CKD

SM－415182－A

INSTRUCTION MANUAL

CYLINDER WITH GUIDE

POSITION LOCKING TYPE

STG-Q 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 3rd 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.

[SM-415182-A]

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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

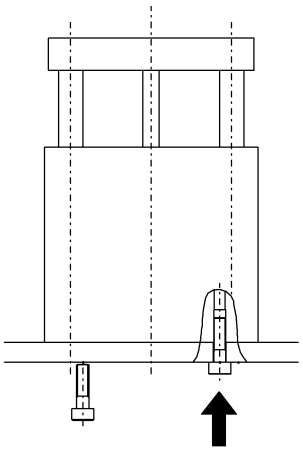
2.1 Installation

1) The ambient temperature for this cylinder is −10 to 60℃(Standard).

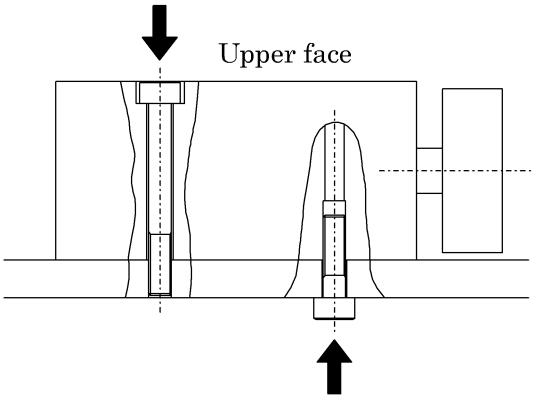
Always operate the cylinder within this temperature range.

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)
φ20･φ25	3 to 5.4
φ32･φ40	5.2 to 9.2
φ50･φ63	12.5 to 22

3) Avoid install cylinder around rain, water, direct sunlight.

4) Eliminate moisture to prevent freezing when ambient temperature is under 5℃ because moisture in the circuit may freeze and may occur accident.

5) Do not operate in atmosphere where the product could corrode. Operating in the environment cause damage or malfunction.

6) Rivet the load when install or remove the cylinder.

2.2 Piping

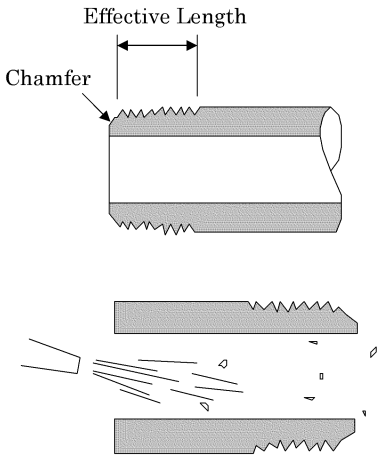
1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.

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.

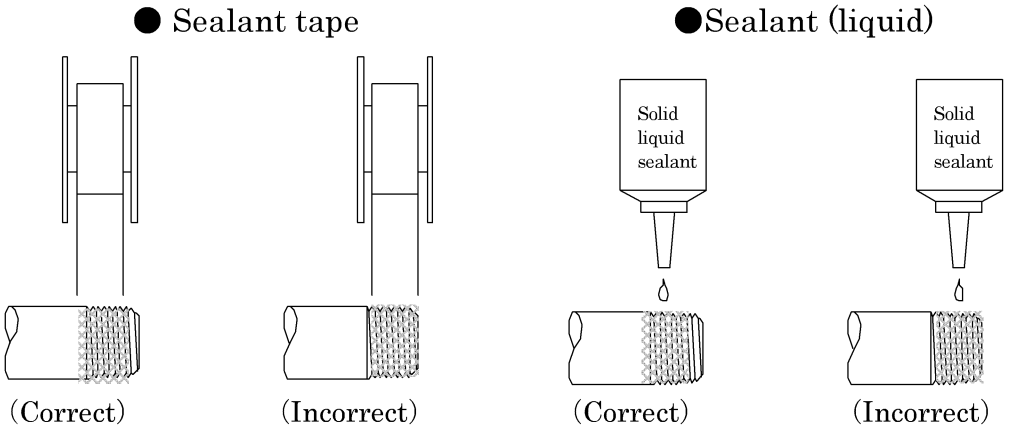
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

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.

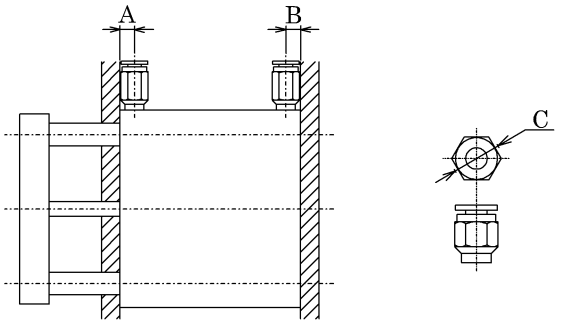


6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.



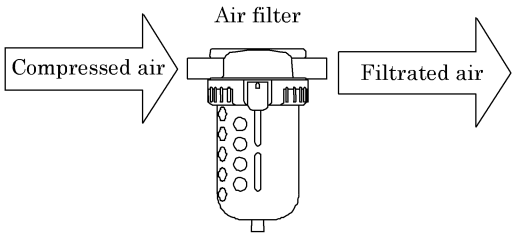
7) Because the usable piping joint has limitations, use it after checking the note below.

Item / Bore size (mm)	Port size	Port dimension A	Port dimension B	Enabled joints	Joint OD φC
φ20	Rc1/8	10.5	8.5	SC3W-6-4·6·8 GWS4-6 GWS6-6 GWS8-6 GWL4-6 GWL6-6	φ15 or less
φ25		11.5	9		
φ32		12.5	9		
φ40		14	10		
φ50	Rc1/4	14	11	SC3W-8-6·8·10 GWS4-8 GWS6-8 GWS10-8 GWS-12-8 GWL4 to 12-8	φ21 or less
φ63		16.5	15		



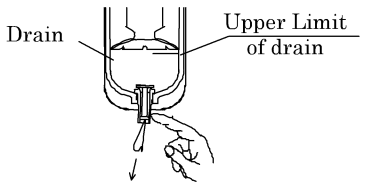
2.3 Fluid

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 μm 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.

