

INSTRUCTION MANUAL

CYLINDER WITH GUIDE

STG Series

- Read this manual carefully and thoroughly before using this product.
- In particular, read the safety notes carefully.
- Retain this instruction manual with the product for further consultation whenever necessary.

For safety use

To use this product safely, 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 instruction manual carefully and fully understand its contents for proper operation.**

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

CAUTION:

- Before performing an overhaul inspection on the actuator, release any residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- Touching the electrical wiring connection (bare charging part) of an actuator with solenoid valve, actuator with switch, etc. may cause electric shock. Perform an overhaul inspection with the power off. Also, do not touch the charging part with wet hands.

CONTENTS

STG Series

CYLINDER WITH GUIDE

Instruction Manual No. SM-363450-A

1. UNPACKING	3
2. INSTALLATION	
2.1 Installation	3
2.2 Piping	4
2.3 Working fluid	5
2.4 Switch installation	6
3. OPERATION	
3.1 How to use the cylinder	8
3.2 How to use the switch	9
4. MAINTENANCE	
4.1 Periodic Inspection	14
4.2 Failures and troubleshooting	15
4.3 Disassembly	16
5. MODEL NUMBER CODING	
5.1 Product model number	18
5.2 Part number	19
6. PRODUCT SPECIFICATIONS	
6.1 Cylinder specifications	20
6.2 Switch specifications	20

1. UNPACKING

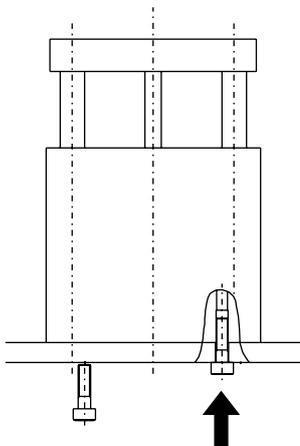
- 1) Check that the product number ordered and the model number in the MODEL field on the product nameplate are the same.
- 2) Check the appearance for any damage.
- 3) Store the product with a seal plug attached to prevent foreign matter from entering the cylinder through the piping port.
Remove the seal plug when piping.

2. INSTALLATION

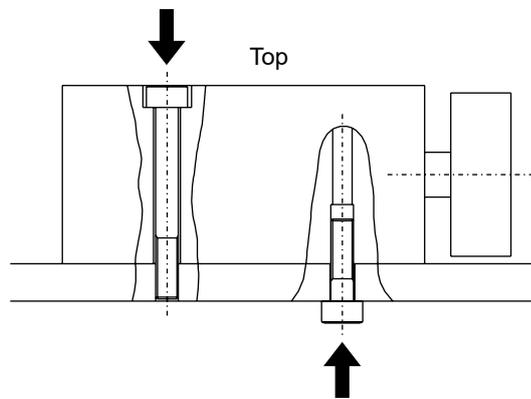
2.1 Installation

- 1) The ambient temperature for this cylinder is -10 to 60°C (Standard).
Use within this temperature range.
- 2) Install the cylinder body with a hexagon socket head cap screw directly.

● Bottom mounting



● Side mounting

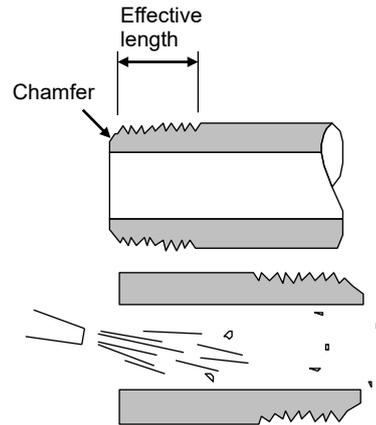


Note) In case of the installation of the body by a through bolt, tighten it with the tightening torque in the table below.

Tube bore (mm)	Tightening torque (N·m)
φ12/φ16	1.5 to 2.7
φ20/φ25	3 to 5.4
φ32/φ40	5.2 to 9.2
φ50/φ63 STG-K φ32	12.5 to 22
φ80 STG-K φ50	24.5 to 44
φ100	42 to 76

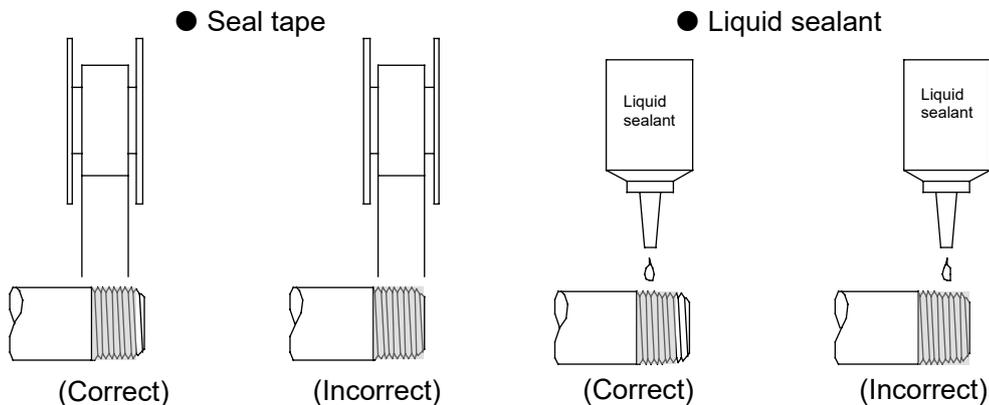
2.2 Piping

- 1) For piping after the air filter, use corrosion-resistant piping materials such as galvanized pipes, nylon tubes, or rubber tubes.
- 2) The piping connecting the cylinder and solenoid valve must have an effective cross-sectional area large enough to allow the cylinder to output the specified piston speed.
- 3) Install the air filter as close to the solenoid valve as possible to remove rust, foreign matter, and drainage from inside the pipe.
- 4) Observe the effective thread length of the gas pipe. Also, chamfer the thread part about 1/2 pitch from the threaded end.



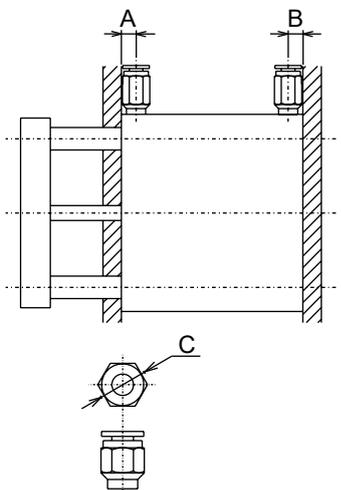
- 5) Before piping, flush (blow air into) the inside of the pipe to remove any foreign matter, chips, etc.

