CKD

SM－419837－A

INSTRUCTION MANUAL

CYLINDER WITH GUIDE

Clean Room Specification

STG-P7 Series

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

The 2nd edition

For Safety Use

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

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

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

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

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

⚠ CAUTION :

- Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch.
  Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.
- The P7 series uses fluorine-based grease. Avoid exposure to open flame to prevent generation of possibly injurious toxic gases. Smoking with a hand with the grease may generate toxic gas, so this is harmful to the health.

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1. UNPACKING

1) The product is packaged in a clean room, and should be opened just before piping it in the clean room.
2) Make sure that the type No. on the nameplate of the delivered Super Compact Cylinder matches the type No. you ordered.
3) Check the appearance for any damage.

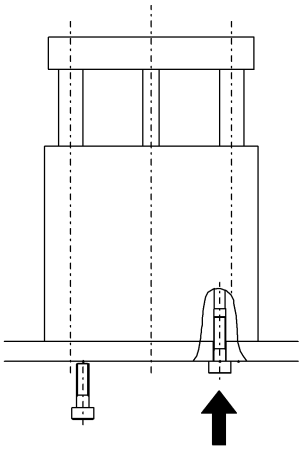
2. INSTALLATION

2.1 Installation

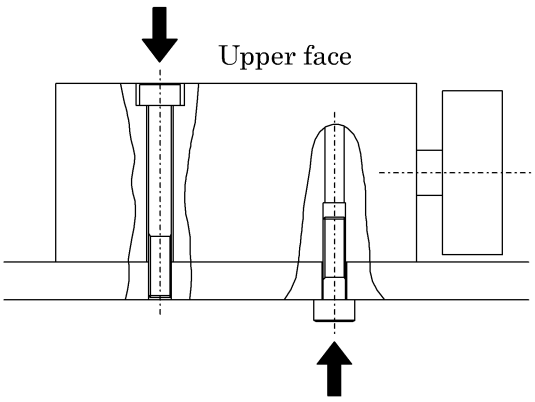
1) The ambient temperature for this cylinder is −10 to 60℃(Standard). Always operate the cylinder within this temperature range.

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

● Bottom



● Side mounting



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)
12 dia. ・16 dia.	2.33
20 dia.・25 dia.	4.52
32 dia.・40 dia.	7.08
50 dia.・63 dia.	15.18

2.2 Piping

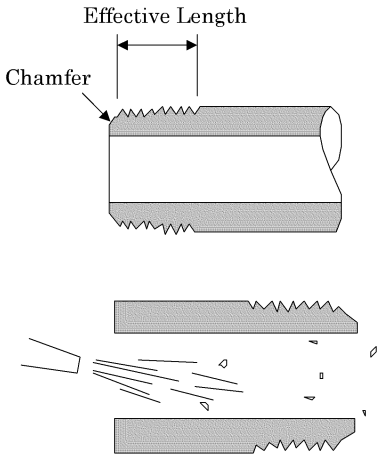
1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.

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.

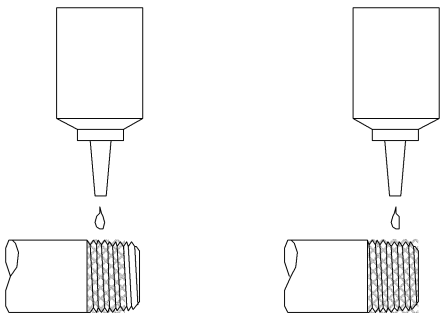
4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.

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.

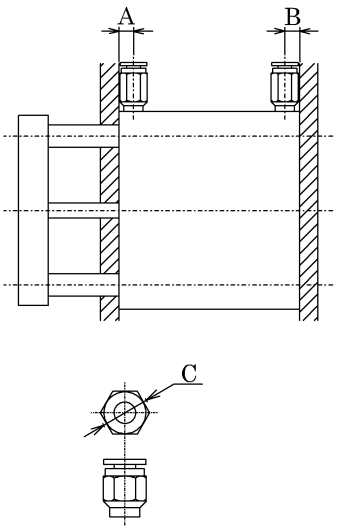
● Sealant (liquid)



(Correct) (Wrong)

