CKD

SM－389601－A

INSTRUCTION MANUAL

GUIDED
SUPER COMPACT CYLINDER
SSG 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

Ver.1

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.

INDEX

SSG

Guided Super Compact Cylinder
Double-acting type

Manual No. SM-389601-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 range 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.

2.2 Piping

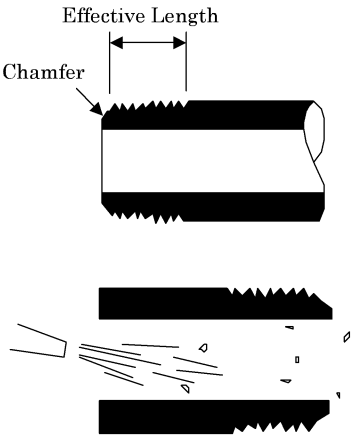
1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.

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.

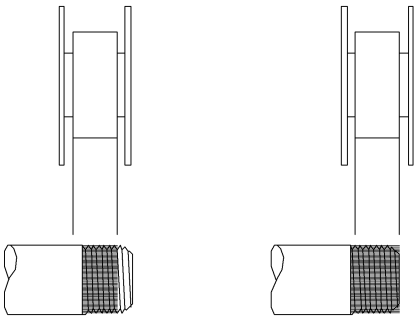
4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.

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



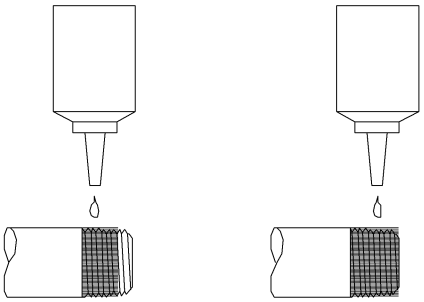
6) Refrain from mapplying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

● Seal Tape



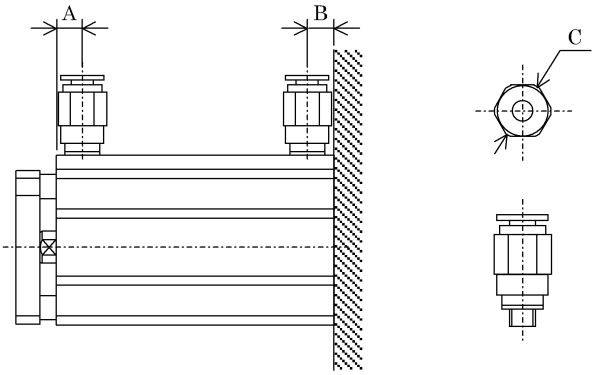
(Correct) (Incorrect)

● Sealant (liquid)



(Correct) (Incorrect)

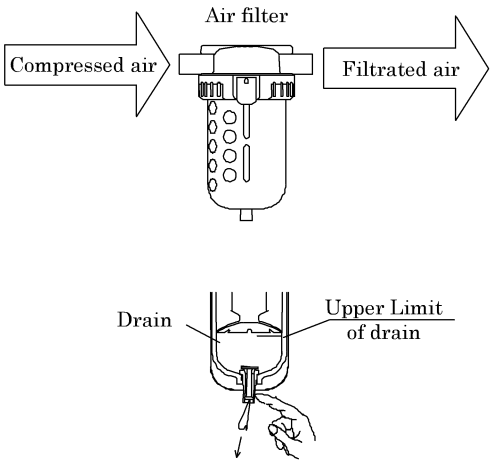
7) Because the usable piping joint has limitations, for using it, see the note below.



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

Note: The port diameter of 5-stroke of Φ32 type without a switch is M5. Refer to the external dimension diagram for the port position and dimension.

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.

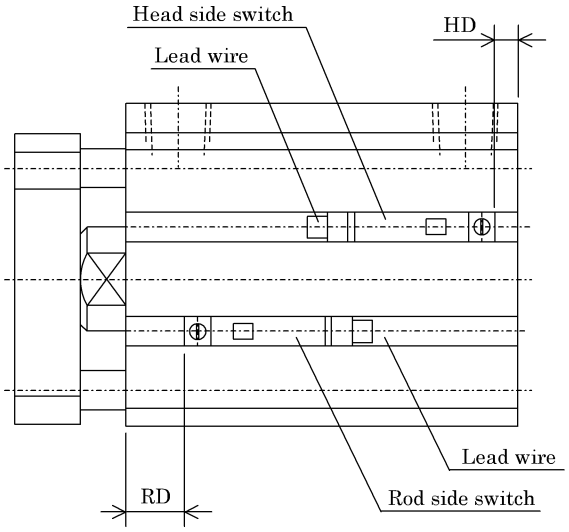
4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 as a lubricant, if and when lubrication is needed.

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 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.

- Relocation of switch
  Slide switch body along cylinder tube after loosening mounting screws and tighten screws when located the most sensitive position.
- 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 1 color indicator:0.1 to 0.2N·m, 2 color indicator:0.5 to 0.7N·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.

