CKD

SM－228714－A

INSTRUCTION MANUAL

CYLINDER WITH GUIDE (Scraper Type)

STS・STL-G, G1, G2, G3

- 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.

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Cylinder With Guide (Scraper Type)
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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.

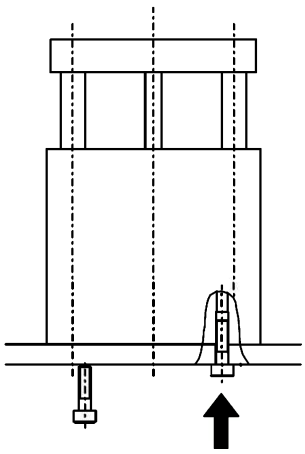
2. INSTALLATION

2.1 Installation

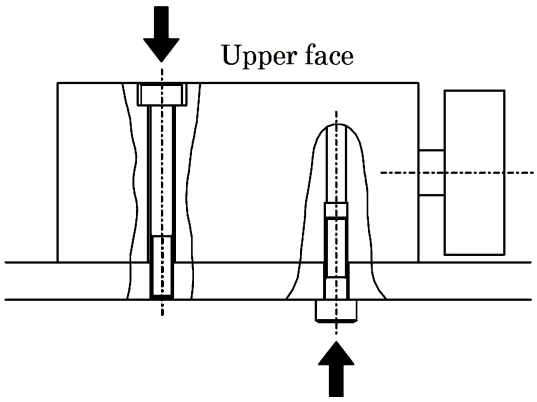
1) The ambient temperature for this cylinder is -10 to 60℃(Standard). Always operate the cylinder within this temperature.

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

● Bottom



● Side mounting
(φ80 bolt is unable to go through the hole)



Note) In case of the installation of the body by a through bolt, tighten by the tightening torque in the bellow table.

Bore size (mm)	Tightening torque (N･m)
φ20・φ25	5.1
φ32 ・φ40	8.6
φ50・φ63	21.5

2.2 Piping

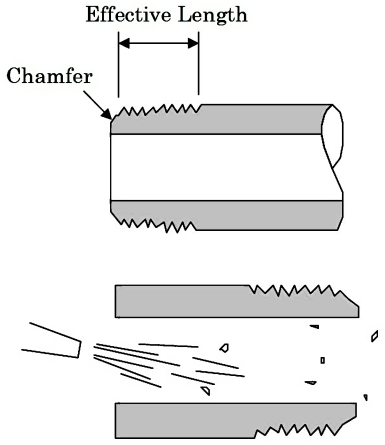
1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.

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

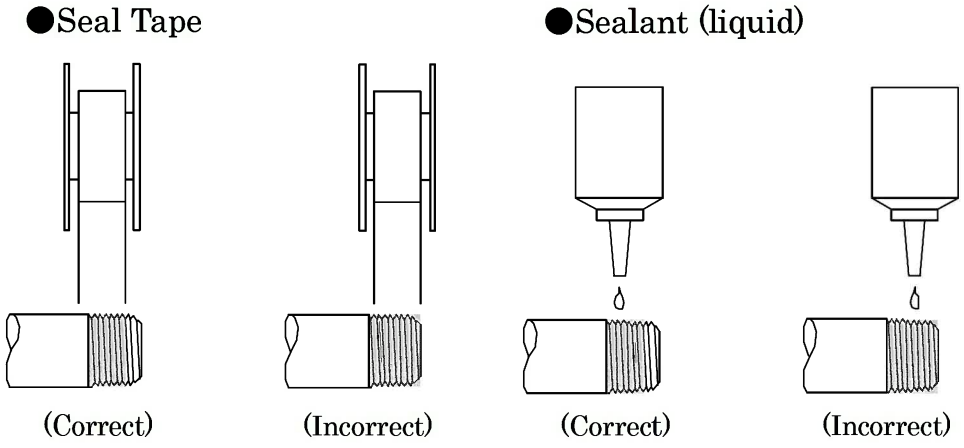
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

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

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

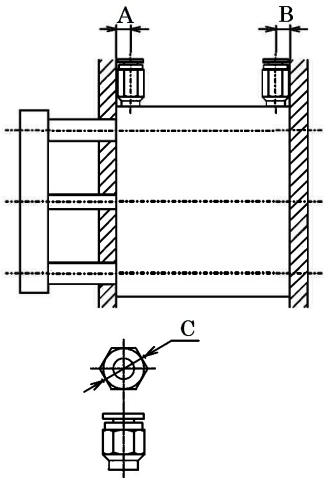


6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.



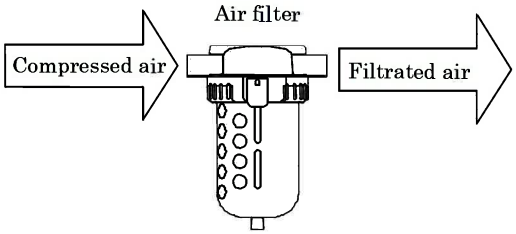
7) Because the usable piping joint has limitations, for using it, see the note below.

Item / Bore size (mm)	Port size	Port location A	Port location B	Available joints	Joint OD ϕC
ϕ20	M5×0.8	12	8	SC3W−M5−4 GWS4−M5 SC3W−M5−6 GWL4−M5 GWS4−M5−S GWL6−M5	ϕ15 or less
ϕ25		12	9		
ϕ32	Rc1/8	14	9	SC3W−6−4·6·8 GWS4−6 GWS6−6 GWS8−6 GWL4−6 GWL6−6	ϕ15 or less
ϕ40		14.5	10		
ϕ50	Rc1/4	16	11	SC3W−8−6·8·10 GWS4−8 GWS6−8 GWS10−8 GWS12−8 GWL4 to 12−8	ϕ21 or less
ϕ63		17.5	16		
ϕ80	Rc3/8	25	26	SC3W−10−8·10·12 GWS6−10 GWS8−10 GWS10−10 GWL6 to 12−10	ϕ21 or less

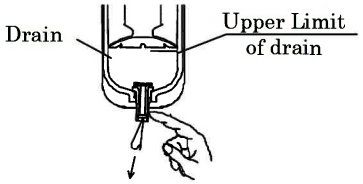


2.3 Fluid

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.