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

Descriptions / Bore size (mm)	Port size	Port dimension A	Port dimension B	Compatible joints	Joint OD Cdia.
12 dia.	M5	12	7	SC3W-M5-4·6 GWS4-M5-S GWS4-M5 GWL4-M5 GWL6-M5 GWS6-M5	12 mm or less
16 dia.		12	7.5		
20 dia.	Rc1/8	10.5	8.5	SC3W-M5-4 GWS4-M5 SC3W-M5-6 GWL4-M5 GWS4-M5-S GWL6-M5	15 mm or less
25 dia.		11.5	9		
32 dia.		12.5	30.5	SC3W-6-4·6·8 GWS4-6 GWS6-6 GWS8-6 GWL4-6 GWL6-6	15 mm or less
40 dia.		14	31		
50 dia.	Rc1/4	14	35	SC3W-8-6·8·10 GWS4-8 GWS6-8 GWS10-8 GWL4 to 12-8	21 mm or less
63 dia.		16.5	35		

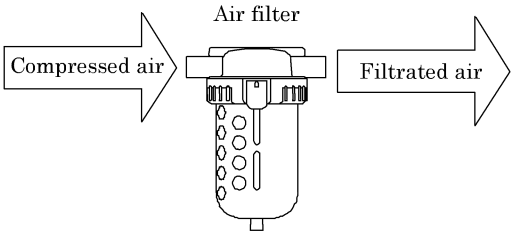


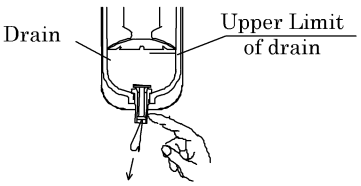
2.3 Fluid

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.

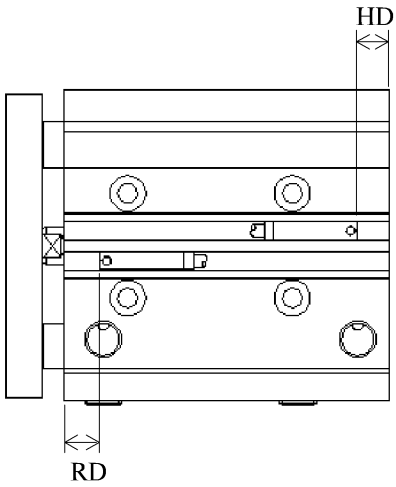
3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.





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 maximum 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 maximum 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

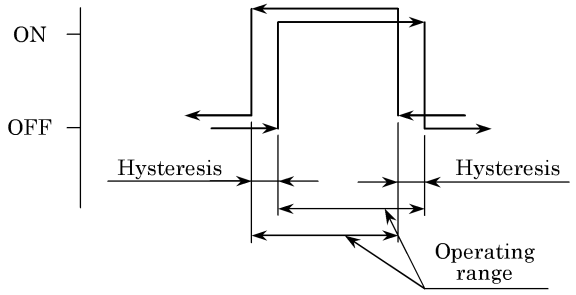
(1) The operating range is from the point where the piston moves and the switch turns ON to the point where the piston moves further in the same direction and the switch turns OFF.

(2) The center of the operation range is the maximum sensitive position. If this position is set as the piston stop position, it is not affected by disturbance and switch operation is stable.

3) Hysteresis

(1) Hysteresis is the distance from the point where the piston moves and the switch turns ON to the point where the piston moves in the reverse direction and the switch turns OFF.

(2) If the piston stops between these points, switch operation becomes unstable and is easily adversely affected by external sources.



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

Switch model No.	T0·T5／T2·T3				T2Y※			
Item / Bore size (mm)	Max. sensitive position HD	Max. sensitive position RD	Operating range	Hysteresis	Max. sensitive position HD	Max. sensitive position RD	Operating range	Hysteresis
12 dia.	5	18	1.5 to 5	1.5 or less	4	17	6 to10	3 or less
16 dia.	10	17			9	16	4 to9	
20 dia.	8.5	22.5	3 to 8		7.5	21.5	6 to 14	
25 dia.		23	3 to 9			22	5 to 14	
32 dia.		22				21	5 to 12	
40 dia.	12	25			11	24	6 to 14	
50 dia.	11.5	24.5			10.5	23.5		
63 dia.	16	25			15	24	7 to 15	