- 6) When using sealing tape or sealant on piping, make sure to use it about two threads back from the tip of the thread, and be careful not to let any tape scraps or sealant residue get inside the pipe or equipment.



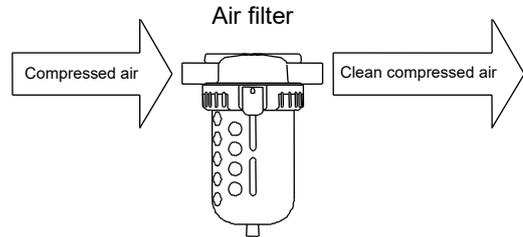
- 7) There are restrictions on the piping joint that can be used, so please refer to the following for details.

Item Tube bore (mm)	Port size	Port position dimensions		Available joints	Joint outer diameter
		A	B		φC
φ12	M5	12	7	SC3W-M5-4·6 GWS4-M5-S GWS4-M5 GWL4-M5 GWL6-M5 GWS6-M5	φ12 or less
φ16		12	7.5		
φ20	Rc1/8	10.5	8.5	SC3W-M5-4 GWS4-M5 SC3W-M5-6 GWL4-M5 GWS4-M5-S GWL6-M5	φ15 or less
φ25		11.5	9		
φ32		12.5	30.5	SC3W-6-4-6·8 GWS4-6 GWS6-6 GWS8-6 GWL4-6 GWL6-6	φ15 or less
φ40	Rc1/4	14	31		
φ50		14	35	SC3W-8-6·8·10 GWS4-8 GWS6-8 GWS10-8 GWL4 to 12-8	φ21 or less
φ63	Rc3/8	16.5	35		
φ80		19	15	SC3W-10-8-10-12 GWS6-10 GWS8-10 GWS10-10 GWL6 to 12-10	φ28 or less
φ100		17	19		

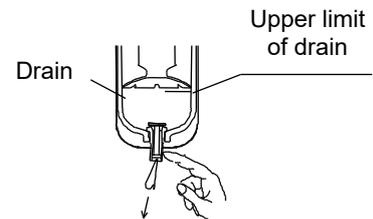


2.3 Working fluid

1) Use the compressed air that should be clean with little moisture that has been passed through an air filter. Therefore, use an air filter in the circuit, paying attention to the degree of filtration (5 μm or less is desirable), flow rate, and mounting position (close to the directional control valve).



2) Periodically discharge the drainage accumulated in the air filter before it exceeds the specified line.

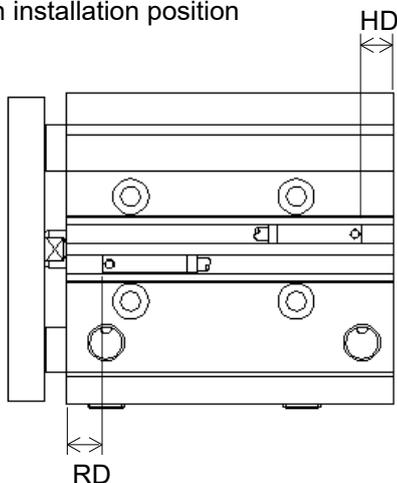


3) If carbides (carbon or tar-like substance) from compressor oil get into the circuit, the solenoid valves and cylinders will malfunction. Be sure to carry out thorough maintenance and inspection of the compressor.

4) This cylinder can be used without lubrication.
If lubricating, use turbine oil class 1 ISOVG32 lubricant.

2.4 Switch installation

1) Switch installation position



(1) Installation at the stroke end

For activation of the switch at the most sensitive positions, install the switches at the RD dimension on the rod side and at the HD dimension on the head side respectively.

(2) When installed at mid-stroke position

To detect in the middle of the stroke, fix the piston at the position where it stops and move the switches back and forth over the piston to find the position where each switch first turns ON. The middle of those two positions is the most sensitive position at that piston position, which is the installation position.

● How to change a switch position

Loosen the set screw and slide the switch body along the cylinder tube. Fasten the set screw to fix the switch in position.

● How to replace a switch

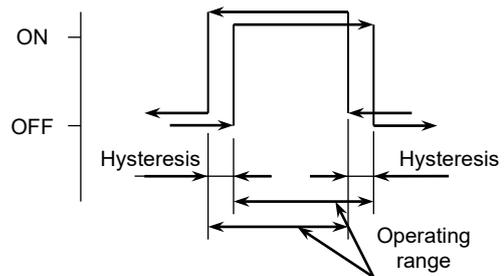
Loosen the set screw and pull the switch body out of the groove. Next, insert the replacement switch into the groove, position it in place, and secure the screw. (Tightening torque for set screws should be 0.1 to 0.2 N m for one-color indication type switches and 0.5 to 0.7 N m for two-color indication type switches.)

2) Operating range

- (1) The operating range is the positional range from where the piston moves and the switch turns ON to where it moves further in the same direction and turns OFF.
- (2) The center position of the operating range provides a switch with the max. sensitivity. Setting this position as the piston-stop point stabilizes the function of the switch with the least disturbance.

3) Hysteresis

- (1) Hysteresis is the distance the piston travels from the position where the switch is turned on to the position where it moves in the opposite direction and the switch is turned off.
- (2) Note that if the piston stops within this range, the switch operation becomes unstable and is susceptible to external disturbances.



Most sensitive position (HD, RD), operating range, and hysteresis (Unit: mm)

Switch model No.	T0·T5/T2·T3				T2Y*			
Item Tube Inside diameter (mm)	Most sensitive position		Operating range	Hysteresis	Most sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
φ12	5.0	5.0	1.5 to 5	Contact point Switch 3 or less Non-contact Switch 1.5 or less	4.0	4.0	4 to 6	1.5 or less
φ16	10.0	4.0			9.0	3.0		
φ20	8.5	9.5	3 to 8		7.5	8.5	5 to 8.5	
φ25		10.0	3 to 9			9.0	5 to 9	
φ32					12.0	13.0	11.0	
φ40	11.5	13.5	4 to 10		10.5	12.5		
φ50	16.0	14.0			15.0	13.0		
φ63	19.5	18			18.5	18	7 to 11	
φ80	25.5	22	24.5		21			
φ100								

* When shipped from the factory, the switches are installed in the most sensitive positions (HD, RD).