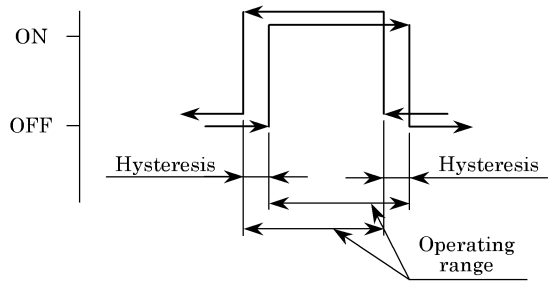


Table of best operating position (HD · RD), Operating range and Hysteresis (mm)

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		
φ 12	0	2.5	2 to 6	1.5 or less	0	2.5	5 to 8	3 or less
φ 16	0	2	2 to 5		0	2	4 to 9	
φ 20	3	6.5	3 to 8		3	6.5	6 to 14	
φ 25	3	9.5	3 to 9		3	9.5	5 to 14	
φ 32	3.5	9	3 to 8		3.5	9	5 to 12	
φ 40	7	12	3 to 9		7	12	6 to 14	
φ 50	7.5	12.5	3 to 9		7.5	12.5	6 to 14	
φ 63	12.5	13	3 to 9		12.5	13	7 to 15	
φ 80	17.5	15.5	4 to 10		17.5	15.5	7 to 15	
φ 100	23	19.5	4 to 10		23	19.5	9 to 15	

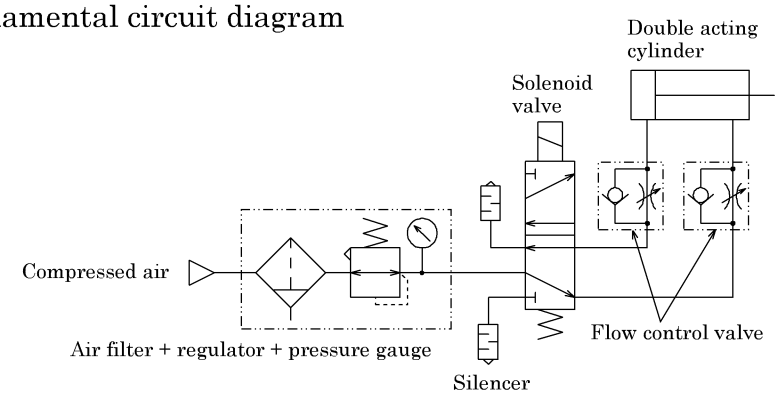
※ Switches at ex-factory shipment are positioned at the most sensitive points (HD and RD).
Note: HD and RD for five strokes may vary from those stated in the above table since they are set every time the cylinder is installed.

3. OPERATION

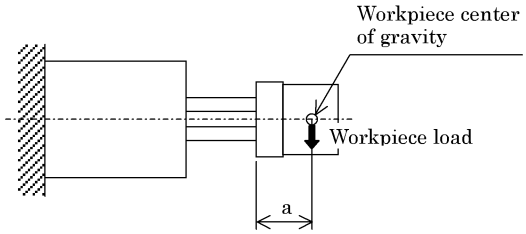
3.1 Operating the Cylinder

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

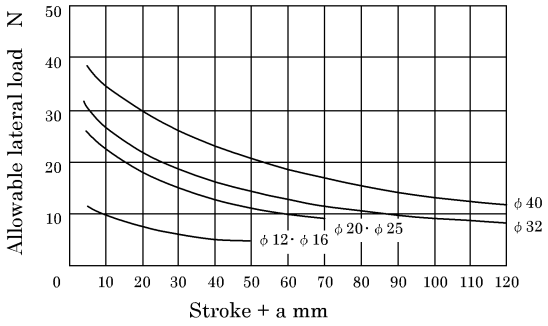
- Fundamental circuit diagram



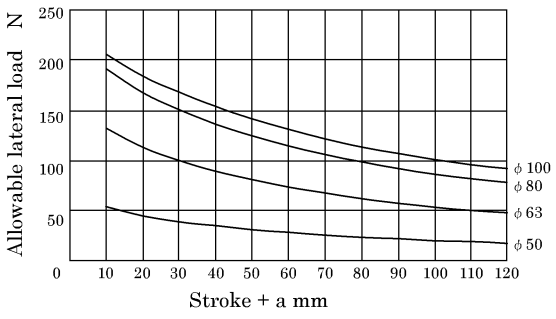
- Allowable lateral load



ϕ 12 to ϕ 40



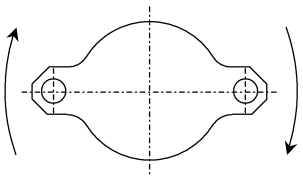
ϕ 50 to ϕ 100



The allowable lateral load is the value when the load functions to the end plate edge. If the gravity center of the work to be attached to the end plate is apart from the mounting surface, replace the gap with the stroke for selection of the model No.

● Allowable torque

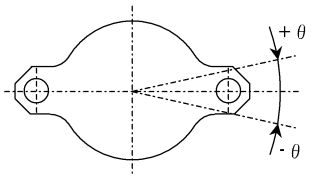
Torque : T (N·m)



Unit: (mm)

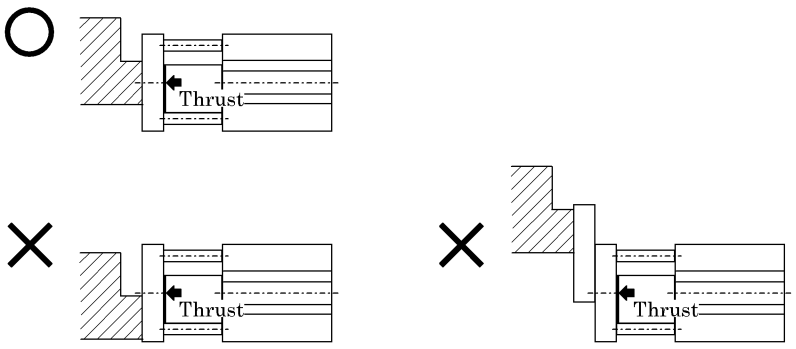
Tube bore (mm)	Stroke							
	5	10	20	30	40	50	75	100
φ 12	0.12	0.10	0.080	0.066				
φ 16	0.16	0.13	0.10	0.085				
φ 20	0.40	0.35	0.28	0.23	0.20	0.17		
φ 25	0.44	0.38	0.31	0.25	0.22	0.19		
φ 32	0.69	0.62	0.51	0.43	0.38	0.33	0.26	0.21
φ 40	1.1	0.99	0.83	0.72	0.63	0.57	0.45	0.37
φ 50		1.9	1.6	1.4	1.2	1.1	0.87	0.73
φ 63		4.3	3.7	3.3	2.9	2.6	2.1	1.8
φ 80		7.9	6.9	6.2	5.6	5.1	4.2	3.6
φ 100		12	11	9.9	9.0	8.3	6.9	5.9