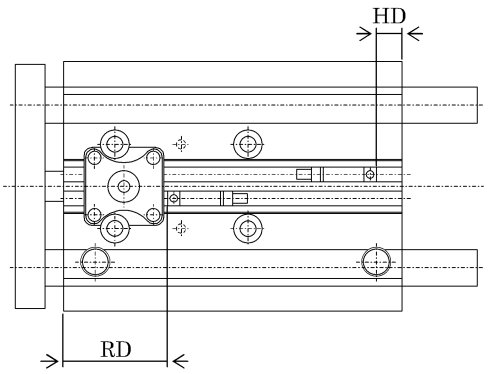
3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.



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 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)

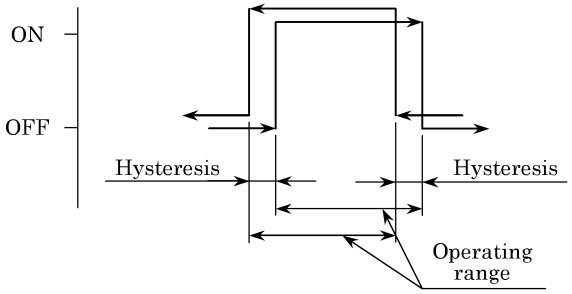
2) Operating range

(1) The switch turns on first and turns off as the piston moves along its stroke.
(2) The center of the range is the mostly sensitive position. Setting switch at this point eliminates majority of external disturbance and provides the most stabile actuation of switch.

3) Hysteresis

(1) Precise operating range deviate slightly depending upon the direction of piston movement as shown right.

(2) Switch is apt to be disturbed its accuracy by external effect when piston stops within this range. Carefully avoid designing stop-ping location of piston.



Maximum sensitive position, operating range and hysteresis (mm)

Item		Solid state switch (T2□,T3□,T3P□,T2J□,T2Y□,T3Y□,T2YD)							
		Maximum sensitive position				Operating range		Hysteresis	
Bore size (mm)		HD (mm)		RD (mm)					
		1 color	2 color	1 color	2 color	1 color	2 color	1 color	2 color
STG-Q-H	φ20	36	36	9.5	8.5	3 to 8	5 to 8.5	1.5 or less	1.5 or less
	φ25	34	34	10	9	3 to 9			
	φ32	34.5	34.5	10	9		5 to 9		
	φ40	37	36.5	13	12		6 to 10		
	φ50	37	37	13.5	13.5				
	φ63	40	39	14	13				
STG-Q-R	φ20	8.5	7.5	34.5	34	3 to 8	5 to 8.5	1.5 or less	1.5 or less
	φ25	8.5	7.5	35	34.5	3 to 9			
	φ32	8.5	8	35	34.5		5 to 9		
	φ40	12	11	40	39.5		6 to 10		
	φ50	11.5	10.5	39	39				
	φ63	16	15	39	39				

Item		Reed switch (T0□,T5□)				Solid state switch (T1□)			
Bore size (mm)		Maximum sensitive position		Operating range	Hysteresis	Maximum sensitive position		Operating range	Hysteresis
		HD	RD			HD	RD		
STG-Q-H	φ20	36	9.5	6 to 14	3 or less	36	8.5	3 to 8	1.5 or less
	φ25	34	10	5 to 14		34	9	3 to 9	
	φ32	34.5	10	5 to 12		34.5	9		
	φ40	37	13	6 to 14		36.5	12		
	φ50	37	13.5	6 to 14		37	12.5		
	φ63	40	14	7 to 15		39	13		
STG-Q-R	φ20	8.5	34.5	6 to 14	3 or less	7.5	34	3 to 8	1.5 or less
	φ25	8.5	35	5 to 14		7.5	34.5	3 to 9	
	φ32	8.5	35	5 to 12		8	34.5		
	φ40	12	40	6 to 14		11	39.5		
	φ50	11.5	39	6 to 14		10.5	39		
	φ63	16	39	7 to 15		15	39		

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

3. OPERATION

3.1 Operating the Cylinder

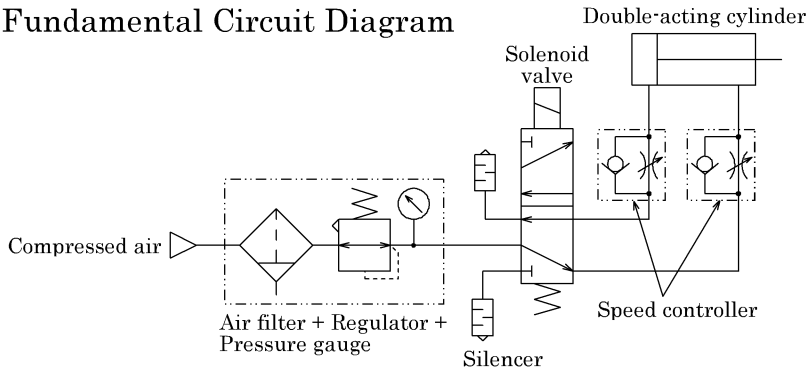
1) The working pressure for this type of cylinder is specified in "Product Specifications". Operate the system within this range.

   Additionally, cylinder load factor must be 50% or less. If the load factor is high, the lock may not be released or the lock section could be damaged.

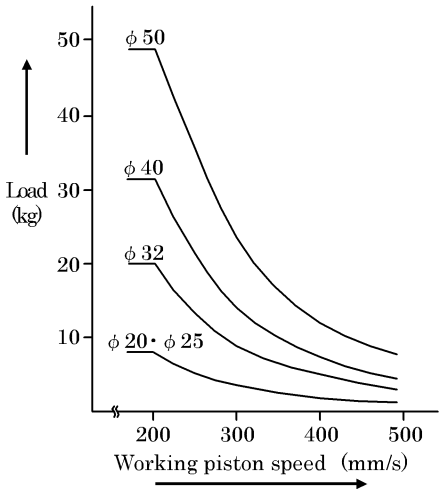
2) Although a rubber cushion is internally provided for this type of cylinder, it is advisable to install an additional external stopper when the kinetic energy is excessive. Tolerable kinetic energy is as the graphs below indicate.