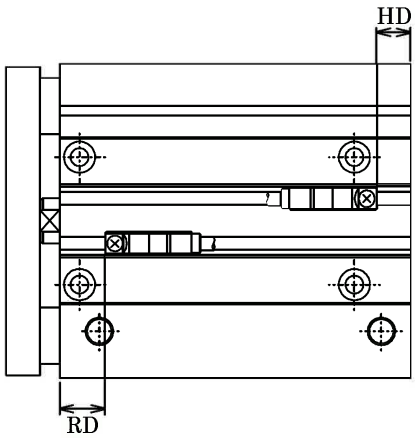


3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.

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 Switch installation

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.

- 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 0.1 to 0.2N·m)

2) Operating range

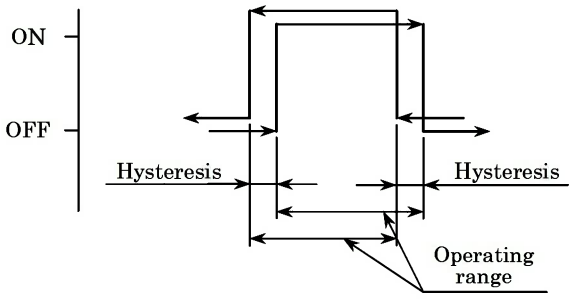
(1) The switch turns on first and turns off as the piston moves along its stroke. Precise operating range deviate slightly depending upon the direction of piston movement as shown right.

(2) The center of the range is the maximum 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 stop-ping location of piston.



Maximum sensitive position, operating range and hysteresis (Unit : mm)

Item / Bore size (mm)	Solid state switch (T2H/V,T3H/V)				Solid state switch bi-color indicator (T※Y※,※)			
	Maximum sensitive position		Operating range	Hysteresis	Maximum sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
φ20	9.5	12.0	3 to 8	1.5 or less	8.0	9.5	5 to 8.5	1.5 or less
φ25	9.0	13.0	3 to 9		7.5	11.5		
φ32	13.5	17.5			12.0	16.0	5 to 9	
φ40	14.0	21.0			12.5	19.5	6 to 10	
φ50	16.0	22.0			13.5	20.5		
φ63	23.0	20.0			21.5	18.5		
φ80	30.5	26.5	4 to10		29.5	25.0	7 to 11	

Item / Bore size (mm)	Reed switch (T0H/V,T5H/V)			
	Maximum sensitive position		Operating range	Hysteresis
	HD	RD		
φ20	9.5	12.0	6 to 14	3 or less
φ25	9.0	13.0	5 to 14	
φ32	13.5	17.5	5 to 12	
φ40	14.0	21.0	6 to 14	
φ50	16.0	22.0		
φ63	23.0	20.0	7 to 15	
φ80	30.5	26.5		

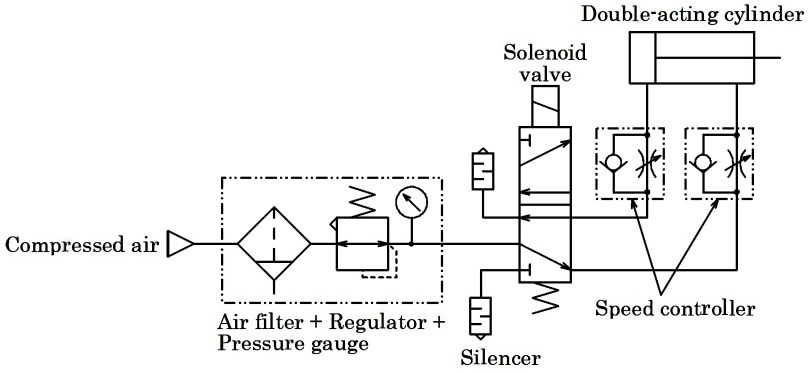
※Switches at ex-factory shipment are positioned at the most sensitive points (HD and RD).

3. OPERATION

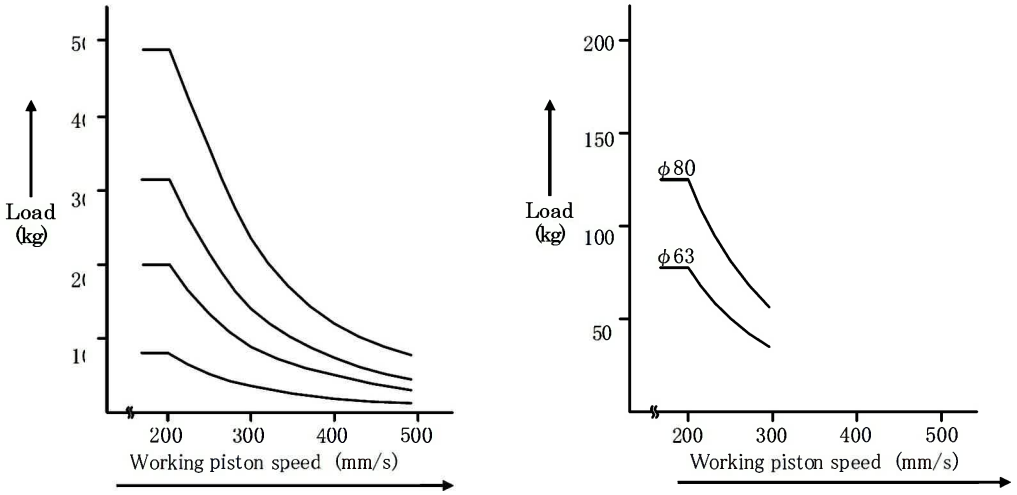
3.1 Operating the Cylinder

1) The working pressure for this type of cylinder is specified in "Cylinder Specifications". Operate the system within this range.
2) Although a rubber cushion is internally provided for this type of cylinder, it is advisable to install an additional external stopper when the kinetic energy is excessive. Allowable energy absorption is as the graphs below indicate.
3) Regulate the working piston speed by installing speed controllers as per illustration in the Fundamental Circuit Diagram, below.

● Fundamental Circuit Diagram



● Graphs for allowable energy absorption



Note : The area left and under the plotted curve designates serviceable range for the cylinder. Additional external cushion is required to operate the cylinder within the area of right and upper plotted curve.

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.