● Revolvable angle tolerance (Reference value)



Tube bore (mm)	Revolvable angle tolerance θ (degree)
φ 12 ·16	±0.2
φ 20 ·25 ·32 ·40	±0.1
φ 50 ·63 ·80 ·100	±0.08

(4) If the work is pressed in the middle of the stroke, the thrust force applied to the end plate shall be directly applied to the axial direction of the piston rod. If the work is pressed in the middle of the stroke such as a clamp, the thrust force functions to the end plate. Pressing of the work at the eccentric position might cause damages of parts. Use the work at the axle center of the piston rod as shown in the figure below.



3.2 How to use the Switches

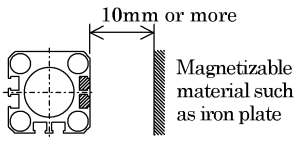
3.2.1 Common items

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.

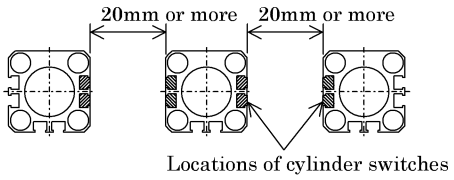
3) Operating temperature
Do not operate the product at a high temperature (60℃)
Always avoid operation of the product in a hot place due to temperature character- istics of magnetic and electronics parts.

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.

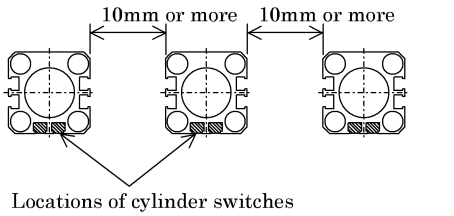


5) Impact
Do not apply a large vibration or impact to the product when transporting the cylinder, or mounting or adjusting the switch.

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.

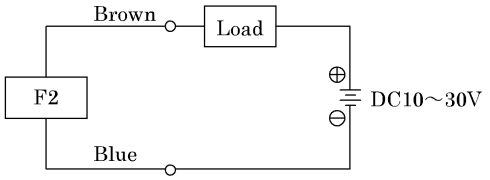


Fig.1 Fundamental circuit Example

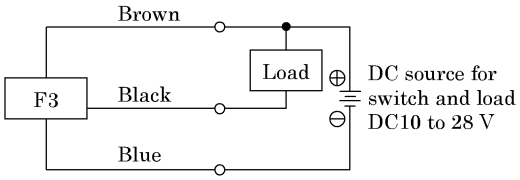


Fig.2 Fundamental circuit Example (1)
(In case the same source of power is used.)

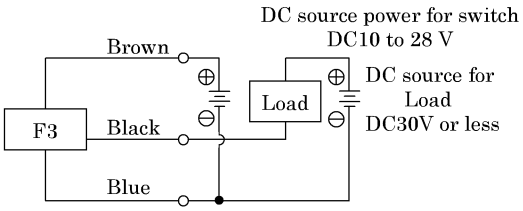


Fig.3 Fundamental circuit Example (2)
(In case individual sources of power are used.)

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).

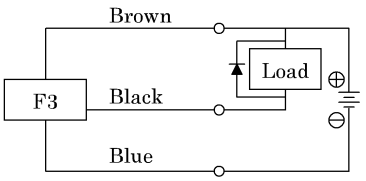
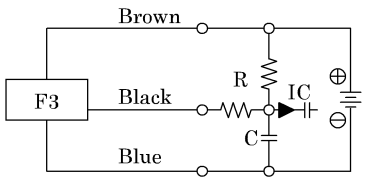


Fig.4 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



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.

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

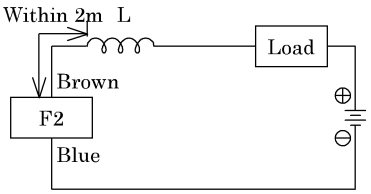


Fig.6 ・Choke coil
L = a couple hundred μH to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

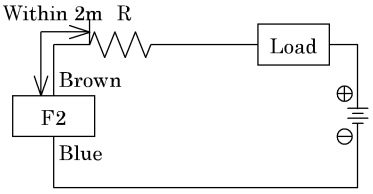


Fig.7 ・Dash current restriction resister.
R = As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

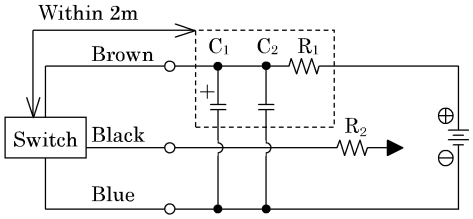


Fig8 ・Electric power noise absorptive circuit.
C_1=20 to 50 μF electrolytic capacitor (withstanding 50V or more)
C_2=0.01 to 0.1 μF ceramic capacitor
R_1=20 to 30 Ω

・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.

