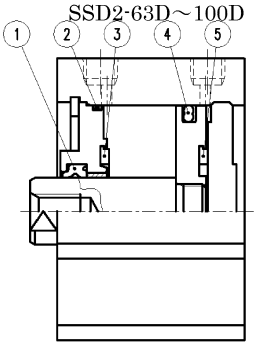
SSD2-12D～32D



SSD2-40D,50D



SSD2-63D～100D

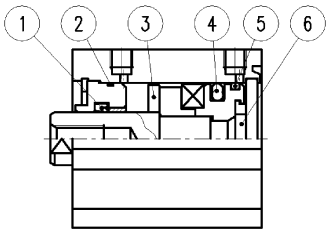


Expendable parts list (Specify the kit No. on your purchase order.)

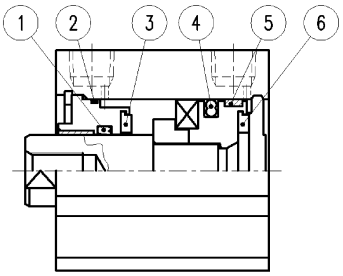
Parts No / Parts name / Bore size (mm) / Kit No		①	②	③	④	⑤
		Rod packing	Rod metal gasket	Cushion rubber R	Piston packing	Cushion rubber H
φ12	SSD2-12DK	MYR-6	F3-657972	D4-117827	PSD-12	F4-364762
φ16	SSD2-16DK	MYR-8	F3-657973	D4-117828	PSD-16	D4-117829
φ20	SSD2-20DK	MYR-10	F3-657968	D4-117830	PSD-20	D4-117831
φ25	SSD2-25DK	MYR-12	F3-657969	D4-117832	PSD-25	F4-659112
φ32	SSD2-32DK	MYR-16	F3-657975	F4-659049	PSD-32	F4-659113
φ40	SSD2-40DK	F4-428463	F3-657976	D4-117833	PSD-40	F4-659049
φ50	SSD2-50DK	F4-428464	F3-657977	D4-117834	PSD-50	F4-659039
φ63	SSD2-63DK	F4-428464	AS568-035	D4-117834	PSD-63	D4-117834
φ80	SSD2-80DK	F4-428465	AS568-041	F4-162661	PSD-80	F4-162661
φ100	SSD2-100DK	F4-428466	AS568-044	F4-659630	PSD-100	F4-659630