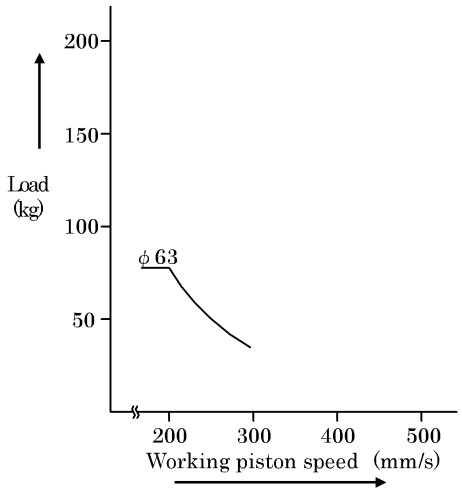
3) Regulate the working piston speed by installing speed controllers as per illustration in the Fundamental Circuit Diagram, below.

● Fundamental Circuit Diagram



● Graphs for Tolerable kinetic energy

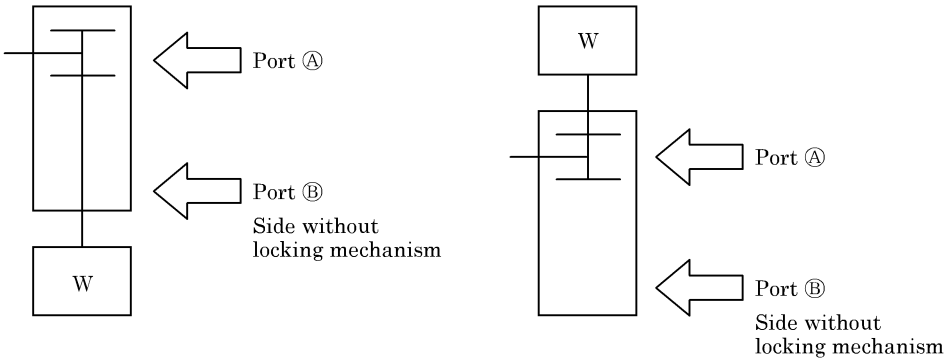




Note : The area left and under the plotted curve designates serviceable range for the cylinder.
Additional external cushion is required to operate the cylinder within the area of right and upper the plotted curve.

4) When adjusting speed with the speed controller, gradually open the needle from closed and raise speed. The piston rod may suddenly pop out and create a hazard if speed is adjusted while the needle is open.

5) To release the locking, be sure to remove the load to locking mechanism by supplying pressure to the port B first.
It is quite dangerous to supply pressure to the A direct while piston is being locked after both ports A and B are exhausted, because the piston rod is apt to pop out all the sudden due to the load on the tip of piston rod. When the port A is pressurized, at the same moment, pilot line releases the locking mechanism.



6) If cylinder is hold with the locking mechanism pressured, stopper piston may come off. Do not use solenoid valve at 3-position valve, especially closed center metal seal or 3 position P·A·B connection.

7) If negative pressure is applied to the locking mechanism, the lock may be released. Use the solenoid valve as a discrete unit, or use an independently exhausted manifold.

8) The lock functions at the stroke end. If the stopper is applied with an external stopper in the middle of the stroke, the lock may not function and result in dropping. Before setting the load, check that the locking mechanism functions correctly.

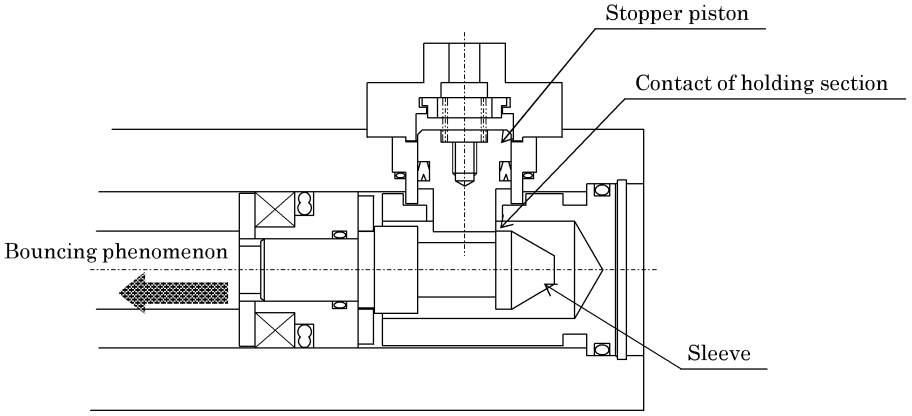
9) Supply a pressure higher than the min. working pressure to the port having the locking mechanism.

10) If piping on the side with the lock is thin and long, or if the speed controller is separated from the cylinder port, exhaust may slow, taking time for the lock to function. This may also occur if the silencer on the valve's EXH port is clogged.

11) If lowering speed is to be increased with the quick exhaust valve, the cylinder may move out faster than the lock pin and prevent the locking pin from being released correctly. Do not use a quick exhaust valve with the cylinder with position locking.

12) In case cylinder with air cushion, if the cushion adjusting needle on the locking mechanism side is fastened too tight, the piston bounces on the stroke end to bring the sleeve and the stopper piston into contact with a bump,

thereby resulting in damage in the locking mechanism. On the other hand, if the cushion adjusting needle is opened too much, the piston bounces on the end of stroke, it also causes damage to the mechanism. Make adjustments of the needles for the cushion so as not to allow bouncing of the piston.