3. OPERATION

3.1 How to use the cylinder

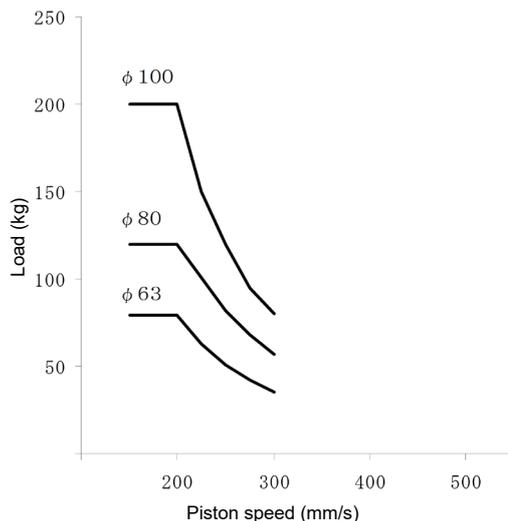
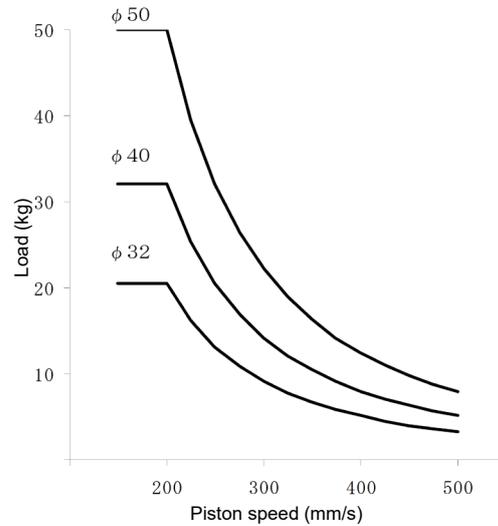
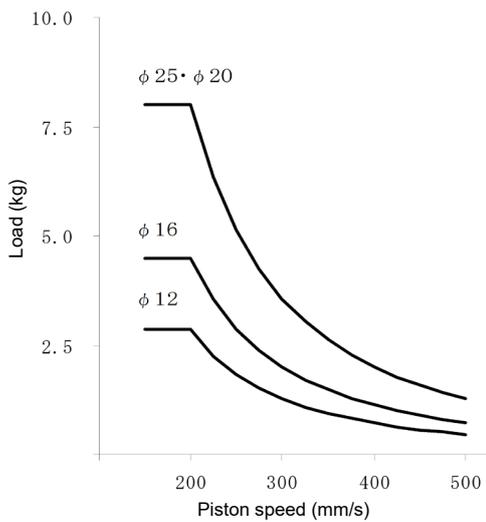
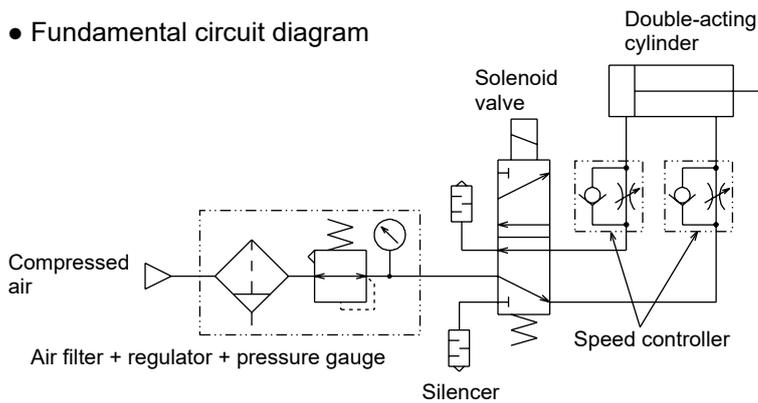
(1) The supply pressure to the cylinder is as described in the product specification.

Use within this operating pressure range.

(2) Although it is equipped with a rubber cushion, please install an additional external stopper when the kinetic energy is excessive. The allowable energy is shown in the graph below.

(3) Adjust the piston speed by installing speed controllers as shown in the Fundamental circuit diagram, below.

● Fundamental circuit diagram



Note: The range below and to the left of the curve is usable. The upper right range requires an external cushion.

3.2 How to use the switch

3.2.1 General cautions

1) Magnetic environment

Avoid using the product in places where there are strong magnetic fields or large currents (large magnets, spot welding machines, etc.) nearby. If multiple cylinders with switch are installed in close proximity to each other in parallel, or if there is a magnetic object traveling near the cylinders, they may interfere with each other, affecting detection accuracy.

2) Protection of lead wire

Pay consideration to eliminate repeated bending stress or stretching forth on the lead wire while laying the cord. Use flexible wires such as robot cables to connect to the moving parts.

3) Ambient temperature

Cannot be used at high temperatures (above 60°C).

Avoid use in high temperature environments due to thermal characteristics of magnetic and electronic parts.

4) Intermediate position sensing

Beware of unstable responses of relay when piston speed is excessive in the event of intending actuation of switch in the way of piston stroke.

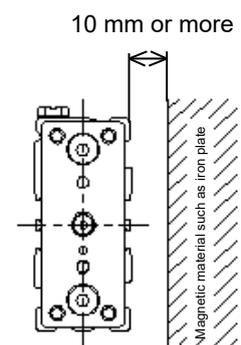
(Example) Operate a piston with a speed of less than 500 mm/s in case the relay actuation time is 20 ms.

5) Impact

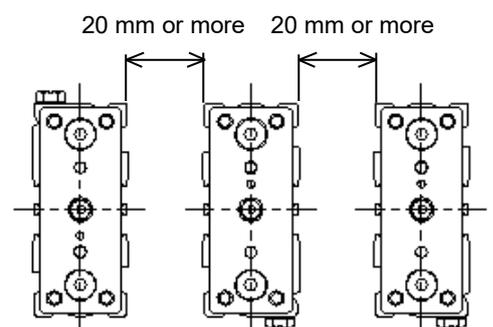
Carefully avoid large shocks or vibrations during transportation of the cylinder or mounting and adjusting the switch.

6) Magnetic material such as an iron plate nearby the cylinder switch is apt to cause malfunction of the cylinder switches. Keep it at least 10 mm away from the cylinder surface.

(Same for all port sizes)



7) It usually causes malfunction of the cylinder switches when plural cylinders are laid adjacent. Keep the distance shown on the right from the cylinder surface. (Same for all port sizes)



3.2.2 Cautions for non-contact switches (T2, T3)

1) Connection of lead wire

Connect correctly according to the color coding of the lead wires. Be sure to turn off the power to the electrical circuit device on the connection side before performing the work.