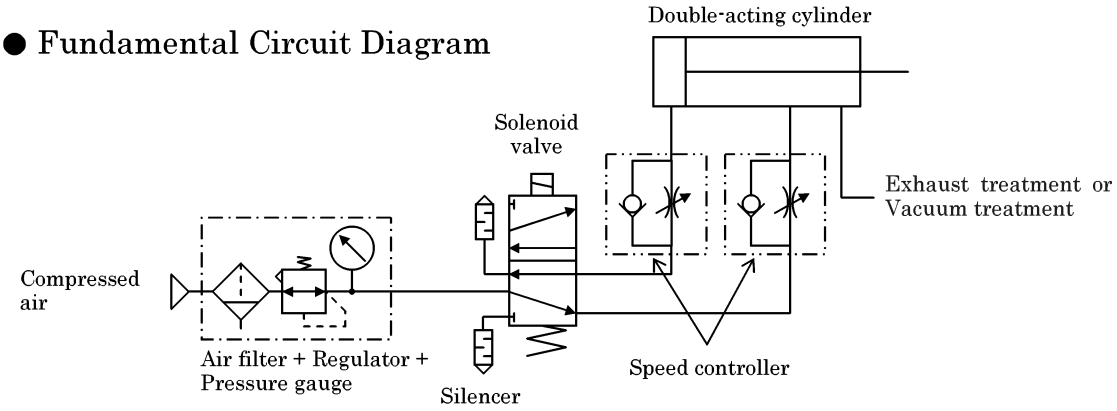
(Unit: mm)

Switch model No.	T1				T8			
Item / Bore size (mm)	Max. sensitive position HD	Max. sensitive position RD	Operating range	Hysteresis	Max. sensitive position HD	Max. sensitive position RD	Operating range	Hysteresis
12 dia.	4	17	1.5 to 5	1.5 or less	–	–	1.5 to 5	1.5 or less
16 dia.	9	16			–	–		
20 dia.	7.5	21.5	3 to 8		2.5	16.5	3 to 8	
25 dia.		22	3 to 9			17	3 to 9	
32 dia.		21				16		
40 dia.	11	24			6	19		
50 dia.	10.5	23.5			5.5	18.5		
63 dia.	15	24			10	19		

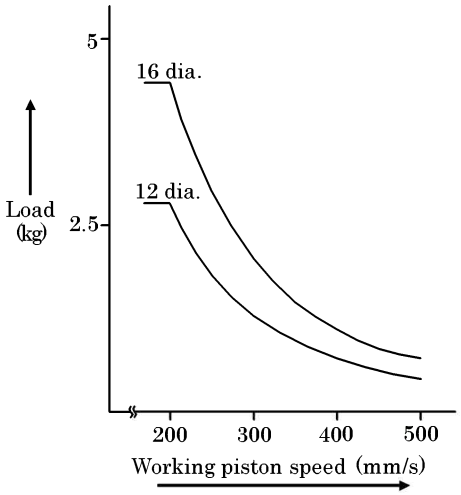
3.1 Operating the Cylinder

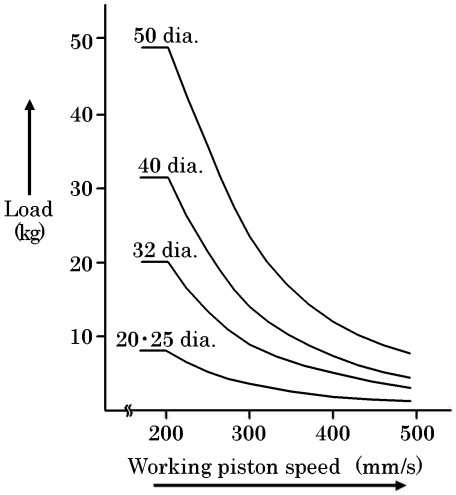
1) The working pressure for this type of cylinder is specified in "Product Specifications". Operate the system within this range.
2) Although a rubber cushion is internally provided for this type of cylinder, it is advisable to install an additional external stopper when the kinetic energy is excessive. Tolerable kinetic energy 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.