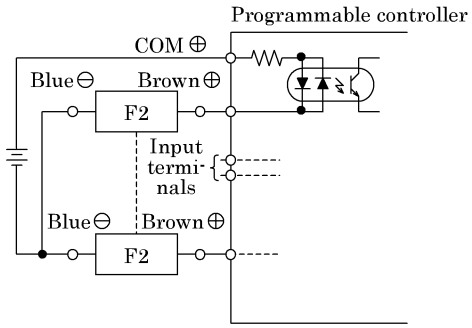


Fig.9 An example of F2 connection to source input type (an external power source)

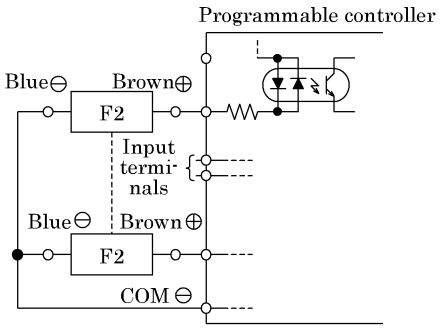


Fig.10 An example of F2 connection to source input type (an internal power source)

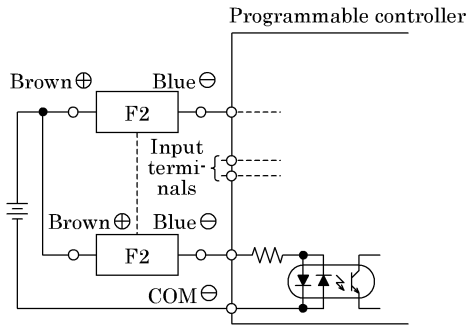


Fig.11 An example of F2 connection to sink input type

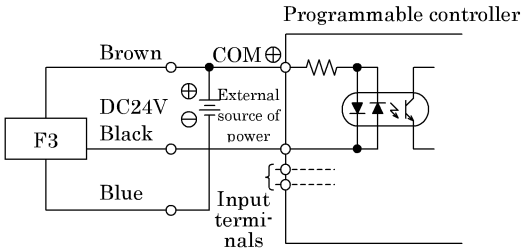


Fig.12 An example of F3 connection to source input type (an external power source)

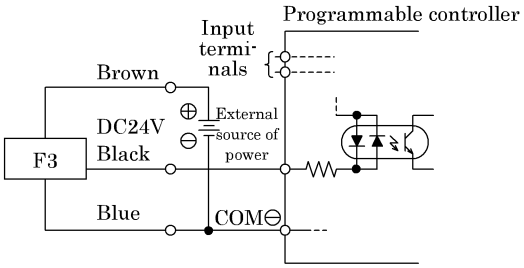


Fig.13 An example of F3 connection to source input type (an internal power source)

4) Parallel 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 lamp may exist.

F3 switches hardly ever leak. When less than 10 μA, then leakage may occur. Usually dimming and failure of the lamp do not occur.

3.2.3 Operational Cautions, Solid state type 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.

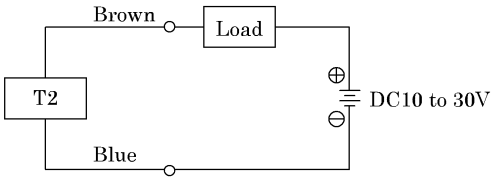


Fig.1 Fundamental circuit Example

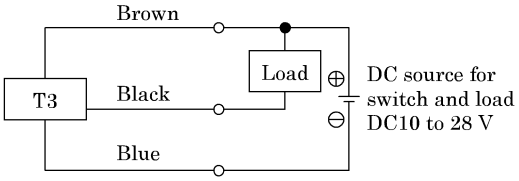


Fig.2 Fundamental circuit Example (1) (In case the same source of power is used.)

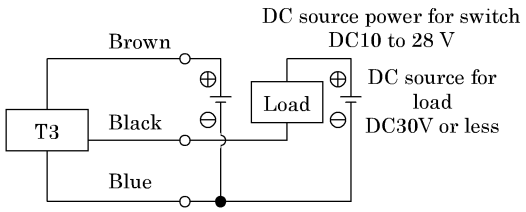


Fig.3 Fundamental circuit Example (2) (In case individual sources of power are

2) Protection of output circuit

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

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

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

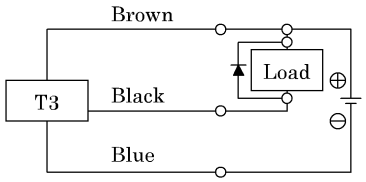
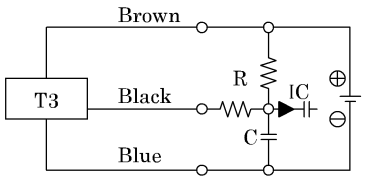


Fig.4 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



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

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

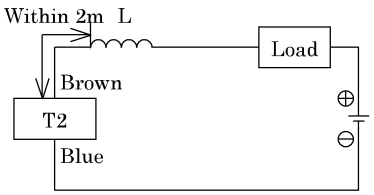


Fig.6 ・Choke coil
L= a couple hundred μH to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

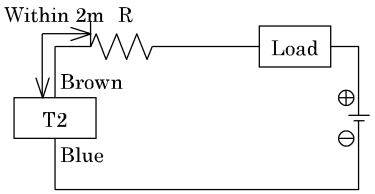


Fig.7 ・Dash current restriction resister.
R= As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