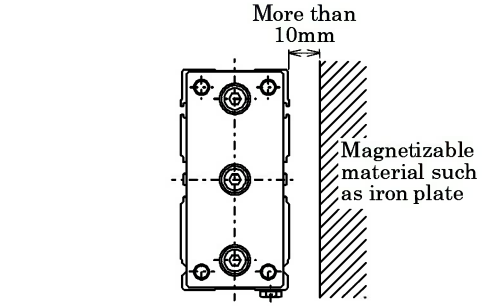
2) Protection of lead cord
Pay consideration to eliminate repeating bending stress or stretching of lead cord while laying the cord.
To the moving portion, use such cord of flexibility as for building a robot.

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.

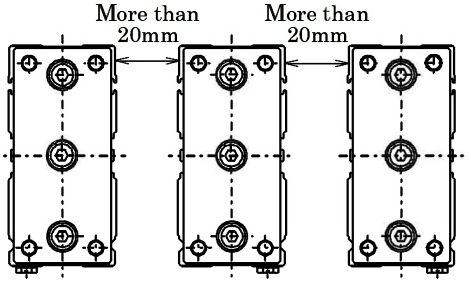
4) Intermediate position detection
When activating the switch halfway of the stroke, the relay may not respond if the working piston speed is too fast.
(Example) Operate cylinder with the speed of less than 500mm/s in case the relay actuation time is 20ms.

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 least 10mm 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 (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

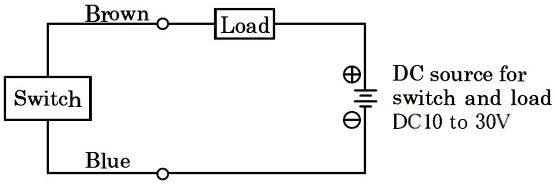


Fig.1 Fundamental circuit example of T2(Y), T2J

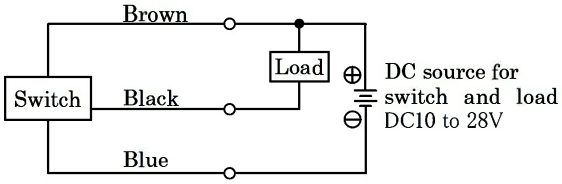


Fig.2 Fundamental circuit example (1) of T3(Y)
(In case the same source of power is used.)

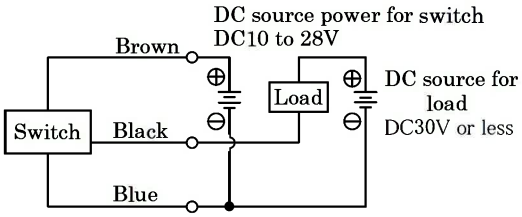


Fig.3 Fundamental circuit example(2) of T3(Y)
(In case individual source of power is used.)

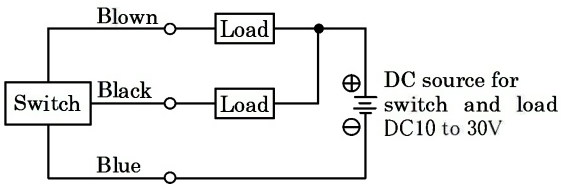


Fig.4 Fundamental circuit example of T2YF/M

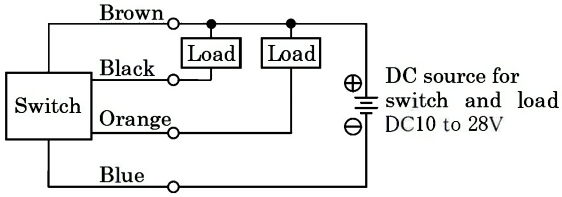


Fig.5 Fundamental circuit example (1) of T3YF/M
(In case the same source of power is used.)

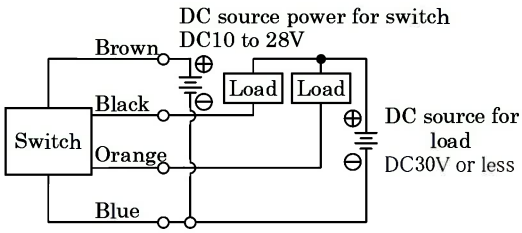


Fig.6 Fundamental circuit example (2) of T3YF/M
(In case individual source of power is used.)

2) Protection of output circuit

Install some protective circuit as illustrated in Fig. 7 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. 8 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. 9 or 10 (in case of model T2) and Fig 11 (in case of model T3).

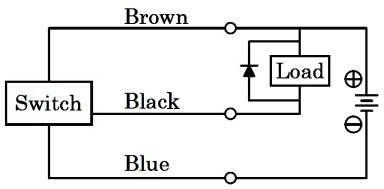
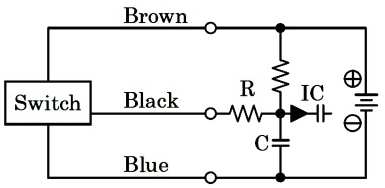


Fig.7 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



Flg.8 An example of using capacitor type load together with current regulating resister R.
Comply with the following formula to figure out required R.

$$\frac{V}{0.10} = R(\Omega)$$

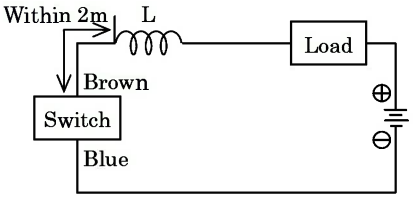


Fig.9 ・Choke coil
L = a couple hundred μ H to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

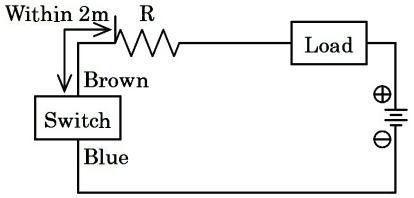


Fig.10 ・Dash current restriction resister.
R = As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

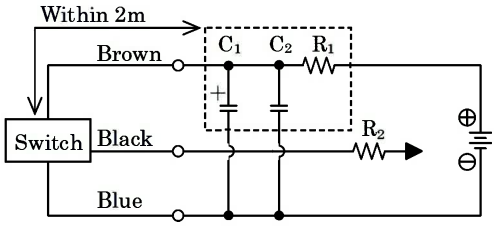


Fig11 ・Electric power noise absorptive circuit.
C_1 = 20 to 50 μ F electrolytic capacitor
(Withstand voltage 50V or more)
C_2 = 0.01 to 0.1 μ F ceramic capacitor
R_1 = 20 to 30 Ω

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

3) Connection to a programmable controller (Sequencer).