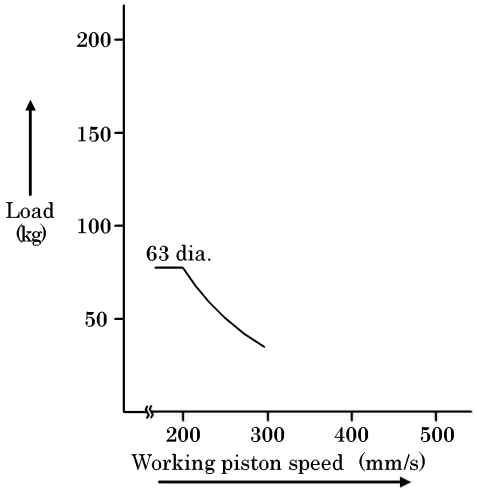
● Fundamental Circuit Diagram



● Graphs for Tolerable kinetic energy







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

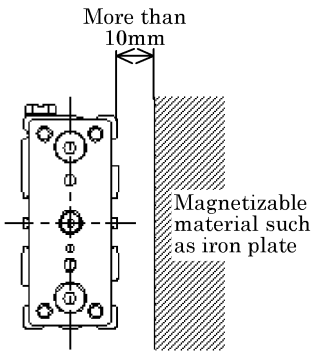
When activating the switch halfway of the stroke, the relay may not respond if the working piston speed is too fast.
(Example) Operate cylinder with the speed of less than 500mm/s in case the relay actuation time is 20ms.

5) Impact

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

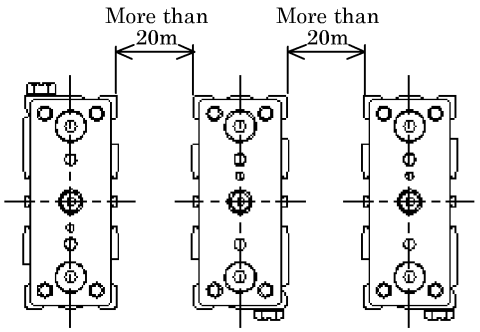
6) Magnetizable material such as iron plate near by cylinder switch is apt to cause malfunction of cylinder switches. Keep it from cylinder surface at least 10mm away.

(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 states 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

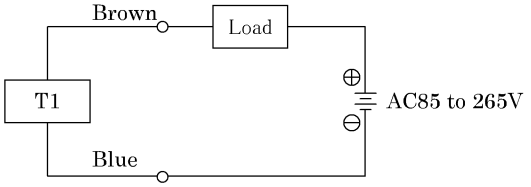


Fig. 1 Fundamental circuit Example of T1

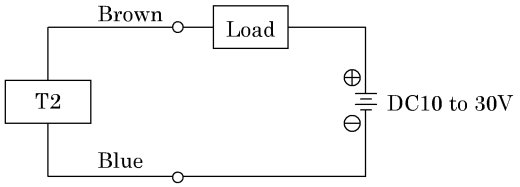


Fig.2 T2 Fundamental circuit Example

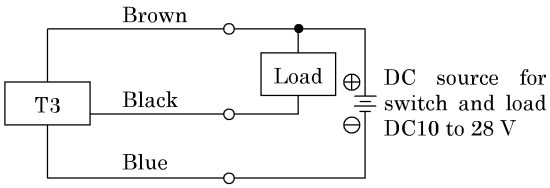


Fig.3 T3 Fundamental circuit Example of (1)
(In case the same source of power is used.)

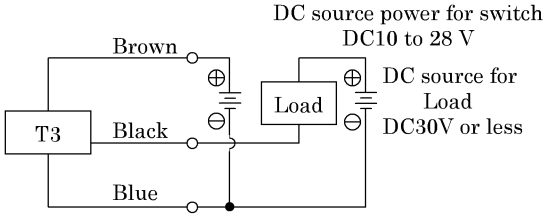


Fig.4 T3 Fundamental circuit Example of (2)
(In case individual sources of power are used.)

2) Protection of output circuit

Install some protective circuit as illustrated in Fig. 5, 7 or SKAC/DC 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. 6 or SKDC 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. 8, 9 or SKAC/DF (in case of model T2) and Fig 10 (in case of model T3).