Mis-wiring or short-circuiting of the load will result in damage not only to the switch but also to the electrical circuit on the load side. In addition, working while energized may lead to damage to the switch load electrical circuit depending on the work procedure, even if there is no mis-wiring.

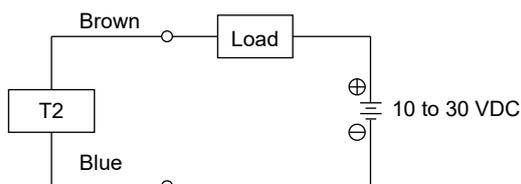


Fig. 1 F2 fundamental circuit example

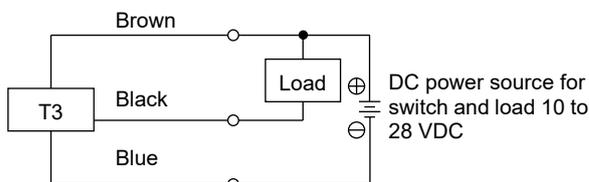


Fig. 2 F3 fundamental circuit example (1)
(When the switch power source and the load power source are the same)

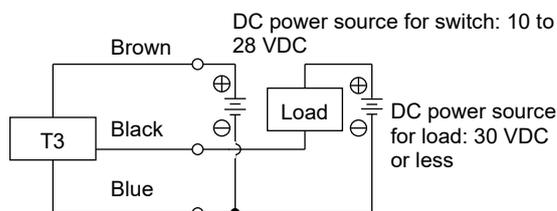


Fig. 3 F3 fundamental circuit example (2)
(When the switch power source and the load power source are different)

2) Protection of output circuit

Install the protection circuit as illustrated in Fig. 4 when an inductive load (relay or solenoid valve) is to be used because it generates surge voltage when the switch is turned off.

Install the protection circuit as illustrated in Fig. 5 when a capacitive load (capacitor) is to be used, because it generates an inrush current when the switch is turned on.

Install the protection circuit as illustrated in Fig. 6 or 7 (in case of model T2) and Fig. 8 (in case of model T3) when the lead wire length exceeds 10 m.

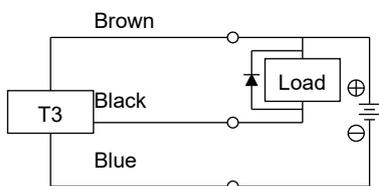


Fig. 4 An example of using a surge absorptive element (diode) for inductive load. Use Hitachi V06C or equivalent diodes.

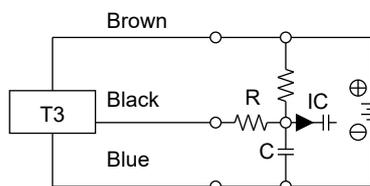


Fig. 5 An example of a capacitive load with a current limiting resistor R.
Use the following formula result or higher for the resistance R(Ω) at this time.
$$\frac{V}{0.05} = R (\Omega)$$

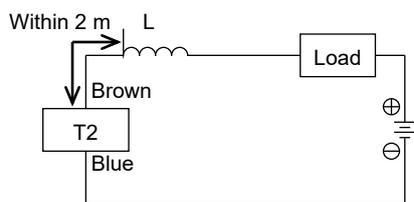


Fig. 6 Choke coil
L = several hundred μH to several mH
Surpassing high-frequency characteristic
• Wire nearby the switch (within 2·m)

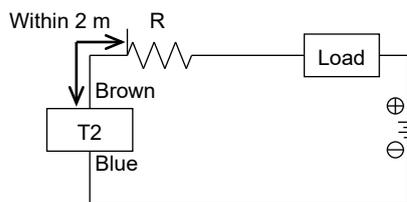


Fig. 7 Inrush current limiting resistor
R = Resistor as large as the load side circuit allows
• Wire nearby the switch (within 2·m)

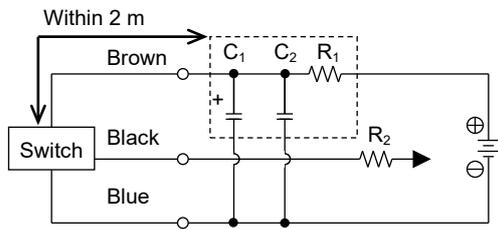


Fig. 8 • Power source noise absorptive circuit
 $C_1 = 20$ to $50 \mu\text{F}$ electrolytic capacitor (Withstand voltage 50 V or more)
 $C_2 = 0.01$ to $0.1 \mu\text{F}$ ceramic capacitor
 $R_1 = 20$ to 30Ω

- Inrush current limiting resistor
 $R_2 =$ Use as large a resistor as the load side circuit allows.
- Wire nearby the switch (within 2 m)

3) Connection to a programmable controller (sequencer)

The connection method varies depending on the type of programmable controller. Connect according to the following Fig. 9 to 13.

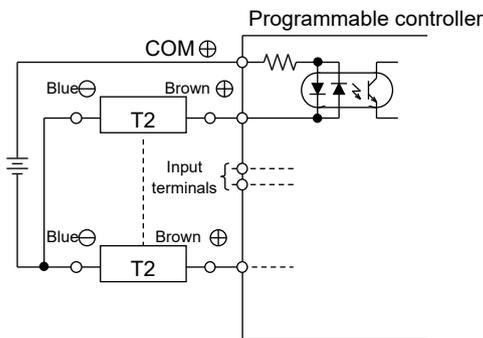


Fig. 9 An example of T2 connection to source input type (an external power source)

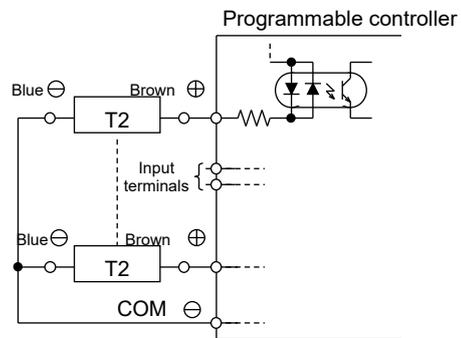


Fig. 10 An example of T2 connection to source input type (a built-in power source)

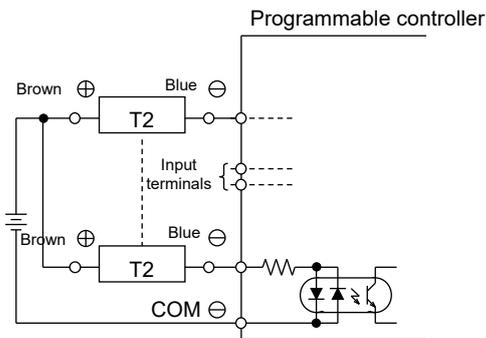


Fig. 11 An example of T2 connection to sink input type (an external power source)