Type of connection varies depending upon the model of the programmable controller. Refer to the following Fig. 12 to 18 respectively.

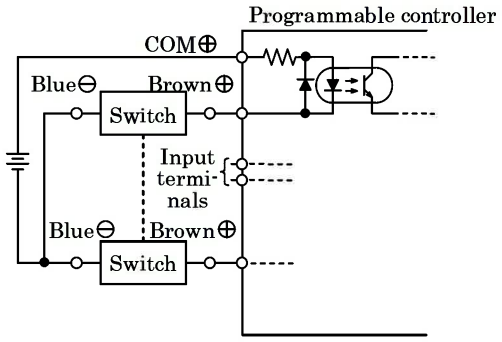


Fig.12 An example of T2 connection to source input type (an external power source)

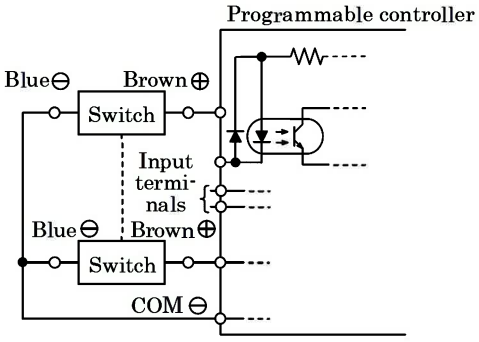


Fig.13 An example of T2 connection to source input type (an internal power source)

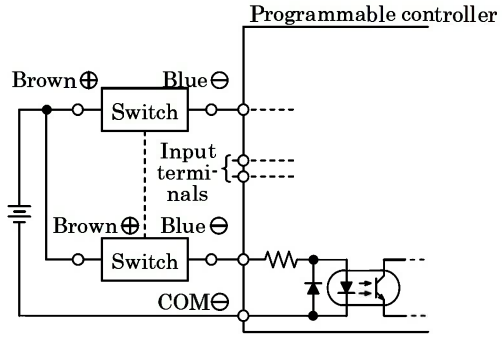


Fig.14 An example of T2 connection to sink input type

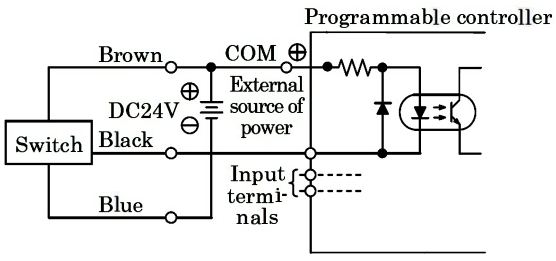


Fig.15 An example of T3 connection to source input type (an external power source)

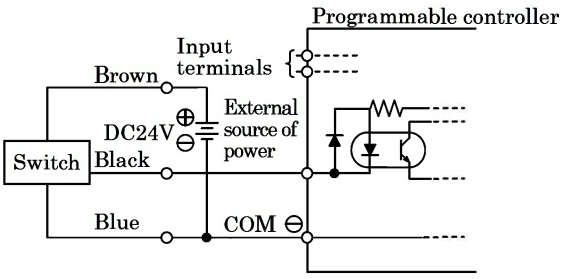


Fig.16 An example of T3 connection to source input type (an internal power source)

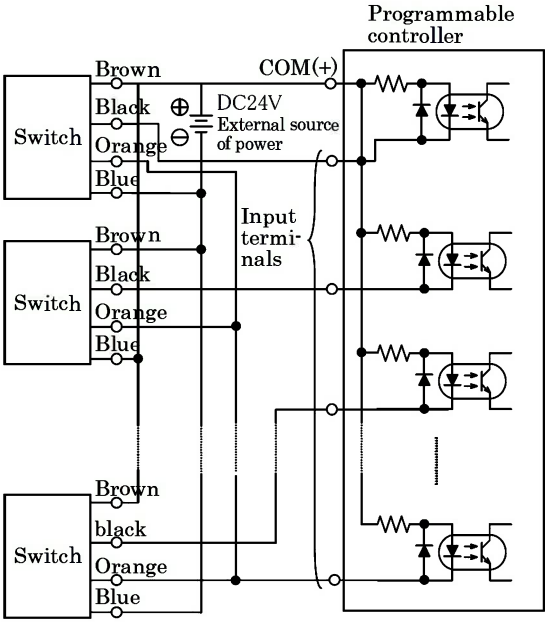


Fig.17 An example of T3YF/M connection to source input type (an external power source)

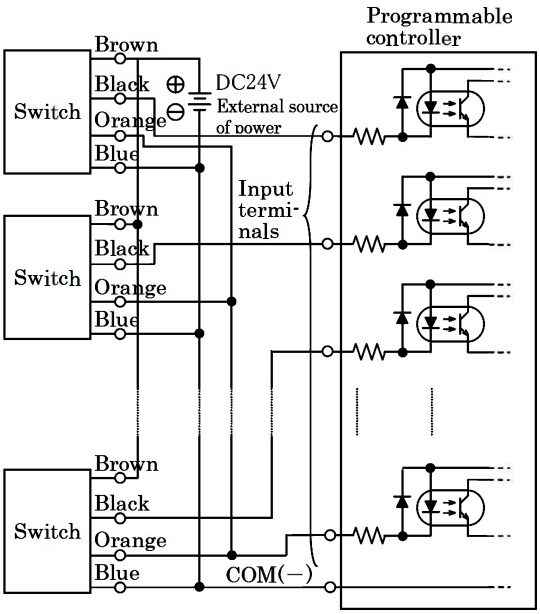


Fig.18 An example of T3YF/M connection to source input type (an internal power source)

4) Series connection

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

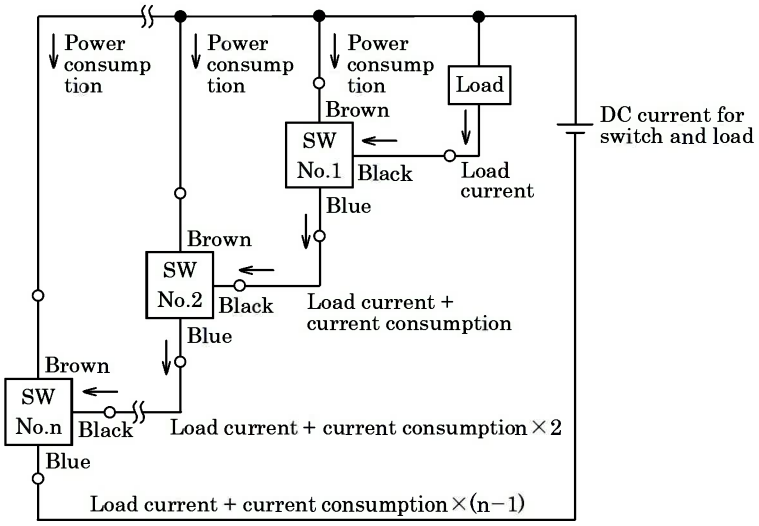
T3 switches hardly ever leak. When less than 10 μ A, then leakage may occur. Usually dimming and failure of the indicator light do not occur.