●High load type

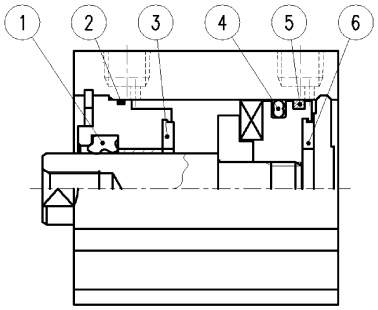
SSD2-K-12～25



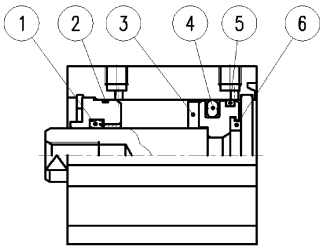
SSD2-KL-32



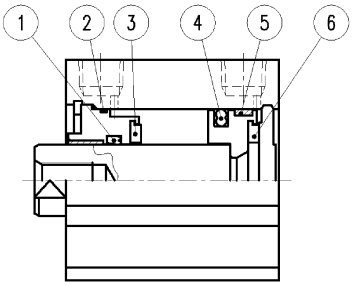
SSD2-KL-40～100



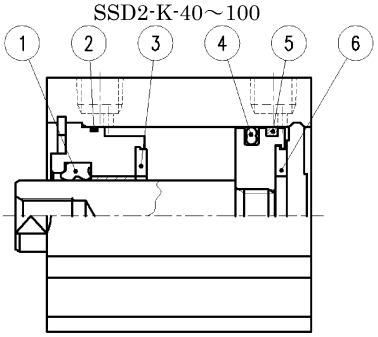
SSD2-K-12～25



SSD2-K-32



SSD2-K-40～100



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

Parts No / Parts name / Bore size (mm)	Kit No	① Rod packing	② Rod metal gasket	③ Cushion rubber R	④ Piston packing	⑤ Wear ring	⑥ Cushion rubber H
φ12	SSD2-K-12-K	MYR-6	F3-657972	F4-166347	PSD-12	F4-659141	F4-659142
φ16	SSD2-K-16K	MYR-8	F3-657973	F4-160424	PSD-16	F4-162726	F4-659112
φ20	SSD2-K-20K	MYR-10	F3-657968	F4-116102	PSD-20	F4-125610	F4-659112
φ25	SSD2-K-25K	MYR-12	F3-657969	F4-116103	PSD-25	F4-161716	F4-659113
φ32	SSD2-K-32-K	MYR-16	F3-657975	F4-659049	PSD-32	F4-654960	F4-659049
φ40	SSD2-K-40K	F4-428463	F3-657976	F4-659039	PSD-40	F4-650239	F4-659039
φ50	SSD2-K-50K	F4-428464	F3-657977	F4-659026	PSD-50	F4-650240	F4-659026
φ63	SSD2-K-63K	F4-428464	AS568-035	F4-659069	PSD-63	F4-650241	F4-659069
φ80	SSD2-K-80K	F4-428465	AS568-041	F4-162661	PSD-80	F4-650242	F4-162661
φ100	SSD2-K-100K	F4-428466	AS568-044	F4-659630	PSD-100	F4-650243	F4-659630

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.

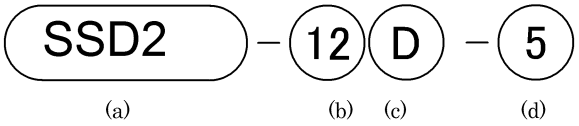
2) Switch

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.

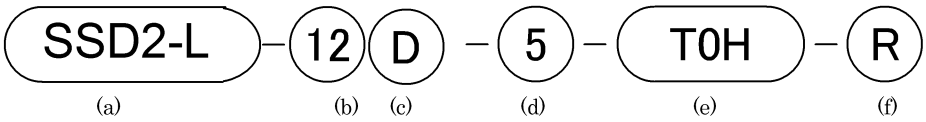
6. HOW TO ORDER

6.1 Product Number Coding

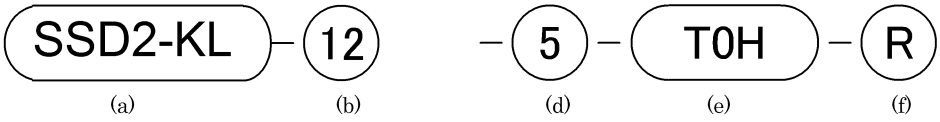
● No switch



● With switch



● High load type with switch



(a) Model	
SSD2	Double acting/single rod type
SSD2-L	Double acting/single rod type /With switch
SSD2-K	Double acting, High load type
SSD2-KL	Double acting, High load type, with switch

(b) Bore size (mm)		(c) Cushion		(d) Stroke length (mm)			
12	φ12	No code	No cushion	φ12 , φ16	φ20 , φ25	φ32 , φ40	φ50 to φ100
16	φ16	D	Rubber cushioned	5	5	5	—
20	φ20	※The rubber cushion adheres to the high load type by the standard.		10	10	10	10
25	φ25			15	15	20	15
32	φ32			20	20	30	20
40	φ40			25	25	40	25
50	φ50			30	30	50	30
63	φ63				35	35	35
80	φ80				40	40	40
100	φ100				45	45	45
					50	50	50
						75	75
						100	100