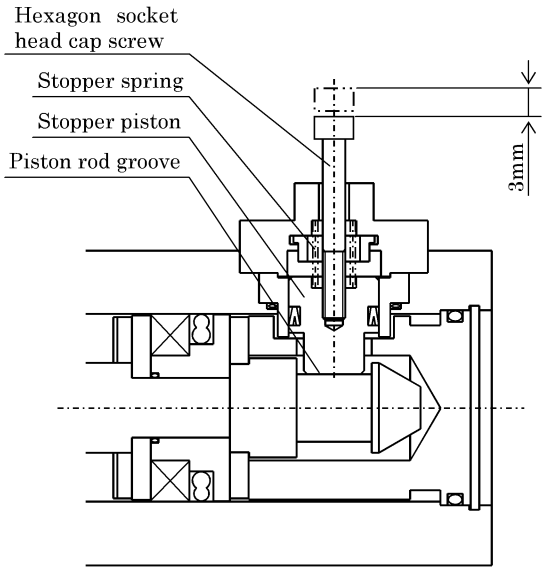
13) When an external cushion dumper (such as a shock absorber) is used to stop the piston, it is also needed to make adjustments so as not to allow bouncing of the piston. Conduct periodic inspections once or two times a year to check for damage on the holding portion by this phenomenon.

14) Release the lock when installing or adjusting the cylinder. The lock may be damaged if the cylinder is installed while the lock is applied.

15) Do not use multiple cylinders together.
Do not move one work piece using more than one position locking type cylinder.
It may not be possible to release one of the cylinder's locks.

16) Use the flow control valve with meter-out control.
It may not be possible to release locks used with meter-in control.

17) Unlocking Procedures by Manual control
Screw a hexagon socket head cap screw (M3 × 30 or more) into the stopper piston, and pull the bolt up with a force of 20N or more. The stopper piston moves and the lock is released. (loadless and horizontal installation, opposite side port pressurization)
When the hand is released, if the stopper piston is returned by the internal spring and enters the piston rod groove, the piston locks.



Note) If the locking mechanism is operated manually, check and return the manual override to the original position. Do not operate this product manually other than during adjustment, because this may be very hazardous.

18) Locking Motion

(a) Stopper piston ③ is pushed up by the slant of sleeve tip ② as the piston ① of cylinder approaches to its stroke end. (Fig. 1)

(b) When the piston of cylinder further comes closer to its stroke end and the groove ⑤ of sleeve matches to the tail of stopper piston, the stopper piston drops back to the groove ⑤ due to expansion force of spring ④, generating an effect of locking the piston of cylinder. (Fig. 2)

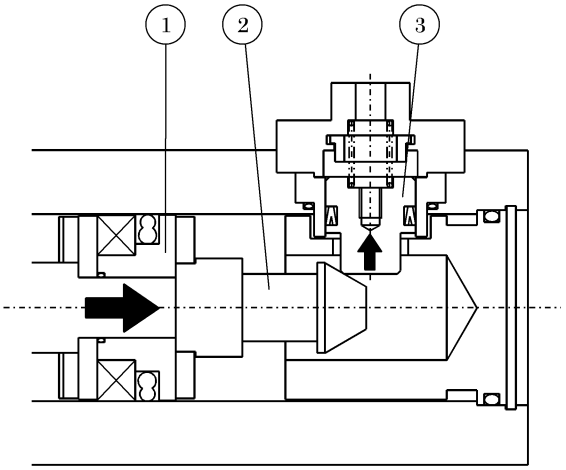


Fig.1

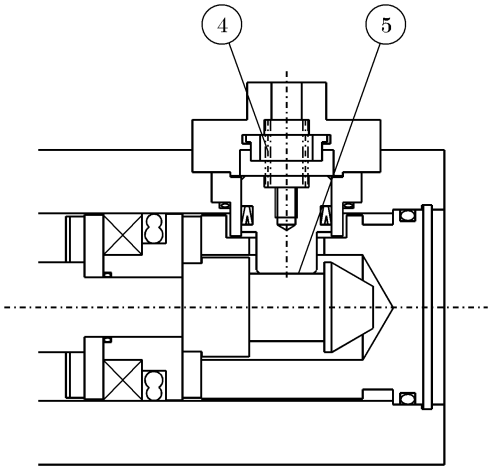


Fig.2

19) Unlocking Motion

The stopper piston, when compressed air is supplied through the port, floats up against the force of the spring ④ and comes off the groove ⑤ of sleeve, generating an effect of unlocking the piston of cylinder. (Fig. 3)

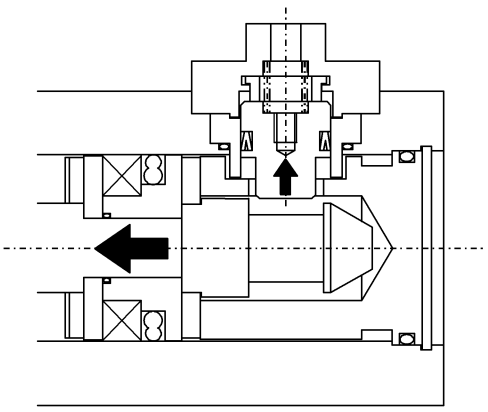


Fig.3

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.

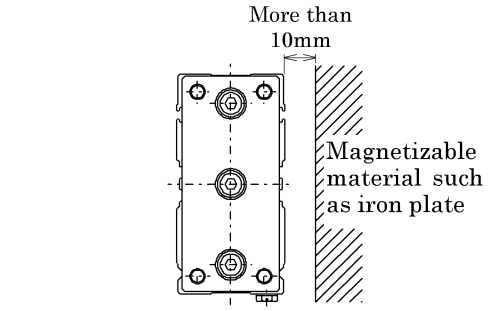
2) Protection of lead cord
Pay consideration to eliminate repeating bending stress or stretching of lead cord while laying the cord.
To the moving portion, use such cord of flexibility as for building a robot.

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

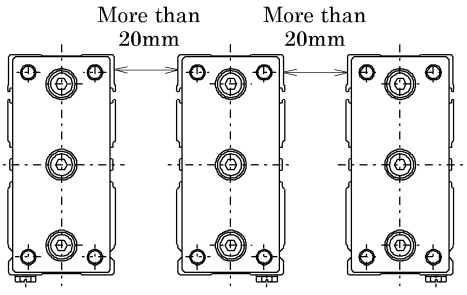
4) Intermediate position detection
When activating the switch halfway of the stroke, the relay may not respond if the working piston speed is too fast.
(Example) Operate cylinder with the speed of less than 500mm/s in case the relay actuation time is 20ms.