5) Serial connection

When two or more T2※ switches are connected in series, the voltage drop is equal to the sum of the voltage drops in all of the connected switches. The voltage applied to the load is the result of subtracting the total voltage drop from the power source voltage. It is necessary to determine the number of switches to be connected based on the specifications of the load.

When two or more T3※ switches are connected in series, the voltage drop is equal to the sum of the voltage drops in all the connected switches as in the case of the T2※ switches. The current flowing through the switches is equivalent to the sum of the current consumption of the connected switches as shown in the figure below and the load current. Determine the number of switches to be connected based on the specifications of the load so that the current will not exceed the maximum load current.

The indicator light turn ON only when all switches are ON.



3.2.3 Reed switch type switch (T0, T5)

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

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

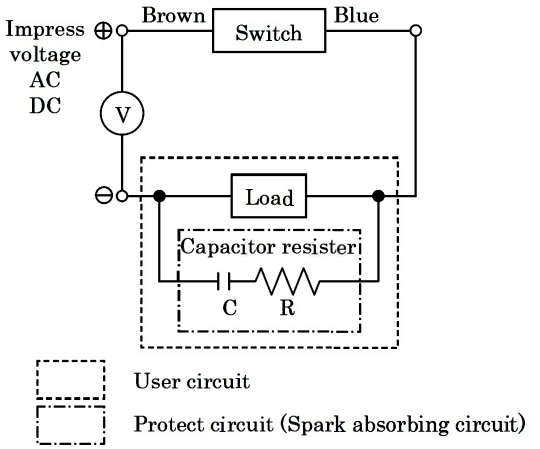
Ⓑ When the switch is connected to an AC relay or a programmable controller input, the indicator light on the switch is not lit if the half-wave rectification is performed in the connected circuit. If this occurs, reverse the polarities of the switch lead wire connection. The indicator light may then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

2) Contact protective measures
When an inductive load, such as relay is used or the wire length exceeds that stated in Table1, always install a contact protective circuit.

Table1

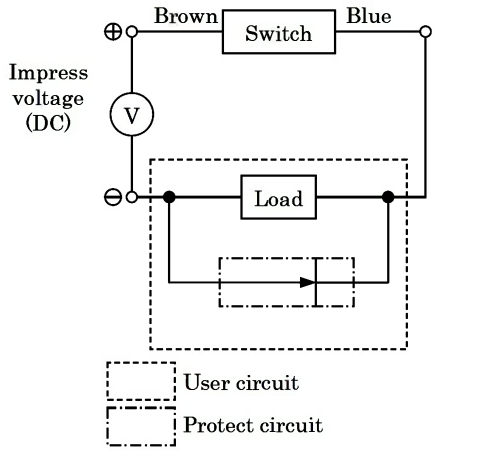
Electric power	Length of wire
DC	100m
AC	10m

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



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

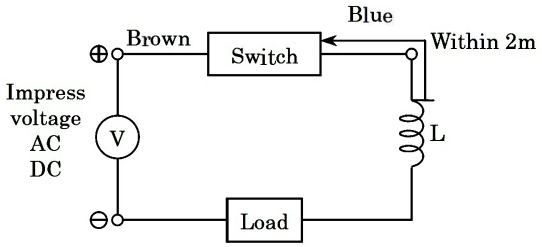
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

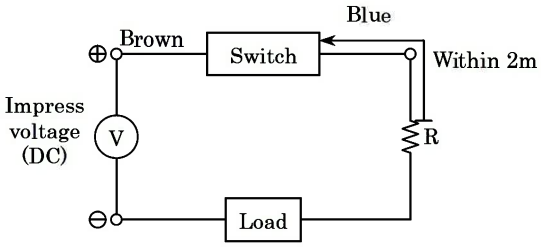
(2) Protective circuit when the wire length exceeds that stated Table1.



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

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

Fig.3



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

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

Fig.4

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

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

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

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

4. MAINTENANCE

4.1 Periodical Inspection

1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.
2) Inspection items
   (1) Check the bolts and nuts fitting the piston rod end brackets and mounting brackets for slackening.
   (2) Check to see that the cylinder operates smoothly.
   (3) Check any change of the working 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.

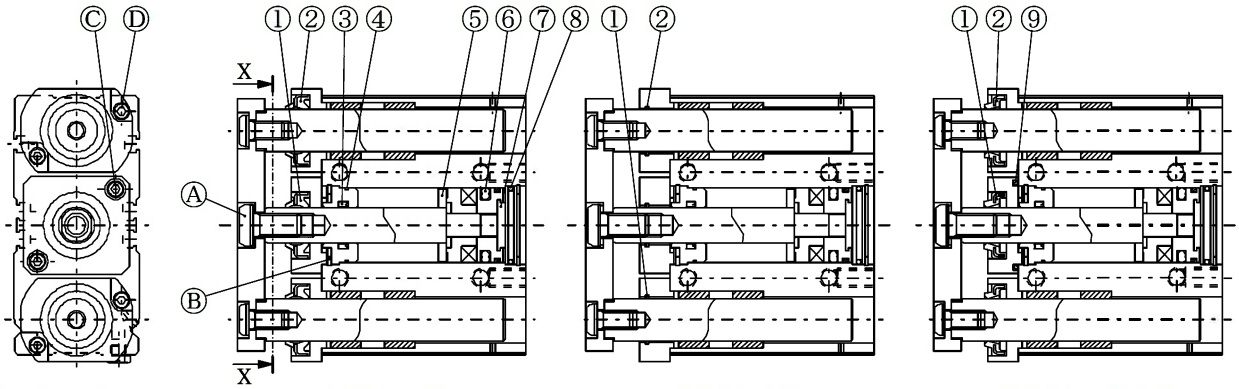
   See "TROUBLE SHOOTING, 5. should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

4.2 Disassembling

1) Cylinder of this type is able to be disassembled. Disassemble it, referring to the Internal structural drawing, should there be any disorder such as air leakage then replace the expendable parts refer to Exp. Parts list posted below.