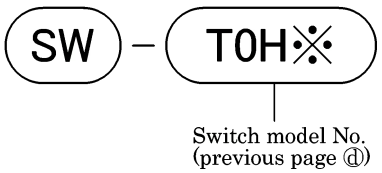
(e) Switch model No.						※Lead wire length	
Lead wire straight type	Lead wire L-shaped type	Switch type	Indicator light	Lead wire	Bore size	No code	1m (standard)
						3	3m (option)
F2H※	F2V※	Solid state	1 color indicator	2 wire	ϕ 20,25	5	5m (option) (Only t type switch. F type switch becomes set up to 3m.)
F3H※	F3V※			3 wire	ϕ 20,25		
F2YH※	F2YV※		2 color indicator	2 wire	ϕ 20,25		
F3YH※	F3YV※			3 wire	ϕ 20,25		
T0H※	T0V※	Reed	1 color indicator	2 wire	ϕ 12 to ϕ 100	※mark shows lead wire length	
T5H※	T5V※		No lamp		ϕ 12 to ϕ 100		
T8H※	T8V※		1 color indicator		ϕ 40 to ϕ 100		
T1H※	T1V※	Solid state	1 color indicator	2 wire	ϕ 20 to ϕ 100		
T2H※	T2V※				ϕ 12 to ϕ 100		
T3H※	T3V※			3 wire	ϕ 12 to ϕ 100		
T3PH※	T3PV※		1 color indicator (PNP output) (custom order)		ϕ 12 to ϕ 100		
T2YH※	T2YV※		2 color indicator	2 wire	ϕ 12 to ϕ 100		
T3YH※	T3YV※			3 wire	ϕ 12 to ϕ 100		
T2YD※	—		Strong magnetic field proof Proximity	2 wire	ϕ 12 to ϕ 100		
T2YDT※	—				ϕ 12 to ϕ 100		
T2JH※	T2JV※		Off delay type	2 wire	ϕ 12 to ϕ 100		

(Caution for model No. selection)
Note1: For 12, 16 mm bore size and the stroke length 5mm,T0※、T5※ switches are not available.
Note2: For 12, 16 mm bore size cylinders, T2YD※switches are not available
Note3: For 12 to 32 mm bore size cylinders, T8※switches are not available
Note4: f type switch is possible equipped with only the piping port side of inside 20, 25 mm bore size.

(e) Switch quantity	
R	One on rod side
H	One on head side
D	Two
T	Three

● About custom stroke length
Available per 1mm increment. Overall length dimensions are as same as dimensions of the following increment of standard stroke length.

6.2 Component parts Model coding



7. SPECIFICATION

7.1 Product Specifications

Model code / Item		SSD2									
Bore size mm		φ12	φ16	φ20	φ25	φ32	φ40	φ50	φ63	φ80	φ100
Actuation		Double acting									
Working fluid		Compressed Air									
Max. working pressure MPa		1.0									
Min. working pressure MPa		0.15				0.1					
Proof pressure MPa		1.6									
Ambient temperature ℃		-10 to 60 (No freezing)									
Port size		M5				Rc1/8 (Note 1)		Rc1/4		Rc3/8	
Stroke tolerance mm	No cushion	+1.0 0									
	Rubber cushioned	+2.0 0									
Working piston speed mm/s		50 to 500						50 to 300			
Cushion		No cushion or Rubber cushioned									
Lubrication		Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)									
Allowable Energy absorption J	No cushion	0.004	0.01	0.016	0.021	0.025	0.092	0.1	0.12	0.27	0.56
	Rubber cushioned	0.03	0.05	0.10	0.16		0.44	0.75	0.78	2.51	3.92

Note 1 : As for 32 mm bore size and the stroke length 5mm the switch none, the size of the port becomes M5.

Model code / Item	SSD2-K									
Bore size mm	φ12	φ16	φ20	φ25	φ32	φ40	φ50	φ63	φ80	φ100
Actuation	Double acting									
Working fluid	Compressed Air									
Max. working pressure MPa	1.0									
Min. working pressure MPa	0.15				0.1					
Proof pressure MPa	1.6									
Ambient temperature ℃	-10 to 60 (No freezing)									
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			
Cushion	Rubber cushion									
Lubrication	Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)									
Allowable 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

Model / Descriptions			Purpose・Applications
Solid state	2 wire	T1H	AC programmable controller, relay, compact solenoid valve
		T1V	
		T2H	DC programmable controller
		T2V	
	3 wire	T3H	DC programmable controller, relay
		T3V	
	2 wire	F2H	DC programmable controller
		F2V	
	3 wire	F3H	DC programmable controller, relay
		F3V	
	3 wire (PNP output)	T3PH	DC programmable controller, relay
		T3PV	
Reed	2 wire	T0H	AC / DC programmable controller, relay
		T0V	
		T5H	AC / DC programmable controller, relay, IC circuit (without lamp), serial connection
		T5V	
		T8H	AC / DC programmable controller, relay
		T8V	
2color indicator Solid state	2 wire	T2YH	DC programmable controller
		T2YV	
	3 wire	T3YH	DC programmable controller, relay
		T3YV	
	2 wire	F2YH	DC programmable controller
		F2YV	
	3 wire	F3YH	DC programmable controller, relay
		F3YV	
		T3YMV	
Off delay type	2 wire	T2JH	DC programmable controller
		T2JV	
Strong magnetic field proof Solid state	2 wire	T2YD	DC programmable controller
		T2YDT	