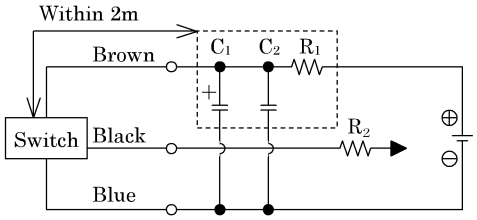


Fig8・ Electric power noise absorptive circuit.
C_1=20 to 50 μF electrolytic capacitor (withstanding 50V or more)
C_2=0.01 to 0.1 μF ceramic capacitor
R_1=20 to 30Ω

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

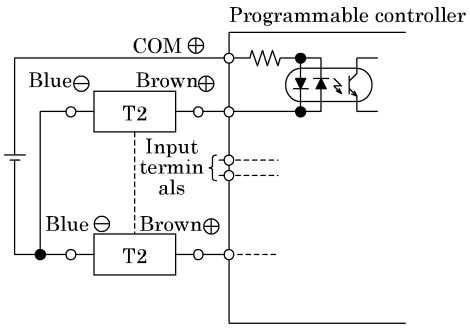


Fig.9 An example of T2 connection to source input type (an external power source)

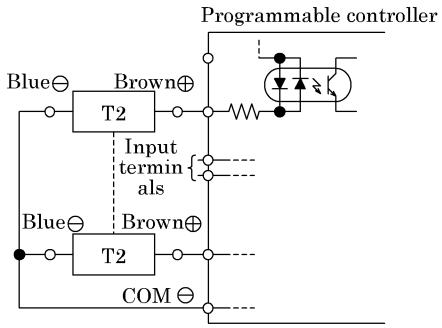


Fig.10 An example of T2 connection to source input type (an internal power source)

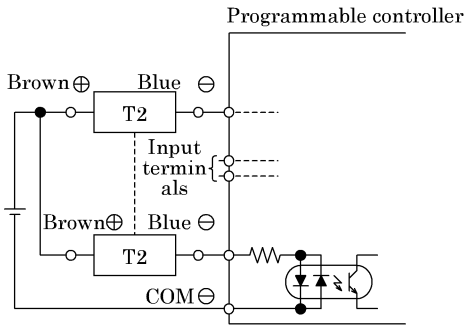


Fig.11 An example of T2 connection to source input type

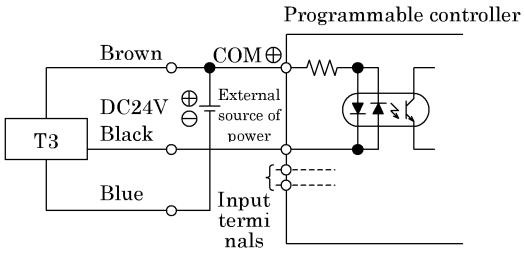


Fig.12 An example of T3 connection to source input type (an internal power source)

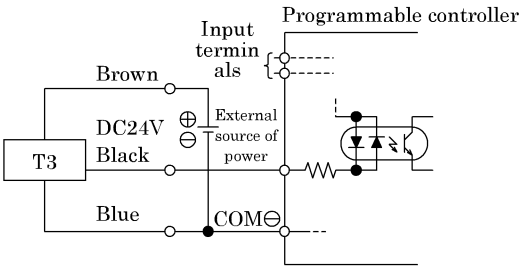


Fig.13 An example of T3 connection to source input type (an internal power source)

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

3.2.4 Reed switch type switch (T0, T5, T8)

1) Lead wire connections
Do not connect the lead wires of the switch to the power supply directly. Always connect the loads in series. For T0 switch, carefully check following items (1), (2).

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

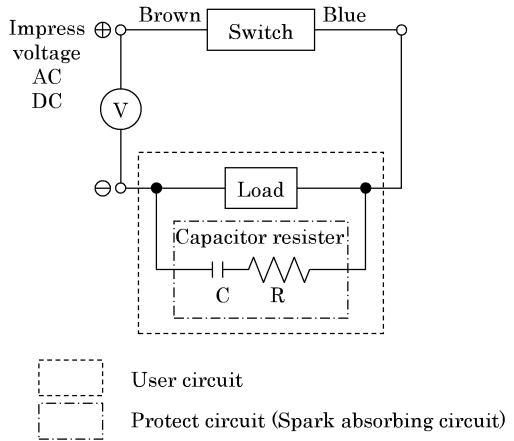
(2) When the switch is connected to an AC relay or a programmable controller input, the lamp on the switch is not lit if the half-wave rectification is performed in the connected circuit. If this occurs, reverse the polarities of the switch lead wire connection. The lamp may then be lit.
Note that the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

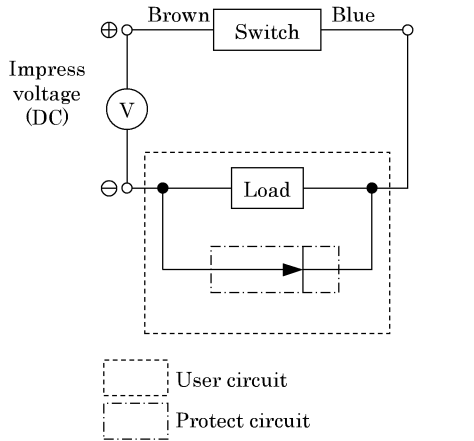
Electric power	Length of wire
DC	50m
AC	10m

(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

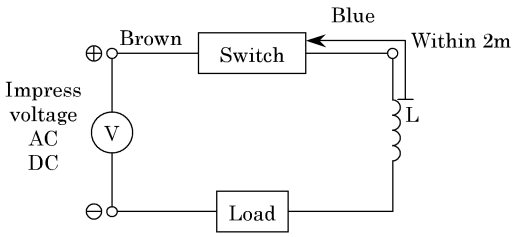
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

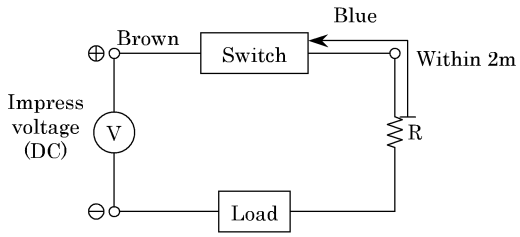
(2) Protective circuit when the wire length exceeds that stated Table 1.