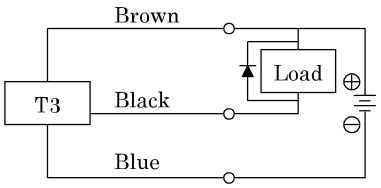
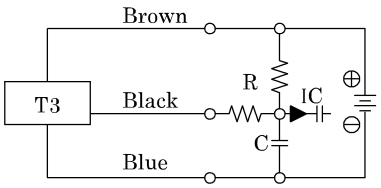


Fig.5 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



Flg.6 An example of using capacitor type load together with current regulating resister R.
Comply with the following formula to figure out required R.

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

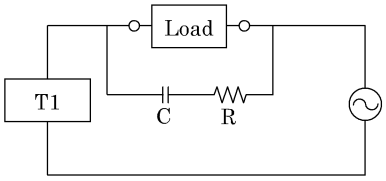


Fig. 7 ・ Capacitor
C=0.03 to 0.1 μF
・ Resister
R=1～3KΩ
XEB1K1 Okaya Denki Mfg or equivalent

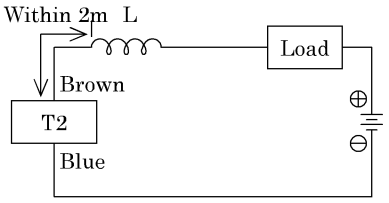


Fig. 8・Choke coil
L = a couple hundred μH to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

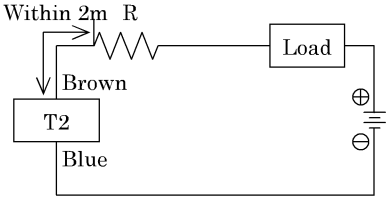


Fig.9 ・Dash current restriction resister.
R = As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

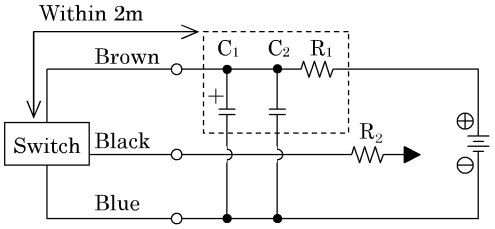


Fig10 ・ Electric power noise absorptive circuit.
C_1=20 to 50 μF electrolytic capacitor
(Withstand voltage 50V or more)
C_2=0.01 to 0.1 μF ceramic capacitor
R_1=20 to 30Ω

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

3) Connection to a programmable controller (Sequencer).

Type of connection varies depending upon the model of the programmable controller. Refer to the following Fig. 11 to 16 respectively.

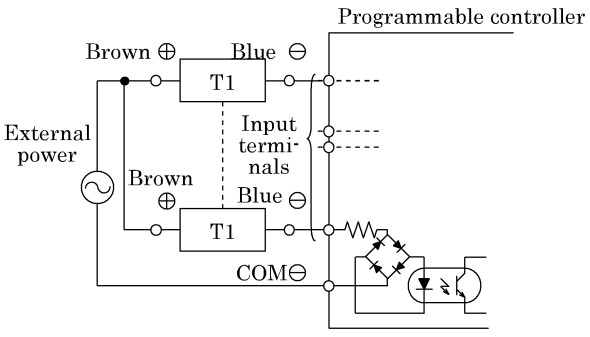


Fig. 11 An example of T1 connection to AC input (external electric power)

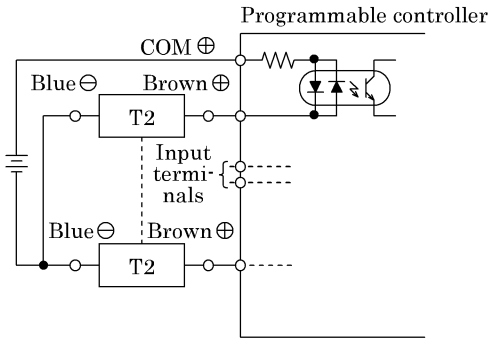


Fig.12 An example of T2 connection to source input type (external electric power)