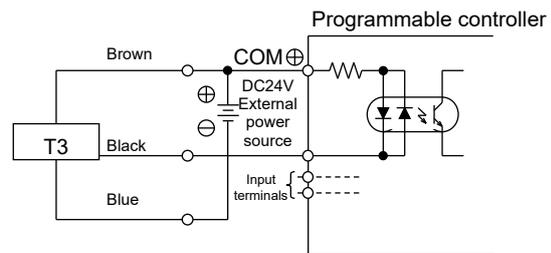


Fig. 12 An example of T3 connection to source input type (an external power source)

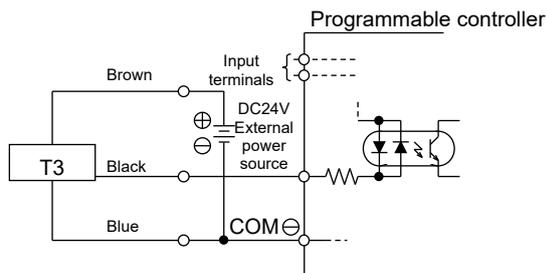


Fig. 13 An example of T3 connection to source input type (a built-in power source)

4) Parallel connection

In the case of T2 switches, leakage current increases with the number of connected switches. Check the input specifications of the programmable controller as a connection load to determine the number of switches. However, the indicator lights may become dimmed or may not illuminate at all.

In the case of T3 switches, leakage current increases with the number of connected switches. However, since the level of leakage current is extremely low (10 μA or less), the leakage is not a problem under normal use. The indicator light will not dim or fail to illuminate.

3.2.3 Cautions for contact switches (T0, T5)

1) Connection of lead wire

Instead of connecting the lead wire of the switch to the power source directly, always connect to the load in series. In case of model T0 connection, pay attention to the following items (A) and (B).

(A) When using for DC, connect the brown cord to the + side and the blue cord to the - side. If connected in reverse, the switch will operate, but the indicator light will not light up.

(B) When connecting an AC relay or programmable controller input, the indicator light for the switch may not be lit in case when half-wave rectification is being carried out. The indicator light is lit, in this occasion, when polarities of lead wires for switch is reversed.

2) Contact protection measures

When used with inductive loads such as relays or when the wiring length exceeds Table 1, be sure to provide a contact protection circuit.

Power source	Wire length
DC	100 m
AC	10 m

(1) Protection when connecting inductive loads

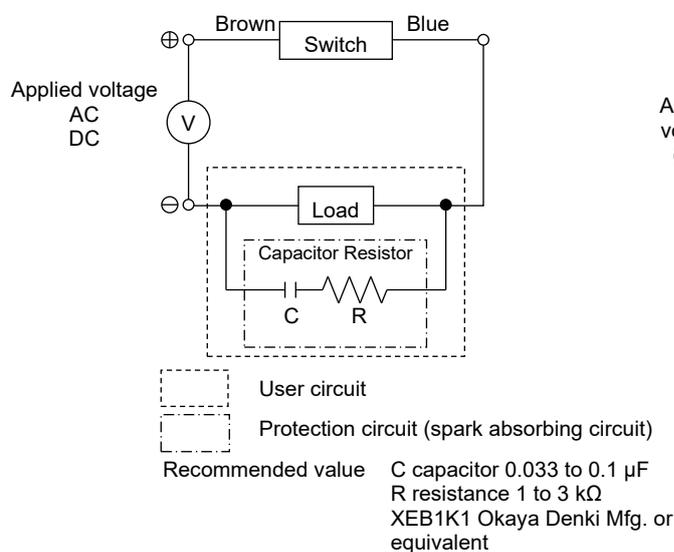


Fig. 1 When capacitors and resistors are used

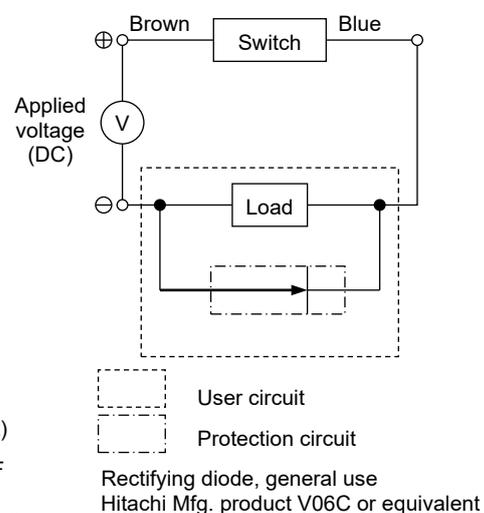
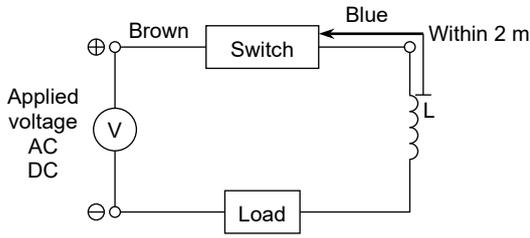


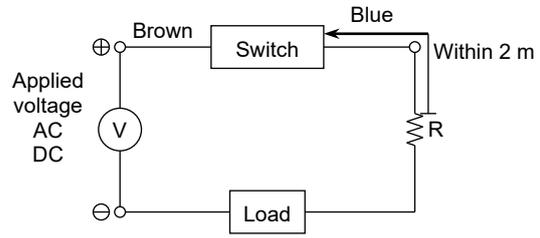
Fig. 2 When diode is used

(2) Protection when wiring length exceeds Table 1



- Choke coil
L= Several hundred μH to several mH
Surpassing high-frequency characteristic
- Wire nearby the switch (within 2 m)

Fig. 3



- Inrush current limiting resistor
R=Resistor as large as the load circuit side allows
- Wire nearby the switch (within 2 m)

Fig. 4

3) Capacity of contact points

Avoid using a load exceeding the max. capacity of contact points. In addition, the indicator light may not illuminate when the current is less than the rated current value.

4) Relay

Use such products as specified below or equivalent.

- OMRON Corporation..... Model MY
- FUJI ELECTRIC CORP Model HH5
- Panasonic Model HC

5) Series connection

Total voltage drop, when connecting T0 switches in series, equals to the sum of voltage drops of all connected switches.