2) Remove bolt, Ⓐ. Take out End plate together with Guide rod. Remove bolt, Ⓒ, Ⓓ. Remove C-shape snap ring, Ⓑ. Pull out piston rod together with rod metal. Follow reverse steps of disassembling during the process of assembling. Be sure at this time to apply a film of grease over packing and guide. Apply adhesive to bolt Ⓐ. Verify that cylinder is in the state of pulling when tightening bolt A to the piston rod.

3) Internal structure drawings and Expendable parts list



Sectional view X-X | STS/L-G | STS/L-G1 | STS/L-G2,G3

Expendable Parts List (Designate the Kit No. when ordering)

Bore size (mm)		Part name / Kit No.	① Scraper	② Scraper	③ Rod packing	④ Metal gasket
φ20	G	STS-MG-20K	SCB-10	SCB-14	MYR-10	F3-657968
		STS-BG-20K		SCB-12		
	G1	STS-MG1-20K	MDH-10	MDH-14		
		STS-BG1-20K		MDH-12		
	G2	STS-MG2-20K	SDB-10	SDB-14		
		STS-BG2-20K		SDB-12		
	G3	STS-MG3-20K	SDB-10F	SDB-14F	MYR-10F	F4-165898
		STS-BG3-20K		SDB-12F		

Bore size (mm)		Part name / Kit No.	⑤ Cushion rubber (R)	⑥ Piston packing	⑦ Cushion rubber (H)	⑧ O ring	⑨ O ring
φ20	G	STS-MG-20K	F4-116102	PSD-20	F4-659112	AS568-018	—
		STS-BG-20K					
	G1	STS-MG1-20K					
		STS-BG1-20K					
	G2	STS-MG2-20K					AS568-019
		STS-BG2-20K					
	G3	STS-MG3-20K		PSD-20F			
		STS-BG3-20K					

Expendable Parts List (Designate the Kit No. when ordering)

Bore size (mm)		Part No. / Part name / Kit No.	① Scraper	② Scraper	③ Rod packing	④ Metal gasket
φ25	G	STS-MG-25K	SCB-12	SCB-14	MYR-12	F3-657969
		STS-BG-25K		SCB-12		
	G1	STS-MG1-25K	MDH-12	MDH-14		
		STS-BG1-25K		MDH-12		
	G2	STS-MG2-25K	SDB-12	SDB-14		
		STS-BG2-25K		SDB-12		
	G3	STS-MG3-25K	SDB-12F	SDB-14F	MYR-12F	F4-165899
		STS-BG3-25K		SDB-12F		

Bore size (mm)		Part No. / Part name / Kit No.	⑤ Cushion rubber (R)	⑥ Piston packing	⑦ Cushion rubber (H)	⑧ O ring	⑨ O ring
φ25	G	STS-MG-25K	F4-116103	PSD-25	F4-659113	AS568-020	—
		STS-BG-25K					
	G1	STS-MG1-25K					
		STS-BG1-25K					
	G2	STS-MG2-25K					AS568-022
		STS-BG2-25K					
	G3	STS-MG3-25K		PSD-25F			
		STS-BG3-25K					

Bore size (mm)		Part No. / Part name / Kit No.	① Scraper	② Scraper	③ Rod packing	④ Metal gasket
φ32	G	STS-MG-32K	SCB-16	SCB-20	MYR-16	F3-657975
		STS-BG-32K		SCB-16		
	G1	STS-MG1-32K	MDH-16	MDH-20		
		STS-BG1-32K		MDH-16		
	G2	STS-MG2-32K	SDB-16	SDB-20		
		STS-BG2-32K		SDB-16		
	G3	STS-MG3-32K	SDB-16F	SDB-20F	MYR-16F	F4-660814-32
		STS-BG3-32K		SDB-16F		

Bore size (mm)		Part No. / Part name / Kit No.	⑤ Cushion rubber (R)	⑥ Piston packing	⑦ Cushion rubber (H)	⑧ O ring	⑨ O ring
φ32	G	STS-MG-32K	F4-659049	PSD-32	F4-659049	AS568-025	—
		STS-BG-32K					
	G1	STS-MG1-32K					
		STS-BG1-32K					
	G2	STS-MG2-32K					AS568-027
		STS-BG2-32K					
	G3	STS-MG3-32K		PSD-32F			
		STS-BG3-32K					

Expendable Parts List (Designate the Kit No. when ordering)

Bore size (mm) / Part name / Part No.		Kit No	① Scraper	② Scraper	③ Rod packing	④ Metal gasket
ϕ40	G	STS-MG-40K	SCB-16	SCB-20	DRP-16	F3-657976
		STS-BG-40K		SCB-16		
	G1	STS-MG1-40K	MDH-16	MDH-20		
		STS-BG1-40K		MDH-16		
	G2	STS-MG2-40K	SDB-16	SDB-20		
		STS-BG2-40K		SDB-16		
	G3	STS-MG3-40K	SDB-16F	SDB-20F	PDU-16F	F4-660814-40
		STS-BG3-40K		SDB-16F		

Bore size (mm) / Part name / Part No.		Kit No	⑤ Cushion rubber (R)	⑥ Piston packing	⑦ Cushion rubber (H)	⑧ O ring	⑨ O ring
ϕ40	G	STS-MG-40K	F4-659039	PSD-40	F4-659039	AS568-029	—
		STS-BG-40K					
	G1	STS-MG1-40K					
		STS-BG1-40K					AS568-030
	G2	STS-MG2-40K					
		STS-BG2-40K					
	G3	STS-MG3-40K		PSD-40F			
		STS-BG3-40K					

Bore size (mm) / Part name / Part No.		Kit No	① Scraper	② Scraper	③ Rod packing	④ Metal gasket
ϕ50	G	STS-MG-50K	SCB-20	SCB-25	DRP-20	F3-657977
		STS-BG-50K		SCB-20		
	G1	STS-MG1-50K	MDH-20	MDH-25		
		STS-BG1-50K		MDH-20		
	G2	STS-MG2-50K	SDB-20	SDB-25		
		STS-BG2-50K		SDB-25		
	G3	STS-MG3-50K	SDB-20F	SDB-25F	PDU-20F	F4-660814-50
		STS-BG3-50K		SDB-20F		