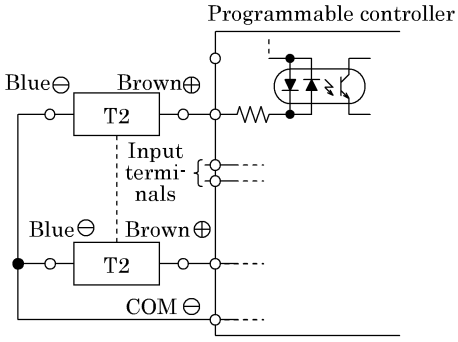


Fig.13 An example of T2 connection to source input type (internal electric power)

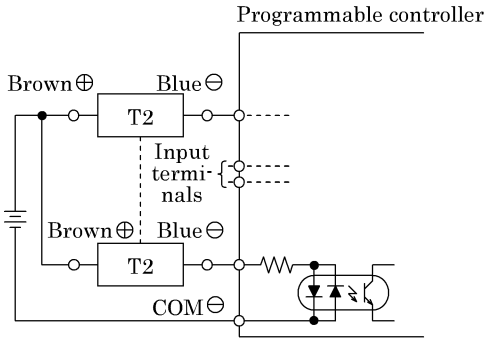


Fig.14 An example of T2 connection to sink input type (external electric power)

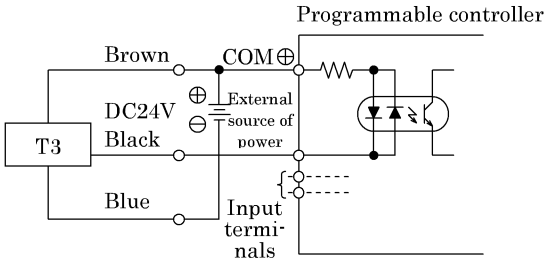


Fig.15 An example of T3 connection to source input type (external electric power)

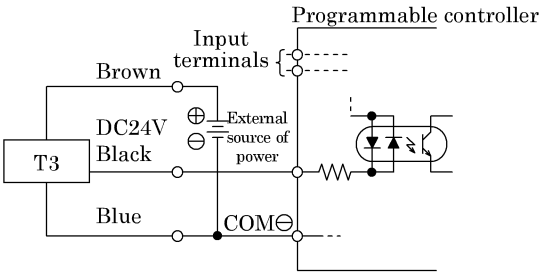


Fig.16 An example of T3 connection to source input type (internal electric power)

4) Series connection

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

3.2.3 Reed switch (T0, T5, T8)

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

Ⓐ 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.

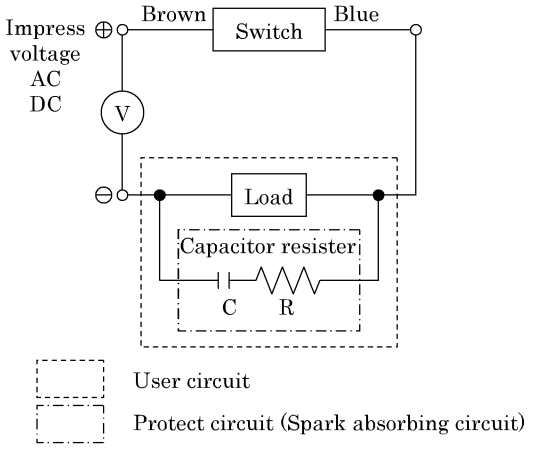
Ⓑ When the switch is connected to an AC relay or a programmable controller input, the indicator light on the switch is not lit if the half-wave rectification is performed in the connected circuit. If this occurs, reverse the polarities of the switch lead wire connection. The indicator light may then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

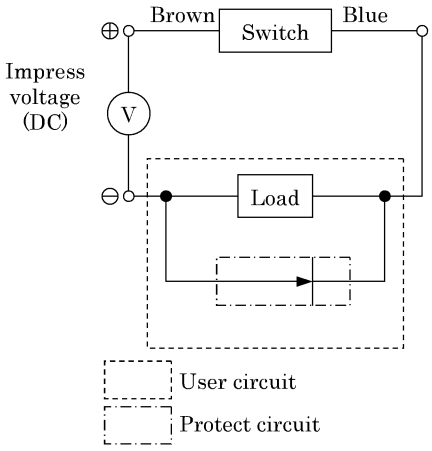
Electric power	Length of wire
DC	50m
AC	10m