When connecting one T0 switch to check operation, and t5 switches for the others, the voltage drop will be about that of one T0 (approximately 2.4 V).

The indicator light will illuminate only when all switches are turned on.

6) Parallel connection

There is no restriction to the number of switches in parallel. In the case of T0, the switch indicator light may become dim or may not light up.

4. MAINTENANCE

4.1 Periodic inspection

- 1) Perform periodical inspection once or twice a year to ensure the best performance of the cylinder.
- 2) Inspection item
 - (1) Whether the bolts and nuts for mounting the piston rod end fittings and support fittings are loose.
 - (2) Whether it is in smooth operating condition.
 - (3) Changes in piston speed and cycle time.
 - (4) External and internal leaks
 - (5) Scratches and deformation of piston rod.
 - (6) Check for abnormalities in stroke.

Check the above points, and if there is any abnormality, refer to "4.2 Failures and troubleshooting." If there is any looseness, retighten it.

4.2 Failures and troubleshooting

1) Cylinder

Problem	Cause	Countermeasure
Not operate	No pressure, or insufficient pressure	Ensure a pressure source
	The directional control valve does not receive any signal.	Correct the control circuit.
	Improper or misalignment of installation	Correct the installation state.
	Broken piston packing	Replace the packing.
Not operate smoothly	Speed below the operating piston speed	Mitigate the load fluctuations
	Improper or misalignment of installation	Correct the installation state.
	Transverse load is applied	Correct the installation state.
	Excessive load	Increase the pressure Use a tube of a larger inner diameter.
Breakage/deformation	The speed control valve functions as a meter-in circuit.	Change the speed control valve to meter-out circuit
	Impact force due to high-speed operation.	Reduce the speed. Reduce the load. Use a cylinder with a more reliable cushion mechanism (External cushion mechanism)
	Transverse load is applied	Correct the installation state.

2) Switch

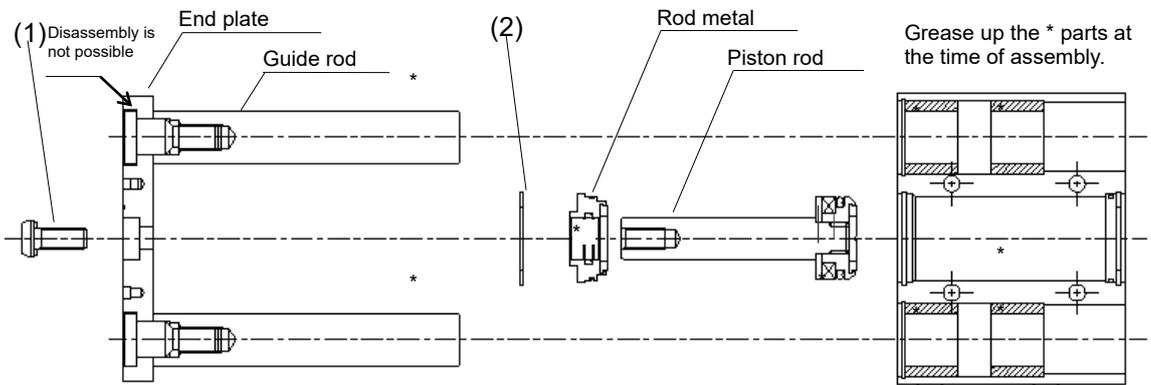
Problem	Cause	Countermeasure
Indicator light does not blink	The contact is melted and stuck	Replace the switch.
	The load exceeds the rating.	Replace with recommended relay or switch
	Damage to indicator light	Replace the switch.
	An external signal error occurs.	Recheck the external circuit.
The switch does not operate.	The wiring is disconnected.	Replace the switch.
	An external signal error occurs.	Recheck the external circuit.
	The voltage is not proper.	Make the indicated voltage
	Incorrect mounting position.	Install the switch in the proper position.
	The switch is dislocated.	Replace the switch in the proper position, and retighten the mounting screws.
	The switch is not installed in the proper direction.	Install the switch in the proper direction.
	The load (relay) cannot respond during detection in the middle of the stroke.	Reduce the speed. Replace with recommended relay
The switch cannot be reset.	The load exceeds the rating.	Replace with recommended relay or switch
	The piston does not move.	Move the piston
	The contact is melted and stuck	Replace the switch.
	The relay exceeds the rating.	Replace with recommended relay or switch
	Ambient temperature outside specification range	Keep the ambient temperature within the range of -10 to 60°C
	There is a magnetic field near the switch.	Provide magnetic shielding
An external signal error occurs.	Recheck the external circuit.	

4.3 Disassembly

1) This cylinder can be disassembled.

If air leaks or other problems occur, disassemble the unit referring to the internal structural drawing and replace the parts on the consumable parts list.

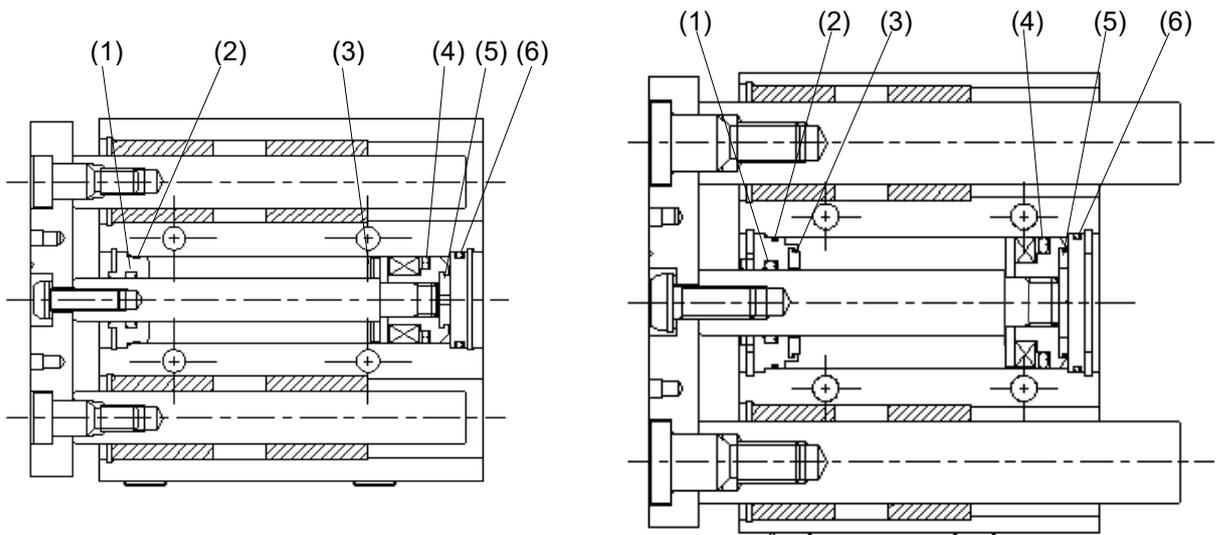
2) To disassemble, remove the bolt (1) and pull out the end plate and guide rod while they are still fastened. Next, remove the C-shaped snap ring (2) and pull out the piston rod with the rod metal. Assembly is done in reverse order. Do not forget to grease up the packing and guide parts at this time. (* parts)(tighten the piston rod and bolt (1) with the cylinder in the pulled state, and apply adhesive to the bolt.