・ 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 lamp may not be lit.

4) Relay
Always use the relays listed below.
Omron Corporation ・・・・・・・・・・・・・・・ MY type
Fuji Electric Co., Ltd. ・・・・・・・・・・・・・ HH5 type
Matsushita Electric Works, 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. Lamp is lit only when all switches turn on.

6) Parallel connection
There is no restriction in parallel connection number of switches of these types. Multi number connection of model T0, sometimes, cause a dimmed lamp or complete lamp 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”, 4.2 should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

4.2 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.
	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.
	Exertion of transverse (lateral) load.	Correct the installation state.
	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.	Correct the installation state.

2) Switch

Troubles	Causes	Remedies
Lamp 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 lamp	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.

5. HOW TO ORDER

5.1 Product Number Coding

- Without switch

SSG —— 12 D – 5

- With switch

SSG-L – 12 D – 5 – T0H – R

- 2 color indicator/preventive maintenance output, T1 switch (12, 16mm bore only)

SSG-L1 – 12 D – 10 – T2YH – R

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

(a) Model	
SSG	Double acting/single rod type
SSG-L	Double acting/single rod type/With switch
SSG-L1	ϕ 12, ϕ 16, 2 color indicator, preventive maintenance switch, off delay type, T1 switch

(b) Tube bore (mm)		(c) Cushion		(d) Standard stroke (mm)			
12	ϕ 12	Blank	With out cushion	ϕ 12 to ϕ 16	ϕ 20 to ϕ 25	ϕ 32 to ϕ 40	ϕ 50 to ϕ 100
16	ϕ 16	D	With cushion	5	5	5	-
20	ϕ 20			10	10	10	10
25	ϕ 25			15	15	15	15
32	ϕ 32			20	20	20	20
40	ϕ 40			25	25	25	25
50	ϕ 50			30	30	30	30
63	ϕ 63				35	35	35
80	ϕ 80				40	40	40
100	ϕ 100				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	Contact	Indicator lamp	Lead wire	Tube bore	Blank	1m (standard)
						3	3m (option)
F2H※	F2V※	Solid state	1 color indicator	2 wire	φ25	5	5m (option) (T-shaped switch only. F-shaped switch is applicable up to 3 m.)
F3H※	F3V※			3 wire			
F2YH※	F2YV※		2 color indicator	2 wire			
F3YH※	F3YV※			3 wire			
T0H※	T0V※	Reed	1 color indicator	2 wire	φ12 to φ100	※mark shows lead wire length.	
T5H※	T5V※						
T8H※	T8V※						
T1H※	T1V※	Slid state					
T2H※	T2V※						
T3H※	T3V※			3 wire			
T3PH※	T3PV※		1 color indicator (PNP out put) (Custom order)				
T2YH※	T2YV※		2 color indicator	2 wire			
T3YH※	T3YV※			3 wire			
T2YFH※	T2YFV※		Preventive maintenance output	3 wire			
T3YFH※	T3YFV※			4 wire			
T2YMH※	T2YMV※			3 wire			
T3YMH※	T3YMV※			4 wire			
T2YD※	—		Strong magnetic field proof	2 wire			
T2YDT※	—						
T2JH※	T2JV※		Off delay type				

(Remarks on selection of model No.)
Note1: T0※ and T5※ switches can not be loaded to 5mm-stroke of φ12 and φ16.
Note2: For 12, 16 mm bore cylinders, strong magnetic field proof switches are not available.
Note3: For 12 to 32 mm bore cylinders, T8※ switches are not available.
Note4: F-type switch can be loaded to the pipe port surface of the tube inside diameter φ25 only.

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

▸ Shorter stroke than standard

Available to manufacturer in every 1 mm intervals but overall length of cylinder itself is equivalent to that of the standard type.

5.2 Indication method of mounting bolt model No.

SSD — BOLT — d×L

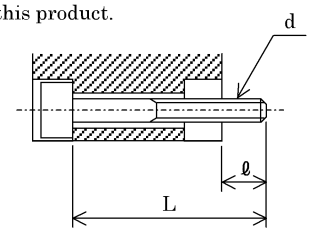
Refer to the following table for "d" and "L".

Note: Four mounting bolts are shipped as a set. Two mounting bolts are used in this product.

Example: SSG-L-32D-30 ··· SSD-BOLT-M5×65

Tube bore	ℓ	d	L		
			50 stroke or less		75・100 stroke
			Without switch	With switch	
φ12 ・φ16	6.5	M3	20 + stroke	25 + stroke (note)	
φ20	6	M5	20 + stroke	25 + stroke	
φ25	8	M5	25 + stroke	35 + stroke	
φ32	7.5	M5	25 + stroke	35 + stroke	35 + stroke
φ40	6	M5	30 + stroke	40 + stroke	40 + stroke
φ50	11	M6	35 + stroke	45 + stroke	45 + stroke
φ63	13	M8	40 + stroke	50 + stroke	50 + stroke
φ80	17.5	M10	50 + stroke	60 + stroke	60 + stroke
φ100	18	M10	60 + stroke	70 + stroke	70 + stroke

Note: If "SSG-L1" is (30 + stroke).