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 (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

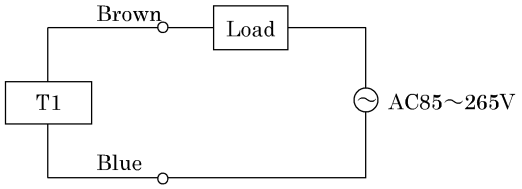


Fig.1 Fundamental circuit Example of T1

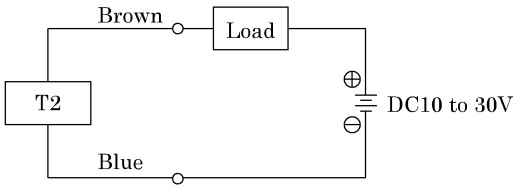


Fig.2 Fundamental circuit Example of T2

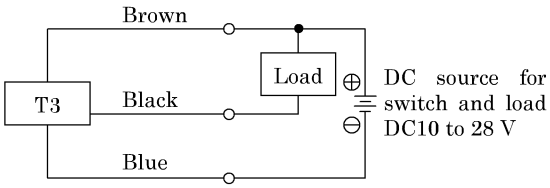


Fig.3 Fundamental circuit Example of T3 (1)
(In case the same source of power is used.)

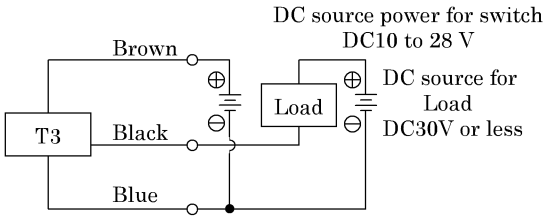


Fig.4 Fundamental circuit Example of T3 (2)
(In case individual sources of power are used.)

2) Protection of output circuit

Install some protective circuit as illustrated in Fig. 5 or 6 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. 7 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 or 9 (in case of model T2) and Fig 10 (in case of model T3).

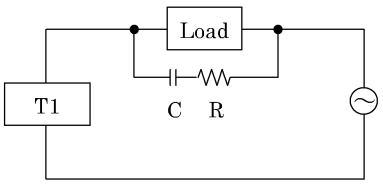


Fig. 5 An example of protective circuit at CR circuit
Capacitor volume: 0.03 to 0.1Mf
Resister: 1 to 3kΩ

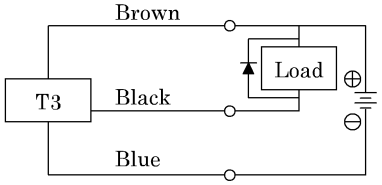
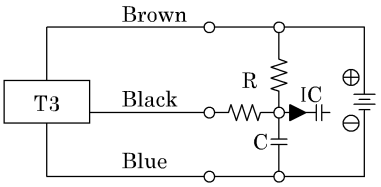


Fig.6 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)



Flg.7 An example of using capacitor type load together with current regulating resister R. Comply with the following formula to figure out required R.

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

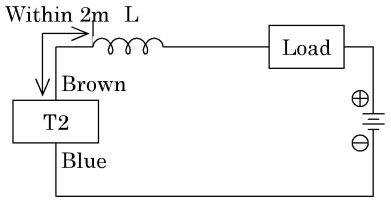


Fig.8 ・Choke coil
L = a couple hundred μH to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

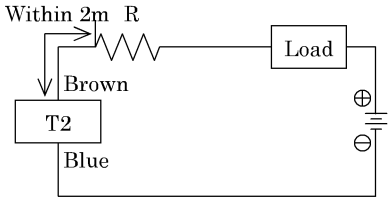


Fig.9 ・Dash current restriction resister.
R = As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

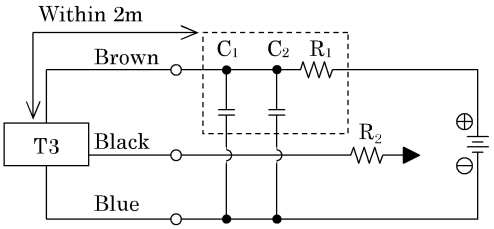


Fig10 ・Electric power noise absorptive circuit.
C_1=20 to 50 μF electrolytic capacitor
(Withstand voltage 50V or more)
C_2=0.01 to 0.1 μF ceramic capacitor
R_1=20 to 30Ω

・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 15 respectively.

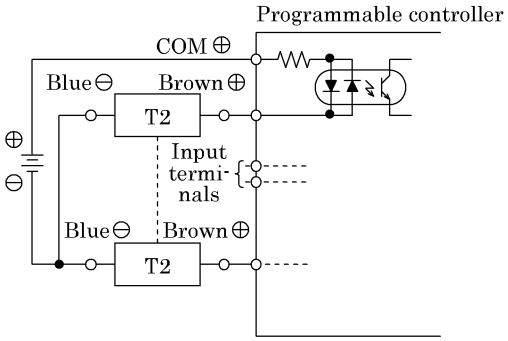


Fig.11 An example of T2 connection to source input type (an external power source)

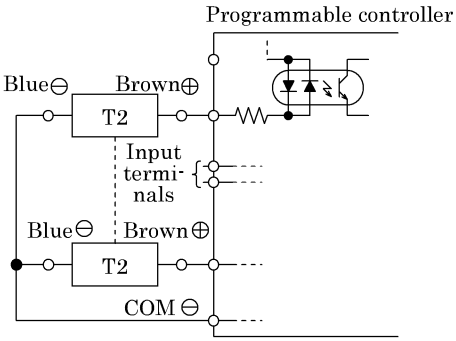


Fig.12 An example of T2 connection to source input type (an internal power source)