Bore size (mm) / Part name / Part No.		Kit No	⑤ Cushion rubber (R)	⑥ Piston packing	⑦ Cushion rubber (H)	⑧ O ring	⑨ O ring
ϕ50	G	STS-MG-50K	F4-659026	PSD-50	F4-659026	AS568-032	—
		STS-BG-50K					
	G1	STS-MG1-50K					
		STS-BG1-50K					AS568-033
	G2	STS-MG2-50K					
		STS-BG2-50K					
	G3	STS-MG3-50K		PSD-50F			
		STS-BG3-50K					

Expendable Parts List (Designate the Kit No. when ordering)

Bore size (mm)		Part No. / Part name / Kit No	① Scraper	② Scraper	③ Rod packing	④ Metal gasket
φ63	G	STS-MG-63K	SCB-20	SCB-25	DRP-20	AS568-035
		STS-BG-63K		SCB-20		
	G1	STS-MG1-63K	MDH-20	MDH-25		
		STS-BG1-63K		MDH-20		
	G2	STS-MG2-63K	SDB-20	SDB-25		
		STS-BG2-63K		SDB-25		
	G3	STS-MG3-63K	SDB-20F	SDB-25F	PDU-20F	
		STS-BG3-63K		SDB-20F		

Bore size (mm)		Part No. / Part name / Kit No	⑤ Cushion rubber (R)	⑥ Piston packing	⑦ Cushion rubber (H)	⑧ O ring	⑨ O ring
φ63	G	STS-MG-63K	F4-659096	PSD-63	F4-659069	AS568-036	—
		STS-BG-63K					
	G1	STS-MG1-63K					
		STS-BG1-63K					AS568-037
	G2	STS-MG2-63K					
		STS-BG2-63K					
	G3	STS-MG3-63K		PSD-63F			
		STS-BG3-63K					

Bore size (mm)		Part No. / Part name / Kit No	① Scraper	② Scraper	③ Rod packing	④ Metal gasket
φ80	G	STS-MG-80K	SCB-25	SCB-40	DRP-25	AS568-041
		STS-BG-80K		SCB-35		
	G1	STS-MG1-80K	MDH-25	MDH-40		
		STS-BG1-80K		MDH-35		
	G2	STS-MG2-80K	SDB-25	SDB-40		
		STS-BG2-80K		SDB-35		
	G3	STS-MG3-80K	SDB-25F	SDB-40F	PDU-25F	
		STS-BG3-80K		SDB-35F		

Bore size (mm)		Part No. / Part name / Kit No	⑤ Cushion rubber (R)	⑥ Piston packing	⑦ Cushion rubber (H)	⑧ O ring	⑨ O ring
φ80	G	STS-MG-80K	F4-162661	PSD-80	F4-162661	AS568-041	—
		STS-BG-80K					
	G1	STS-MG1-80K					
		STS-BG1-80K					AS568-041
	G2	STS-MG2-80K					
		STS-BG2-80K					
	G3	STS-MG3-80K		PSD-80F			
		STS-BG3-80K					

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 installation direction 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

● Short stroke

STS – M G – 63 – 50 – T0V – R – F

● Long stroke

STL – M G – 63 – 50 – T0V – R – F

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

(a) Type of bearing.		(b) Bearing type		(c) Bore size (mm)			
M	Slide bearing	G	Rubber scraper type	20	φ20	50	φ50
B	Ball bearing	G1	Coil scraper type	25	φ25	63	φ63
		G2	Coolant proof scraper type (Packing:NBR)	32	φ32	80	φ80
				40	φ40		
		G3	Coolant proof scraper type (Packing:FKM)				

○ : Standard — : Not available ● : option

(d) Standard stroke (mm)		25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
STS	φ20～φ63	○	○	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	φ80	○	○	○	○	—	—	—	—	—	—	—	—	—	—	—	—
STL	φ8～φ63	—	○	○	○	○	○	○	○	●	●	●	●	●	●	●	●
	φ80	—	—	○	○	○	○	○	○	●	●	●	●	●	●	●	●

(e) Switch model No.					(f) Switch quantity		(g) Option	
Axial lead wire	Radial lead wire	Switch type	Indicator	Lead wire	R	One on rod side	Material of end plate	
					H	One on head side	F	Steel
T0H※	T0V※	Reed	1 color indicator	2 wire	D	Two	Blank	Aluminum alloy
T5H※	T5V※				T	Three		
T2H※	T2V※	Solid state	1 color indicator	2 wire				
T3H※	T3V※			3 wire				
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				
T2JH※	T2JV※		Off delay type	2 wire				
T2YD※	—		Strong magnetic field proof Solid state	2wire				
T2YDT※	—							
T2YLH※	T2YLV※		Coolant proof Solid state	2 wire				
T3YLH※	T3YLV※			3 wire				

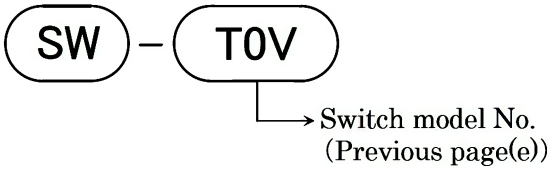
※Lead wire length	
Blank	1m (Standard)
3	3m (Option)
5	5m (Option)

Note : Add "L1" to model code when ordering 2-color indicator or preventive maintenance or strong magnetic field proof switch of φ40 or larger.
(Example) STS–MG–L1–63–50–T2YH3–D–F

- Shorter stroke than standard
  Available to manufacturer in every 5mm intervals but overall length of cylinder itself is equivalent to that of the standard type.