Material : steel
Treatment : blackening
d : mounting bolt screw diameter
L : mounting bolt length
ℓ : threaded length
(note) mounting bolt is indicated as d×L

5.3 Component Parts Model Coding

1) How to order switch

SW — T0H※

(e)

Switch model No.
(Refer to (e) on previous page.)

6. SPECIFICATION

6.1 Product Specifications

Model code / Item		SSG									
Tube bore	mm	φ 12	φ 16	φ 20	φ 25	φ 32	φ 40	φ 50	φ 63	φ 80	φ 100
Actution		Double acting									
Working fluid		Compressed Air									
Max. working pressure	MPa	1.0									
Min. working pressure	MPa	0.15				0.1					
Withstanding pressure	MPa	1.6									
Ambient temperature	℃	-10 to 60 (to be unfrozen)									
Port size		M5				Rc1/8 (note1)		Rc1/4		Rc3/8	
Stroke tolerance mm	Without switch	+1.0 0									
	With switch	+2.0 0									
Working piston speed	mm/s	50 to 500						50 to 300			
Cushioning		Be able to select rubber cushioned or air cushioned.									
Lubrication		Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)									
Allowable energy absorption J	Without switch	0.004	0.01	0.016	0.021	0.025	0.092	0.1	0.12	0.27	0.56
	With switch	0.03	0.05	0.10	0.16		0.44	0.75	0.78	2.51	3.92

Note: The port diameter of 5-stroke of φ 32 type without a switch is M5.

6.2 Switch Specifications

1) Types and applications of switches

Model code / Item			Application
Solid state	2 wire	T1H	AC For use with programmable controller, relay, compact solenoid valve
		T1V	
		T2H	DC For use exclusively with programmable controller
		T2V	
	3 wire	T3H	DC For use with, relay, programmable controllers
		T3V	
	2 wire	F2H	DC For use exclusively with programmable controller
		F2V	
	3 wire	F3H	DC For use with, relay, programmable controllers
		F3V	
	3 wire (PNP out put)	T3PH	DC For use with, relay, programmable controllers
		T3PV	
Reed	2 wire	T0H	AC/DC For use with, relay, programmable controllers
		T0V	
		T5H	AC/DC For use with programmable controller, relay, IC circuit, (without lamp), series connection
		T5V	
		T8H	AC/DC For use with, relay, programmable controllers
		T8V	
2 color indicator solid state	2 wire	T2YH	DC For use exclusively with programmable controller
		T2YV	
	3 wire	T3YH	DC For use with, relay, programmable controllers
		T3YV	
	2 wire	F2YH	DC For use exclusively with programmable controller
		F2YV	
	3 wire	F3YH	DC For use with, relay, programmable controllers
		F3YV	
With preventive maintenance output solid state	3 wire	T2YFH	DC For use exclusively with programmable controller
		T2YFV	
	4 wire	T3YFH	DC For use with, relay, programmable controllers
		T3YFV	
	3 wire	T2YMH	DC For use exclusively with programmable controller (self hold)
		T2YMV	
	4 wire	T3YMH	DC For use with, relay, programmable controllers (self hold)
		T3YMV	
Off delay type	2 wire	T2JH	DC For use exclusively with programmable controller
		T2JV	
Strong magnetic field proof solid state	2 wire	T2YD	DC For use exclusively with programmable controller
		T2YDT	

2) Switch Specifications

Descriptions	Reed 2 wire						
	T0H/V		T5H/V		T8H/V		
Applications	Programmable controller, relay		Programmable controller relay, IC circuit (without light), serial connection		Programmable controller, relay		
Power 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		
Light	LED (ON lighting)		—		LED (ON lighting)		
Leakage current	0						
Lead wire length (note1)	Standard 1m (Oil resistant vinyl cabtire code 2 conductor 0.2mm^2)				Standard 1m (Oil resistant vinyl cabtire code 2 conductor 0.3mm^2)		
Max. shock resistance	294m/s^2						
Insulation resistance	20MΩ over at DC 500V megger				100MΩ over at DC 500V megger		
Withstand Voltage	No failure at AC 1000V for one minute				No failure at AC 1500V for one minute		
Ambient temperature	-10 to 60℃						
Protective structure	IEC standards IP67, JIS C0920 (water tight type), oil resistance						

Descriptions	Solid state 2 wire			
	T1H/V	T2H/V	T2JH/V	T2YH/V
Applications	Programmable controller, relay, small solenoid valve	Programmable controller		
Power voltage	—			
Load voltage	AC85 to 265V	DC10 to 30V		
Load current	5 to 100mA	5 to 20mA (note 2)		
Current consumption	—			
Internal voltage drop	7V or less	4V or less		
Light	LED (ON lighting)			Red/Green LED (ON lighting)
Leakage current	1 mA or less at AC100V 2mA or less at AC200V	1 mA or less		
Lead wire length (note1)	Standard 1m (oil resistant vinyl cabtire code 2 conductor 0.3mm2)	Standard 1m (oil resistant vinyl cabtire code 2 conductor 0.2mm2)	Standard 1m (oil resistant vinyl cabtire code 2 conductor 0.3mm2)	
Max. 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 at AC1500V impressed for one minute	No failure at AC1000V impressed for one minute		
Ambient temperature	-10 to 60℃			
Protective structure	IEC standards IP67, JIS C0920 (water tight type), oil resistance			