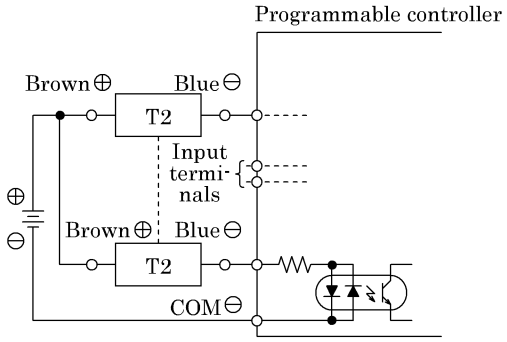


Fig.13 An example of T2 connection to sink input type

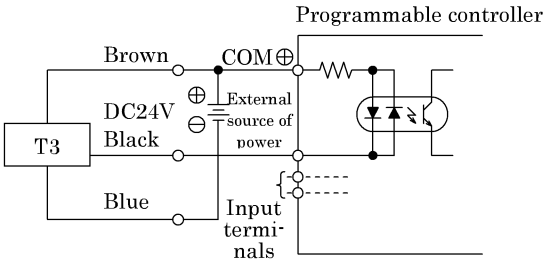


Fig.14 An example of T3 connection to source input type (an external power source)

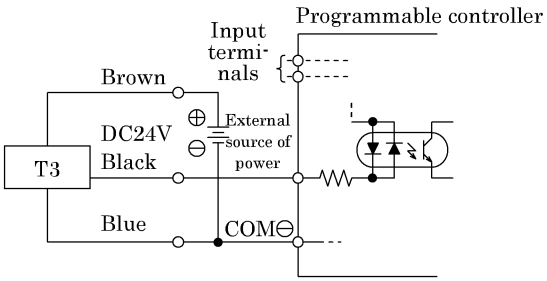


Fig.15 An example of T3 connection to source input type (an internal power source)

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.

3.2.3 Reed 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.

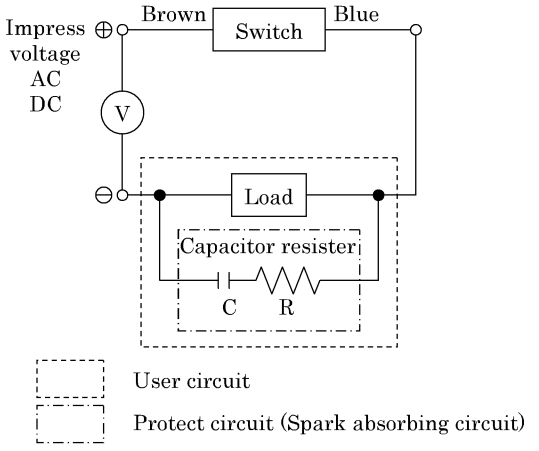
2) Contact protective measures

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

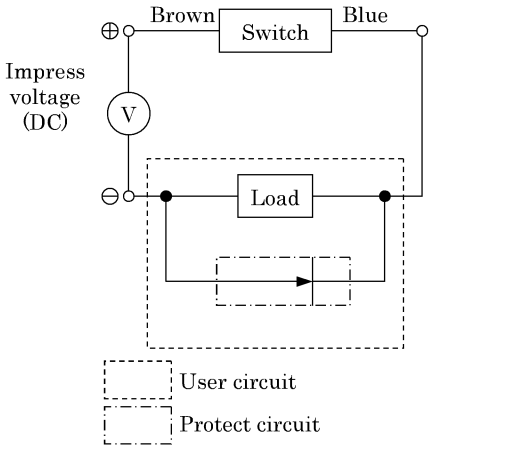
Electric power	Length of wire
DC	100m
AC	10m

(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

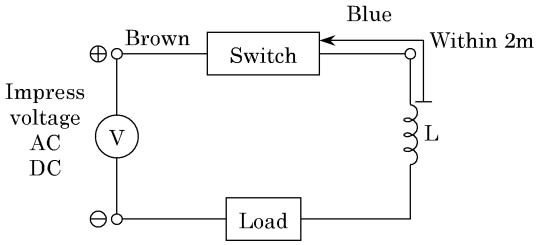
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

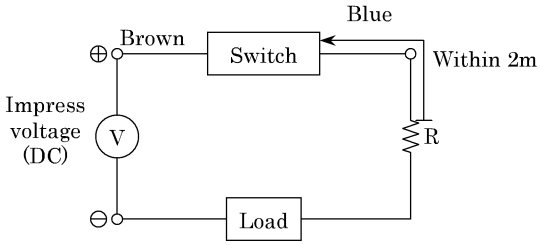
(2) Protective circuit when the wire length exceeds that stated Table1.



・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.

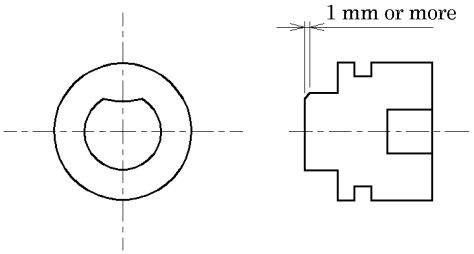
4. MAINTENANCE

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.
(7) Check if the position locking mechanism is securely locked.
(8) Check for scratches, wear and tear on the position locking mechanism. (sleeve, stopper piston, stopper packing, coil spring, etc.)
When a permanent deformation of 1 mm or more is observed on the stopper piston, the stopper piston needs to be replaced.
Since this may be caused by a permanent deformation of the sleeve, the sleeve also needs to be checked in this case.



See “4.2 Trouble shooting”, should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.
Since the position locking mechanism is a safety mechanism, disassemble it and check for scratches, wear and tear on it without fail.