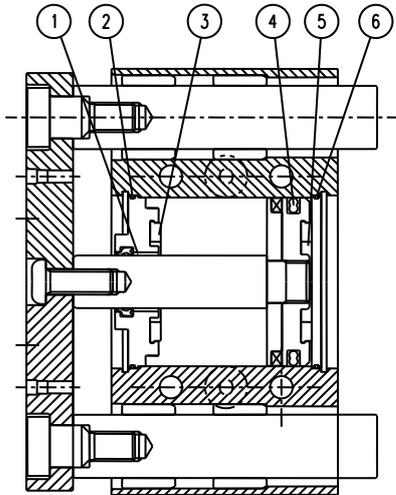
3) Internal structure and consumable parts list

● STG $\phi 12$ to $\phi 25$

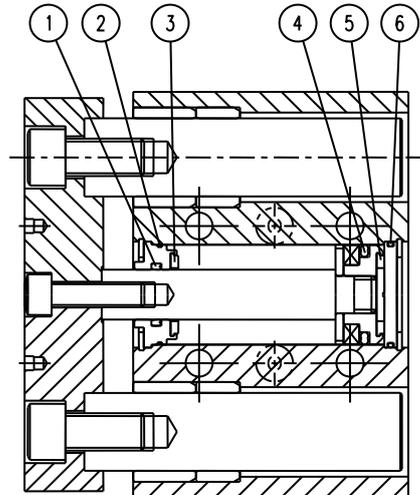
● STG $\phi 32$ to $\phi 63$



● STGφ80, φ100



● STG-Kφ32, φ50

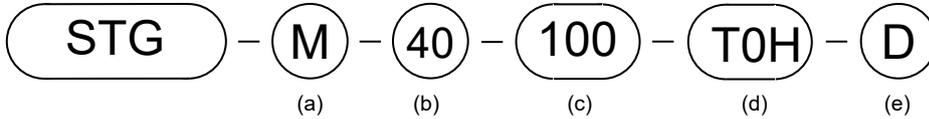


Consumable parts list (Please specify kit number when ordering.)

Tube bore (mm)	Kit No.	Consumable part number
φ12	STG-12K	(1) Rod packing (2) O-ring (3) Cushion rubber (4) Piston packing (5) Cushion rubber (6) O-ring
φ16	STG-16K	
φ20	STG-20K	
φ25	STG-25K	
φ32	STG-32K	
K type φ32		
φ40	STG-40K	
φ50	STG-50K	
K type φ50		
φ63	STG-63K	
φ80	STG-80K	
φ100	STG-100K	

5. MODEL NUMBER CODING

5.1 Product model number



(a) Bearing type		(b) Tube bore (mm)			
M	Slide bearing (metal bearing)	12	φ12	40	φ40
B	Rolling bearing (bearing)	16	φ16	50	φ50
K	Strong guide rod type (metal bearing)	20	φ20	63	φ63
		25	φ25	80	φ80
		32	φ32	100	φ100

○ : Standard, - : Not available

(c) Standard stroke (mm)		10	20	25	30	40	50	75	100	125	150	175	200	250	300	350	400	
STG	φ12	○	○	-	○	○	○	○	○	○	○	○	○	○	-	-	-	
	φ16	○	○	-	○	○	○	○	○	○	○	○	○	○	-	-	-	
	φ20	-	○	-	○	○	○	○	○	○	○	○	○	○	○	○	○	
	φ25	-	○	-	○	○	○	○	○	○	○	○	○	○	○	○	○	
	φ32	-	-	○	-	-	○	○	○	○	○	○	○	○	○	○	○	
	φ40	-	-	○	-	-	○	○	○	○	○	○	○	○	○	○	○	○
	φ50	-	-	○	-	-	○	○	○	○	○	○	○	○	○	○	○	○
	φ63	-	-	○	-	-	○	○	○	○	○	○	○	○	○	○	○	○
	φ80	-	-	○	-	-	○	○	○	○	○	○	○	○	○	○	○	○
STG-K	φ100	-	-	○	-	-	○	○	○	○	○	○	○	○	○	○	○	
	φ32	-	-	○	-	-	○	○	○	○	○	○	○	-	-	-	-	
	φ50	-	-	○	-	-	○	○	○	○	○	○	○	-	-	-	-	

(d) Switch model number					(e) Number of switches	
Lead wire Straight type	Lead wire L-shape type	Contact point	Indicator type	Lead Wire	R	With 1 switch at rod end
T0H*	T0V*	Contact point	1-color indicator type	2-core	H	With 1 switch at head end
T5H*	T5V*	Non-contact	1-color indicator type		D	With 2 switches
T2H*	T2V*			3-core	T	With 3 switches
T3H*	T3V*		2-color indicator type		2-core	
T2YH*	T2YV*			3-core		
T2WH*	T2WV*				2-core	
T3YH*	T3YV*			3-core		
T3WH*	T3WV*		2-core			
T2JH*	T2JV*			2-core	Off delay type	
T2YD*	-		2-core		Strong magnetic field resistance Non-contact	
T2YDT*	-					

The * mark shows the lead wire length.

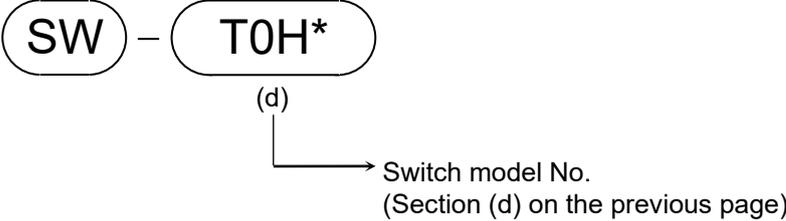
* Lead wire length	
No symbol	1 m (standard)
3	3 m (optional)
5	5 m (optional)

► Intermediate strokes

Available per 5 mm increment. However, the overall length dimension will be the same as that of the above standard stroke.