Descriptions	Solid state 3 wire		
	T3H/V	T3PH/V	T3YH/V
Applications	Programmable controller, relay		
Output type	NPN out put	PNP out put	NPN out put
Power voltage	DC10 to 28V		
Load voltage	DC30V or less		
Load current	100 mA or less		50mA or less
Current consumption	10mA or less at DC24V (at ON state)	12mA or less at DC24V (at ON state)	10mA or less at DC24V (at ON state)
Internal voltage drop	0.5V or less		
Light	LED (ON lighting)	Green LED (ON lighting)	Red/Green LED (ON lighting)
Leakage current	10 μA or less		
Lead wire length (note1)	Standard 1m (oil resistant vinyl cabtire code 3 conductor 0.2mm2)		
Max. shock resistance	980m/s2		
Insulation resistance	20MΩ over at DC500V megger		100MΩ over at DC500V megger
Withstand Voltage	No failure at AC1000V impressed for one minute		
Ambient temperature	-10 to 60℃		
Protective structure	IEC standards IP67, JIS C0920 (water tight type), oil resistance		

Descriptions		Solid state 3 wire	Solid state 4 wire	Solid state 3 wire	Solid state 4 wire
		T2YFH/V	T3YFH/V	T2YMH/V	T3YMH/V
Applications		Programmable controller	Programmable controller, relay	Programmable controller	Programmable controller, relay
light	Installation position adjustment	Red/Green LED (ON lighting)			
	Preventive maintenance output	—		Yellow LED (ON lighting)	
Out put	Power voltage	—	DC10 to 28V	—	DC10 to 28V
	Load voltage	DC10 to 30V	DC30V or less	DC10 to 30V	DC30V or less
	Load current	5 to 20mA	50mA or less	5 to 20mA	50mA or less
	Internal voltage drop	4V or less	0.5V or less	4V or less	0.5V or less
	Current consumption	—	10mA or less	—	10mA or less
	Leakage current	1mA or less	10 μA or less	1.2mA or less	10 μA or less
Preventive maintenance output	Load voltage	DC30V or less			
	Load current	20mA or less	50mA or less	5 to 20mA (note2)	50mA or less
	Internal voltage drop	0.5V pr less		4V or less	2.4V or less
	Leakage current	10 μA or less			
	Signal holding (T on)	—		0.4 ± 0.2sec after installation position adjustment red LED turned on.	
	Signal release (T off)	—		0.7 ± 0.2sec after installation position adjustment green LED turned on.	
Lead wire length (note1)		1m (oil resistant vinyl cabtire code 3 conductor 0.2mm2)	1m (oil resistant vinyl cabtire code 4 conductor 0.2mm2)	1m (oil resistant vinyl cabtire code 3 conductor 0.2mm2)	1m (oil resistant vinyl cabtire code 4 conductor 0.2mm2)
Insulation resistance		100MΩ over at DC500V megger			
Withstand voltage		No failure at AC1000V impressed for one minute			
Max. shock resistance		980m/s2			
Ambient temperature		-10 to 60℃			
Protective structure		IEC standards IP67, JIS C0920 (water tight type), oil resistance			

Descriptions	Solid state 2 wire	
	T2YD	T2YDT
Applications	Programmable controller	
Load voltage	DC24V±10%	
Load current	5 to 20mA	
Internal voltage drop	6V or less	
Light	Red/Green LED (ON lighting)	
Leakage current	1.0mA or less	
Output delay time (note 3) (ON delay, OFF delay)	30 to 60ms	
Lead wire length (note 1)	1m (oil resistant vinyl cabtire code 2 conductor 0.5mm2)	1m (Flame resistant vinyl cabtire cord 2 conductor 0.5mm
Max. shock resistance	980m/s2	
Insulation resistance	100MΩ over at DC500V megger	
Withstand voltage	No failure at AC1000V impressed for one minute	
Ambient temperature	-10 to 60℃	
Protective structure	IEC standards IP67, JIS C0920 (water tight type), oil resistance	

Descriptions	Solid state 2 wire		Solid state 3 wire	
	F2H/V	F2YH/V	F3H/V	F3YH/V
Applications	Programmable controller		Programmable controller, relay	
Power voltage	—		DC10 to 28V	
Load voltage	DC10～30V	DC24V±10%	DC30V or less	
Load current	5 to 20mA (note 2)		50mA or less	
Current consumption	—		10mA or less at DC24V (at ON state)	
Internal voltage drop	4V or less		0.5V or less	
Light	Yellow LED (ON lighting)	Red/Green LED (ON lighting)	Yellow LED (ON lighting)	Red/Green LED (ON lighting)
Leakage current	1mA or less		10μA or less	
Lead wire length (standard)	1m (oil resistant vinyl cabtire code 2 conductor 0.15mm2)		1m (oil resistant vinyl cabtire code 3 conductor 0.15mm2)	
Max. shock resistance	980m/s2			
Insulation resistance	20MΩ over at DC500V megger			
Withstand voltage	No failure at AC1000V impressed for one minute			
Ambient temperature	−10 to 60℃			
Protective structure	IEC standards IP67, JIS C0920 (water tight type), oil resistance			

Note1 : 3m or 5m long lead wire is optionally available.
Note2 : Maximum value, 20mA is at 25℃ of ambient temperature. Load current decreases less than 20mA when the ambient temperature exceeds 25℃. (For example: it may be 5 to 10mA at 60)
Note3 : This shows a period of time between detection of the piston magnet by the magnetic sensor and sending of switch output.