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) Cylinder position locking mechanism

Trouble	Causes	Remedies
No locking.	No operation up to the stroke end.	Operate the cylinder up to the stroke end.
	Residual pressure is present inside the cylinder room on the locking mechanism side.	Reduce the residual pressure to zero.
No lock is released	No pressure up to the locking mechanism side.	Correct the control circuit.
	Stopper piston spring is being damaged.	Replace the cylinder.
	The external force is applied to the stopper piston.	After pressurizing the cylinder side on the side without position locking unit, actuate the cylinder.
	No pressure: the pressure is insufficient.	Maintain the pressure source.
Does not operate.	No pressure: the pressure is insufficient.	Maintain the pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Broken stopper packing.	Replace the piston packing.
Does not function smoothly.	Excessive load.	Increase the pressure itself and/or the inner diameter of the tube.
	Speed control valve is built in the way of "Meter in" circuit.	Change the meter-out circuit of the speed control valve.
	Grease shortage.	Grease is spread.
Breakage and / or deformation	Impact force due to high speed operation.	Turn the speed down.
	Excessive load.	Reduce the load.
	Speed control valve is built in the way of "Meter in" circuit.	Change the meter-out circuit of the speed control valve.
	Bounce on the end of stroke.	Eliminate a bounce on the end of stroke.

3) 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.

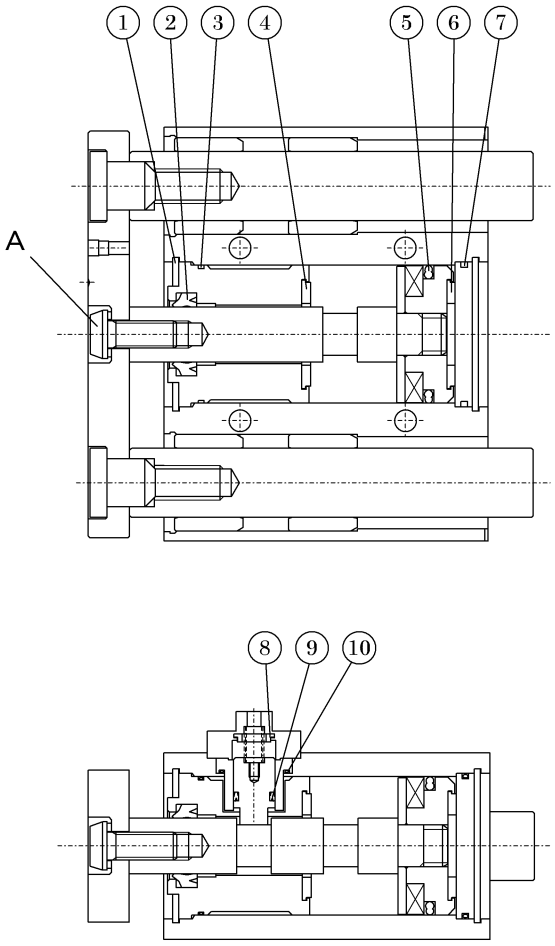
4.3 Disassembling

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.

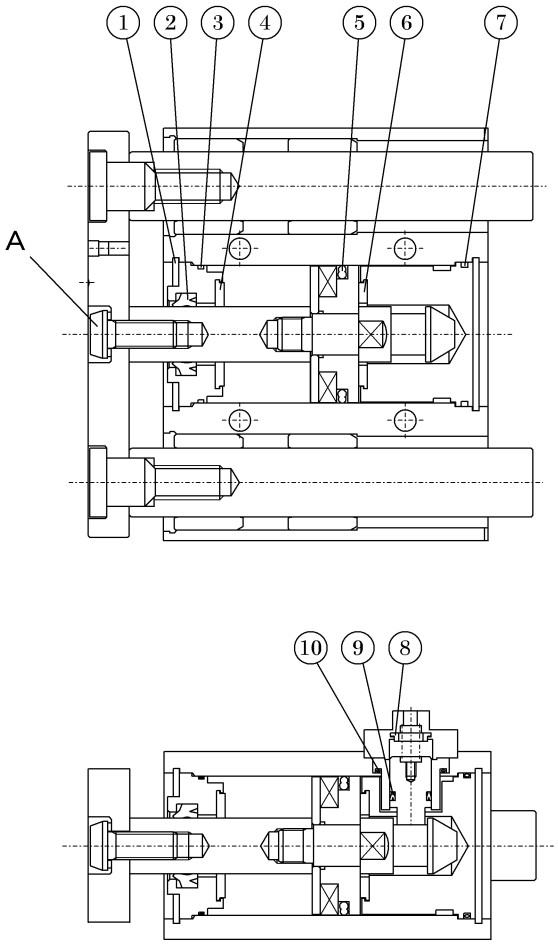
2) Remove bolt, ①. Take out End plate together with Guide rod. Remove C-shape snap ring ②. Pull out piston rod together with rod metal. Follow reverse steps of disassembling during the process of assembling. Be sure at this time to apply a film of grease over packing and guide. Apply adhesive to bolt ①. Verify that cylinder is in the state of pulling when tightening bolt ① to the piston rod.

3) Internal structure drawings and Expendable parts list

● Rod end position locking type



● Head end position locking type



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

Bore size (mm)	Kit No.		Repair parts number
	Rod end position locking type	Head end position locking type	
ϕ20	STG-Q-R-20K	STG-Q-H-20K	②Rod packing ③Metal gasket ④Rubber cushion (R) ⑤Piston packing ⑥Rubber cushion (H) ⑦O ring ⑧Rubber cushion ⑨Stopper packing ⑩O ring
ϕ25	STG-Q-R-25K	STG-Q-H-25K	
ϕ32	STG-Q-32K		
ϕ40	STG-Q-40K		
ϕ50	STG-Q-50K		
ϕ63	STG-Q-63K		

5. HOW TO ORDER

5.1 How to order product

●Without switch

STG – M Q – 32 NN – 25 – H ——— M1

●With switch

STG – M Q – 32 NN – 25 – H – T2H – R – M1

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

(a) Type of bearing		(b) Bore size (mm)		(c) Port thread type		(d) Stroke length (mm)							
M	Slide bearing	20	φ20	Blank	Rc thread			φ20	φ25	φ32	φ40	φ50	φ63
B	Ball bearing	25	φ25	NN	NPT thread (φ32 or more) (custom order)	Standard stroke	25	●	●	●	●	●	●
		32	φ32				50	●	●	●	●	●	●
		40	φ40				75	●	●	●	●	●	●
		50	φ50	GN	G thread (φ32 or more) (custom order)		100	●	●	●	●	●	●
		63	φ63				125	●	●	●	●	●	●
							150	●	●	●	●	●	●
							175	●	●	●	●	●	●
							200	●	●	●	●	●	●
							250	●	●	●	●	●	●
							300	●	●	●	●	●	●
							350	●	●	●	●	●	●
							400	●	●	●	●	●	●