(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

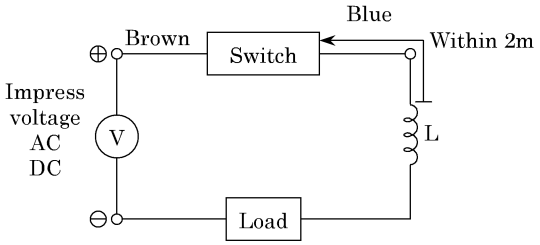
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

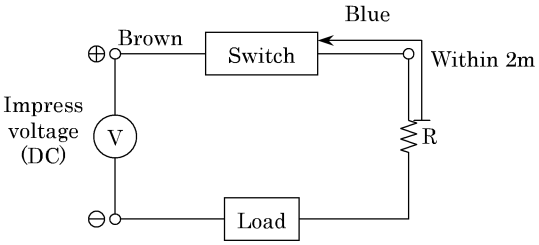
(2) Protective circuit when the wire length exceeds that stated Table1.



・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 main body mounting bolts and work piece mounting bolts 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”, 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 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.

5. HOW TO ORDER

5.1 Product Number Coding

STG – B (a) – 40 (b) – 100 (c) – T0H (d) – D (e) – P72 (f)

(a) Type of bearing		(b) Bore size (mm)			
B	Ball bearing	12	12 dia.	32	32 dia.
		16	16 dia.	40	40 dia.
		20	20 dia.	50	50 dia.
		25	25 dia.	63	63 dia.

○ : Standard — : Not available

(c) Standard stroke (mm)		10	20	25	30	40	50	75	100	125	150	175	200	250	300	350	400
STG	12 dia.	○	○	—	○	○	○	○	○	○	○	○	○	○	—	—	—
	16 dia.	○	○	—	○	○	○	○	○	○	○	○	○	○	—	—	—
	20 dia.	—	○	—	○	○	○	○	○	○	○	○	○	○	○	○	○
	25 dia.	—	○	—	○	○	○	○	○	○	○	○	○	○	○	○	○
	32 dia.	—	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○
	40 dia.	—	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○
	50 dia.	—	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○
	63 dia.	—	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○

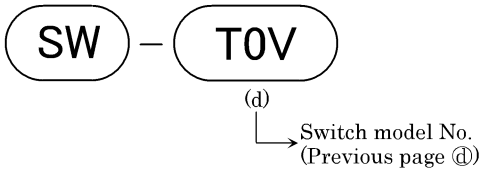
(d) Switch model No.					(e) Qty. of switch	
Lead wire straight type	Lead wire L-shaped type	Switch type	Indicator light	Lead wire	R	One on rod side
					H	One on head side
T0H※	T0V※	Reed	1 color indicator	2 wire	D	Two
T5H※	T5V※		Without indicator light		T	Three
T8H※	T8V※	Solid state	1 color indicator			
T1H※	T1V※					
T2H※	T2V※					
T3H※	T3V※			3 wire		
T2YH※	T2YV※		2 color indicator	2 wire		
T3YH※	T3YV※			3 wire		
T2JH※	T2JV※		Off delay type	2 wire		
T2YD※	—					
T2YDT※	—		Strong magnetic field proof			

※mark shows lead wire length.

※ Lead wire length		(f) Clean room specifications	
Blank	1m (Standard)	P72	Exhaust treatment
3	3m (Optional)	P73	Vacuum treatment
5	5m (Optional)		

● Custom stroke length
Available per 5mm increment.
Overall length dimensions are as same as the following standard stroke length increment.