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

2) Switch Specification

Type & Model / Item	Reed 2 wire						
	T0H/V		T5H/V		T8H/V		
Applications	Programmable controller, relay		Programmable controller, relay, IC circuit (without indicator light), series connection		Programmable controller, relay		
Power supply voltage	—						
Load Voltage	DC12/24V	AC110V	DC12/24V	AC110V	DC12/24V	AC110V	AC220V
Load Current	5 to 50mA	7 to 20mA	50mA or less	20mA or less	5 to 50mA	7 to 20mA	7 to 10mA
Current consumption	—						
Internal voltage drop	3V or less		0V		3V or less		
Indicator light	LED (ON lighting)		—		LED (ON lighting)		
Leakage current	0						
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2mm^2)				Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm^2)		
Shock resistance	294m/s^2						
Insulation resistance	20MΩ over at DC500V megger				100MΩ over at DC500V megger		
Withstand voltage	No failure impressed at AC1000V for one minute				No failure impressed at AC1500V for one minute		
Ambient temperature	−10 to 60℃						
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance						

Type & Model / Item	Solid state 2 wire			
	T1H/V	T2H/V	T2JH/V	T2YH/V
Applications	programmable controller, relay, compact solenoid valve	Programmable controller		
Power supply voltage	—			
Load Voltage	AC85 to 265V	DC10 to 30V		
Load Current	5 to100mA	5 to 20mA (Note2)		
Current consumption	—			
Internal voltage drop	7V or less	4V or less		
Indicator light	LED (ON lighting)			Red/green LED (ON lighting)
Leakage current	1mA at AC100V or less 2mA at AC200V or less	1 mA 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 2 conductor 0.2mm^2))	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm^2)	
Shock resistance	980m/s^2			
Insulation resistance	100MΩ over at DC500V megger	20MΩ over at DC500V megger	100MΩ over at DC500V megger	
Withstand voltage	No failure impressed at AC1500V for one minute	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			

7 SPECIFICATION

Type & Model / Item	Solid state 3 wire		
	T3H/V	T3PH/V	T3YH/V
Applications	Programmable controller, relay		
Switch output	NPN output	PNP output	NPN output
Power supply voltage	DC10 to 28V		
Load Voltage	DC30V or less		
Load Current	100 mA or less		50mA or less
Current consumption	10mA at DC24V(ON) or less	12mA at DC24V(ON) or less	10mA at DC24V(ON) or less
Internal voltage drop	0.5V or less		
Indicator light	LED (ON lighting)	Green LED (ON lighting)	Red/green LED (ON lighting)
Leakage current	10μA 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	20MΩ over at DC500V megger		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		

Type & Model / Item	Solid state 2 wire	
	T2YD	T2YDT
Applications	Programmable controller	
Load Voltage	DC24V±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^2))	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	

Type & Model / Item	Solid state 2 wire		Solid state 3 wire	
	F2H/V	F2YH/V	F3H/V	F3YH/V
Applications	Programmable controller		Programmable controller, relay	
Power supply voltage	—		DC10 to 28V	
Load Voltage	DC10 to 30V	DC24V±10%	DC30V or less	
Load Current	5 to 20mA (Note2)		50mA or less	
Current consumption	—		10mA at DC24V(ON) or less	
Internal voltage drop	4V or less		0.5V or less	
Indicator light	LED (ON lighting)	Red/green LED (ON lighting)	LED (ON lighting)	Red/green LED (ON lighting)
Leakage current	1mA or less		10μA or less	
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.15mm^2)		Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.15mm^2)	
Shock resistance	980m/s^2			
Insulation resistance	20MΩ 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			

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.