(e) Position locking mechanism		(f) Switch model No. (※ mark shows lead wire length)					※Lead wire length	
H	Head end position locking mechanism	Lead wire straight type	Lead wire L-shaped type	Switch type	Indicator	Lead wire	Blank	1m (Standard)
R	Rod end position locking mechanism						3	3m (Optional)
		T0H※	T0V※	Reed	1 color indicator	2 wire	5	5m (Optional)
		T5H※	T5V※		Without indicator light			
		T1H※	T1V※	Solid state	1 color indicator			
		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※	—		Strong magnetic field proof Solid state			
		T2YDT※	—					

(g)Qty. of switch		(h) Option	
R	One on rod side	M0	Non-locking manual override (release bolt attached)
H	One on head side	M1	Locking manual override
D	Two		
T	Three		

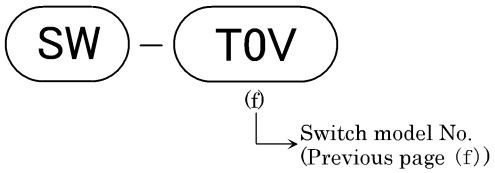
Note 1: If "M0" or "M1" is not selected for options, only the non-locking manual override will be provided. Release bolt is not included.

Note 2: T1H/V installation is a custom order.

►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-MQ/BQ					
Bore size	mm	φ20	φ25	φ32	φ40	φ50	φ63
Actuation		Double-acting・Position locking type					
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 to 60 (No freezing)					
Port size		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					
Position locking mechanism		Rod end or head end					
Holding force	N	Maximum thrust×0.7					
Lubrication		Not required (Use Grade 1 ISO VG32 Turbine oil, if lubrication is preferred)					
Allowable Energy absorption	J	0.157	0.157	0.401	0.627	0.980	1.560

6.2 Switch Specifications

1) Type of switches and applications

Model code / Item			Application (Purpose)
Solid state	2 wire	T1H	AC programmable controller, Relay, Small solenoid valve
		T1V	
		T2H	DC Programmable controller, exclusive
		T2V	
	3 wire	T3H	DC Programmable controller, Relay
		T3V	
Reed	2 wire	T0H	AC/DC Relay, Programmable controller
		T0V	
		T5H	AC/DC Programmable controller, Relay, or IC circuit (without indicator light), for Series connection
		T5V	
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	

Note 1. T※H expresses lead wire straight type. T※V expresses Lead wire L-shaped type.

2) Switch specifications

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	7 to 20mA	50mA or less	20mA or less
Current consumption	—			
Internal voltage drop	3V or less		0V	
Indicator light	LED (ON lighting)		Without indicator light	
Leakage current	0mA			
Lead wire length (Note 1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2 mm^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 C 0920 (Water tight type), oil resistance			

Type & Model / Item	Solid state 2 wire	
	T2H/V	T2YH/V
Applications	Programmable controller, exclusive	
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 (Note 1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.2 mm^2)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.3 mm^2)
Shock resistance	980m/s^2	
Insulation resistance	20MΩ over at DC500V megger	100MΩ over at DC500V megger
Withstand voltage	No failure impressed at AC1000V for one minute	
Ambient temperature	−10 to 60℃	
Degree of protection	IEC Standards IP67, JIS C 0920 (Water tight type), oil resistance	

Type & Model / Item	Solid state 3 wire	
	T3H/V	T3YH/V
Applications	Programmable controller, relay	
Output method	NPN output	
Power supply voltage	DC10 to 28V	
Load voltage	DC30V or less	
Load current	100 mA or less	50mA or less
Current consumption	10mA or less at DC24V (ON lighting)	
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 (Note 1)	Standard 1m (Oil resistant vinyl cabtire cord 3 conductor 0.2 mm^2)	
Shock resistance	980m/s^2	
Insulation resistance	20MΩ over at DC500V megger	100MΩ over at DC500V megger
Withstand voltage	No failure impressed at AC1000V for one minute	
Ambient temperature	−10 to 60℃	
Degree of protection	IEC Standards IP67, JIS C 0920 (Water tight type), oil resistance	

Type & Model / Item	Solid state 2 wire	
	T1H/V	T2JH/V
Applications	Programmable controller, Relay, Small solenoid valve	Programmable controller, exclusive
Load voltage	AC85 to 265V	DC10 to 30V
Load current	5 to 100mA	5 to 20mA
Internal voltage drop	7V or less	4V or less
Delay hour off	—	200±50ms
Indicator light	LED (ON lighting)	
Leakage current	1mA or less at AC100 2mA or less at AC200	1mA or less
Lead wire length (Note 1)	1m (Oil resistant vinyl cabtire cord 2 conductor 0.3 mm²)	1m (Oil resistant vinyl cabtire cord 2 conductor 0.3 mm²)
Shock resistance	980m/s²	
Insulation resistance	100MΩ over at DC500V megger	
Withstand voltage	No failure impressed at AC1500V for one minute	No failure impressed at AC1000V for one minute
Ambient temperature	−10 to 60℃	
Degree of protection	IEC Standards IP67, JIS C 0920 (Water tight type), oil resistance	

Type & Model / Item	Solid state 2 wire	
	T2YD	T2YDT
Applications	Programmable controller, exclusive	
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 (ON delay, OFF delay)	30 to 60ms	
Lead wire length (Note 1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.5 mm²)	Standard 1m (Flame resistant vinyl cabtire cord 2 conductor 0.5mm²)
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 C 0920 (Water tight type), oil resistance	

Note 1 : 3m or 5m long lead wire is optionally available.
Note 2 : Maximum value, 20mA is at 25℃. Load current decreases less than 20mA when the ambient temperature exceeds 25℃. (For example: it may be 5 to 10mA at 60℃.)