5.2 How to order switch



6. SPECIFICATION

6.1 Cylinder Specifications

Model code / Item		STG-B-P72/P73							
Bore size	mm	12 dia.	16 dia.	20 dia.	25 dia.	32 dia.	40 dia.	50 dia.	63 dia.
Actuation		Double-acting type							
Working fluid		Compressed air							
Max. working pressure	MPa	1.0							
Min. working pressure	MPa	0.2		0.15		0.1			
Proof pressure	MPa	1.6							
Ambient temperature	℃	−10 to 60 (No freezing)							
Port size		M5		Rc1/8				Rc1/4	
Stroke tolerance	mm	+2.0 0							
Working piston speed	mm/s	50 to 500						50 to 300	
Cushion		With rubber cushion							
Lubrication		Not permissible							
Allowable Energy absorption	J	0.056	0.088	0.157	0.157	0.401	0.627	0.980	1.560

6.2 switch Specifications

1) Type of switches and applications

Model / Item			Application (Purpose)
Slid state	2 wire	T2H	DC Programmable controller, exclusive
		T2V	
	3 wire	T3H	DC Programmable controller, Relay
		T3V	
	2 wire	T1H	AC Programmable controller, Relay, compact solenoid valve
		T1V	
Reed	2 wire	T0H	AC/DC Relay, Programmable controller
		T0V	
		T5H	AC/DC Programmable controller, Relay or IC circuit (not including light), for Series connection
		T5V	
		T8H	AC/DC Relay, Programmable controller
		T8V	
2 color indicator solid state	2 wire	T2YH	DC Programmable controller, exclusive
		T2YV	
	3 wire	T3YH	DC Programmable controller, Relay
		T3YV	
Off delay type	2 wire	T2JH	DC Programmable controller, exclusive
		T2JV	
Strong magnetic field proof solid state	2 wire	T2YD	DC Programmable controller, exclusive
		T2YDT	

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

2) Switch specification

Descriptions	Reed switch			
	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	7 to 20mA	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 0.2mm^2)			
Shock resistance	294m/s^2			
Insulation resistance	20MΩ over at DC500V megger			
Withstand voltage	No failure impressed at AC1000V for one minute			
Ambient temperature	−10 to 60℃			
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance			

Descriptions	Reed switch		
	T8H/V		
Applications	Programmable controller, relay		
Power supply voltage	—		
Load Voltage	DC12/24V	AC110V	AC220V
Load Current	5 to 50mA	7 to 20mA	7 to 20mA
Current consumption	—		
Internal voltage drop	3V or less		
Indicator light	LED (ON lighting)		
Leakage current	0mA		
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm^2)		
Shock resistance	294m/s^2		
Insulation resistance	100MΩ over at DC500V megger		
Withstand voltage	No failure impressed at AC1500V for one minute		
Ambient temperature	−10 to 60℃		
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance		

Descriptions	Solid state switch		
	T2H/V	T2JH/V	T2YH/V
Applications	Programmable controller		
Power supply voltage	—		
Load Voltage	DC10 to 30V		
Load Current	5 to 20mA (Note 2)		
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/s^2		
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		

Descriptions	Solid state switch	
	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	10 μ A or less	
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.2mm^2)	
Shock resistance	980m/s^2	294m/s^2
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	

Descriptions	Solid state switch
	T1H/V
Applications	Programmable controller, relay, compact solenoid valve
Power supply voltage	—
Load Voltage	AC85 to 265V
Load Current	5 to 100 mA
Current consumption	—
Internal voltage drop	7V or less
Indicator light	LED (ON lighting)
Leakage current	1mA at AC100 2mA at AC200
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3mm^2)
Shock resistance	980m/s^2
Insulation resistance	100MΩ over at DC500V megger
Withstand voltage	No failure impressed at AC1500V for one minute
Ambient temperature	-10 to 60℃
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance

Descriptions	Solid state switch	
	T2YD	T2YDT
Applications	Programmable controller	
Load voltage	DC24V±10%	
Load current	5 to 20mA	
Internal voltage drop	6V or less	
Indicator light	Red/green LED (ON lighting)	
Leakage current	1.0mA or less	
Output delay time (Note3) (ON delay, OFF delay)	30 to 60ms	
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.5mm)	Standard 1m (Flame resistant vinyl cabtire cord 2 conductor 0.5mm)
Shock resistance	980m/s^2	
Insulation resistance	100MΩ over at DC500V megger	
Withstand voltage	No failure impressed at AC1000V for one minute	
Ambient temperature	−10 to 60℃	
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance	

Note1 : 3m or 5m long lead wire is optionally available.
Note2 : Maximum value, 20mA is at 25℃ of ambient temperature. Load current decreases less than 20mA when the ambient temperature exceeds 25℃. (For example: it may be 5 to 10mA at 60)