6.2 Component parts Model coding

● How to order switch



7. SPECIFICATION

7.1 Cylinder Specifications

Model / Item		STS･STL-G ,G1 ,G2 ,G3						
Bore size	mm	φ20	φ25	φ32	φ40	φ50	φ63	φ80
Actuation		Double acting						
working fluid		Compressed air						
Max. working pressure	MPa	1.0						
Min. working pressure	MPa	0.2		0.15				
Proof pressure	MPa	1.6						
Ambient temperature	℃	-10～60 (No freezing)						
Port size		M5		Rc1/8		Rc1/4		Rc3/8
Stroke length tolerance	mm	+2.0 0						
Working piston speed	mm/s	50～500				50～300		
Cushion		Rubber cushioned						
Lubrication		Not required (when lubrication, use turbine oil Class 1 ISO VG 32)						
Allowable energy absorption	J	0.157	0.157	0.401	0.627	0.980	1.560	2.510

7.2 switch Specifications

1) Type of switches and Applications

Model / Item			Applications (Purpose)
Solid state	2 wire	T2H T2V	DC Programmable controller, exclusive
	3 wire	T3H T3V	DC Programmable controller, Relay
Reed	2 wire	T0H T0V	AC/DC Relay, Programmable controller
		T5H T5V	AC/DC Programmable controller, Relay or IC circuit (not including Indicator light), for Series connection
2 color indicator Solid state	2 wire	T2YH T2YV	DC Programmable controller, exclusive
	3 wire	T3YH T3YV	DC Programmable controller, Relay
Preventive maintenance Output	3 wire	T2YFH T2YFV	DC Programmable controller, exclusive
	4 wire	T3YFH T3YFV	DC Programmable controller, Relay
	3 wire	T2YMH T2YMV	DC Programmable controller, exclusive (self holding)
	4 wire	T3YMH T3YMV	DC Programmable controller, Relay (self holding)
Off delay type	2 wire	T2JH T2JV	DC Programmable controller, exclusive
Strong magnetic field proof Solid state	2 wire	T2YD T2YDT	DC Programmable controller, exclusive
Coolant proof Solid state	2 wire	T2YLH T2YLV	DC Programmable controller, exclusive
	3 wire	T3YLH T3YLV	DC Programmable controller, Relay

Note1. T※H expresses the axial lead wire. T※V expresses the radial lead wire.

Note2. Note that applicable cylinders (φ40 to φ80) with switches of 2-corol indication solid state types for preventive maintenance type differ from that for the standard cylinders.

2) Switch specification

Type & Model / Item	Reed 2 wire			
	T0H/V		T5H/V	
Applications	Programmable controller, relay		Programmable controller, relay, IC circuit (without indicator light), series connection	
Power supply voltage	—			
Load Voltage	DC12/24V	AC110V	DC5/12/24V	AC110V
Load Current	5 to 50mA(Note2)	7 to 20mA(Note2)	50mA or less	20mA or less
Current consumption	—			
Internal voltage drop	2.4V or less		0V	
Indicator light	LED (ON lighting)		Without indicator light	
Leakage current	0mA			
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2mm²)			
Shock resistance	294m/s²			
Insulation resistance	20MΩ over at 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		
	T2H/V	T2JH/V	T2YH/V
Applications	Programmable controller		
Power supply voltage	—		
Load Voltage	DC10 to 30V		
Load Current	5 to 20mA(Note2)		
Current consumption	—		
Internal voltage drop	4V or less		
Indicator light	LED (ON lighting)		Red/green LED (ON lighting)
Leakage current	1 mA or less		
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2mm)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm)	
Shock resistance	980m/s²		
Insulation resistance	20MΩ over at DC500V meggeer	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 3 wire	
	T3H/V	T3YH/V
Applications	Programmable controller, relay	
Power supply 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	
Internal voltage drop	0.5V or less	
Indicator light	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 0.2mm²)	
Shock resistance	980m/s²	294m/s²
Insulation resistance	20MΩ over at DC500V meggeer	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		Solid state 3 wire	Solid state 4 wire	Solid state 3 wire	Solid state 4 wire
Item		T2YFH/V	T3YFH/V	T2YMH/V	T3YMH/V
Applications		Programmable controller	Programmable controller, relay	Programmable controller	Programmable controller, relay
Indicator light	Mounting position adjustment	Red/green LED (ON lighting)			
	Preventive maintenance output	—		Yellow LED (ON lighting)	
Output	Power supply voltage	—	DC10 to 28V	—	DC10～28V
	Load voltage	DC10 to 30V	DC30V or less	DC10 to 30V	DC30V or less
	Load current	DC5 to 20mA (Note2)	DC50mA or less	DC5 to 20mA (Note2)	DC50mA 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	10μA or less	1.2mA or less	10A or less
Preventive maintenance output	Load voltage	DC30V or less			
	Load current	DC20mA or less	DC50mA or less	DC5 to 20mA (Note2)	DC50mA or less
	Internal voltage drop	0.5V or less	4V or less		2.4V or less
	Current consumption	10μA or less			
	Signal holding (Ton)	—		0.4 ± 0.2sec after mounting position adjustment red LED turned on.	
	Signal holding (Toff)	—		0.7 ± 0.2sec after mounting position adjustment red LED turned on.	
Lead wire length (Note1)		Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.2mm)	Standard 1m (Oil resistant vinyl cabtire cord 4 conductor 0.2mm)	Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.2mm)	Standard 1m (Oil resistant vinyl cabtire cord 4 conductor 0.2mm)
Shock resistance		980m/s²			
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	Solid state 2 wire	
Item	T2YD	T2YDT
Applications	Programmable controller	
Load voltage	DC24V±10%	
Load current	5 to 20mA (Note2)	
Internal voltage drop	6V or less	
Indicator light	Red/green LED (ON lighting)	
Leakage current	1.0mA or less	
Output delay time (Note3) (ON delay, OFF delay)	30 to 60ms	
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.5mm)	Standard 1m (Flame resistant vinyl cabtire cord 2 conductor 0.5mm)
Shock resistance	980m/s²	
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
	T2YLH/V	T3YLH/V
Applications	Programmable controller	Programmable controller, relay
Power supply voltage	—	DC10 to 28V
Load Voltage	DC10 to 30V	DC30V or less
Load Current	5 to 20mA(Note2)	50mA or less
Current consumption	—	10mA or less at DC24V
Internal voltage drop	4V or less	0.5V or less
Indicator light	Red/green LED (ON lighting)	
Leakage current	1mA or less	10 μ A or less
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm)	Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.2mm)
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℃	
Storage temperature	-20 to 80℃	
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance	

Note1 : 3m or 5m long lead wire is optionally available.

Note2 : Max. Load current above is value at 25℃. The current will be lower if the temperature around switch is higher than 25℃.(50% at 60℃)

Note3 : This shows the time until a magnetic sensor detects the magnet and outputs a switch signal.