5.2 Part number

- 1) How to indicate the model number of a single switch



6. PRODUCT SPECIFICATIONS

6.1 Cylinder specifications

Model	STG										
Item											
Tube bore mm	φ12	φ16	φ20	φ25	φ32	φ40	φ50	φ63	φ80	φ100	
Operating method	Double-acting type										
Working fluid	Compressed air										
Max. working pressure MPa	1.0										
Min. working pressure MPa	0.15					0.1					
Proof pressure MPa	1.6										
Ambient temperature °C	-10 to 60 (no freezing)										
Port size	M5		Rc1/8				Rc1/4		Rc3/8		
Stroke tolerance mm	+2.0 0										
Working piston speed * mm/s	50 to 500						50 to 300				
Cushion	With rubber cushion										
Lubrication	Not necessary (Use turbine oil class 1 ISO VG32 for lubrication)										
Allowable absorption energy J	0.056	0.088	0.157	0.157	0.401	0.627	0.980	1.560	2.510	3.92	

* STG-K is 50 to 400 mm/s.

6.2 Switch specifications

1) Types and applications of switches

Model number			Purpose and Application
Item			
Non-contact	2-core	T2H	DC programmable controller, exclusive
		T2V	
	3-core	T3H	DC programmable controller, relay
		T3V	
Contact point	2-core	T0H	AC/DC relay, programmable controller
		T0V	
		T5H	AC/DC programmable controller, relay, IC circuit (not including indicator light), for series connection
		T5V	
2-color indicator type Non-contact	2-core	T2YH	DC programmable controller, exclusive
		T2YV	
	3-core	T3YH	DC programmable controller, relay
		T3YV	
Compact 2-color indicator type Non-contact	2-core	T2WH	DC programmable controller, exclusive
		T2WV	
	3-core	T3WH	DC programmable controller, relay
		T3WV	
Off delay Type	2-core	T2JH	DC programmable controller, exclusive
		T2JV	
Strong magnetic field resistance Non-contact	2-core	T2YD	DC programmable controller, exclusive
		T2YDT	

Note 1: T*H indicates type with a straight lead wire. T*V indicates type with a L-shaped lead wire.

Note 2: Applicable cylinders (φ40 to φ100) for the two-color indicator are different from those of standard products.

2) Switch specifications

Type and model number	Contact point 2-core type			
Item	T0H/V		T5H/V	
Applications	Relay or programmable controller		Programmable controller, relay, IC circuit (not including indication light), for series connection	
Power supply voltage	-			
Load voltage	12/24 VDC	110 VAC	12/24 VDC	110 VAC
Load current	5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less
Current consumption	-			
Internal voltage drop	2.4 V or less		0 V	
Indicator lamps	LED (Lights while power ON)		-	
Leak current	0			
Lead wire length (Note 1)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.2 mm ²)			
Shock resistance	294 m/s ²			
Insulation resistance	20 MΩ or more by 500 VDC megger			
Withstand voltage	No abnormalities upon applying 1000 VAC for one minute.			
Ambient temperature	-10°C to 60°C			
Degree of protection	IEC Standard IP67, JIS C 0920 (enclosure protection type), oil proof			

Type and model number	Non-contact 2-core type		
Item	T2H/V	T2JH/V	T2WH/V, T2YH/V
Applications	Programmable controller, exclusive		
Power supply voltage	-		
Load voltage	10 to 30 VDC		
Load current	5 to 20 mA (Note 2)		
Current consumption	-		
Internal voltage drop	4 V or less		
Indicator lamps	LED (Lights while power ON)		Red/Green LED (Lights while power is ON)
Leak current	1 mA or less		
Lead wire length (Note 1)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.2 mm)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.3 mm ²)	
Shock resistance	980 m/s ²		
Insulation resistance	20 MΩ or more by 500 VDC megger	100 MΩ or more by 500 VDC megger	
Withstand voltage	No abnormalities upon applying 1000 VAC for one minute.		
Ambient temperature	-10°C to 60°C		
Degree of protection	IEC Standard IP67, JIS C 0920 (enclosure protection type), oil proof		

Type and model number	Non-contact 3-core type	
Item	T3H/V	T3WH/V, T3YH/V
Applications	Programmable controller, relay	
Power supply voltage	10 to 28 VDC	
Load voltage	30 VDC or less	
Load current	100 mA or less	50 mA or less
Current consumption	10 mA or less at 24 VDC (while power is ON)	
Internal voltage drop	0.5 V or less	
Indicator lamps	LED (Lights while power ON)	Red/Green LED (Lights while power is ON)
Leak current	10 μA or less	
Lead wire length (Note 1)	Standard 1 m (oil proof vinyl, Cabtyre cord, 3-core, 0.2 mm ²)	
Shock resistance	980m/s ²	294m/s ²
Insulation resistance	20 MΩ or more by 500 VDC megger	100 MΩ or more by 500 VDC megger
Withstand voltage	No abnormalities upon applying 1000 VAC for one minute.	
Ambient temperature	-10°C to 60°C	
Degree of protection	IEC Standard IP67, JIS C 0920 (enclosure protection type), oil proof	

Type and model number	Non-contact 2-core type	
Item	T2YD	T2YDT
Applications	Programmable controller, exclusive	
Load voltage	24 VDC ± 10%	
Load current	5 to 20 mA	
Internal voltage drop	6 V or less	
Indicator lamps	Red/Green LED (Lights while power is ON)	
Leak current	1.0 mA or less	
Output delay time (Note 3) (ON delay, OFF delay)	30 to 60 ms	
Lead wire length (Note 1)	Standard 1 m (oil proof vinyl, Cabtyre cord, 2-core, 0.5 mm ²)	Standard 1 m (frame-resistant vinyl, Cabtyre cord, 2-core, 0.5 mm ²)
Shock resistance	980 m/s ²	
Insulation resistance	100 MΩ or more by 500 VDC megger	
Withstand voltage	No abnormalities upon applying 1000 VAC for one minute.	
Ambient temperature	-10°C to 60°C	
Degree of protection	IEC Standard IP67, JIS C 0920 (enclosure protection type), oil proof	

Note 1 : Lead wires of 3 m and 5 m are also available as options.

Note 2 : The above maximum load current value: 20 mA is at 25°C. If the ambient temperature is higher than 25°C, the current will be lower than 20 mA. (5 to 10 mA at 60°C)