CKD

SM－288659－A

INSTRUCTION MANUAL

SUPER COMPACT CYLINDER

SSD－T1L

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

CKD Corporation

The 2nd edition

For Safety Use

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

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

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

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

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

⚠ CAUTION :

- **Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.**
- **While the actuator is operating, do not step into or place hands in the driving mechanism.**
- **To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch.**
  Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.

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SSD-T1L
Super Compact Cylinder
Double-acting・Heat resistance type
Manual No. SM-288659-A

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 5 to 150℃. Always operate the cylinder within this temperature range.

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

3) As for the rod nose screw, there are internal thread type and external thread type.

4) Attach a guide so that no lateral load is exerted onto the piston rod.
(Example) Apply no lateral load at all for the purpose of a stopper.

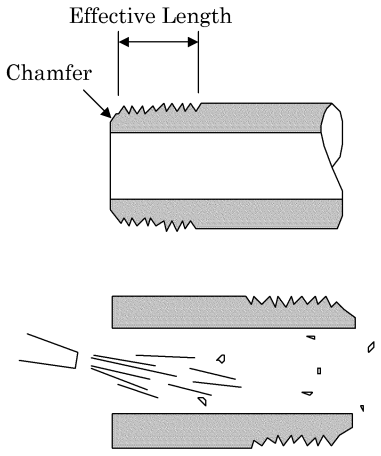
2.2 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc. Use copper tube when the ambient temperature exceeds 60℃.
2) See to it that the pipe connecting cylinder and solenoid valve has effective sectional area which is needed for the cylinder to drive at the specified speed.

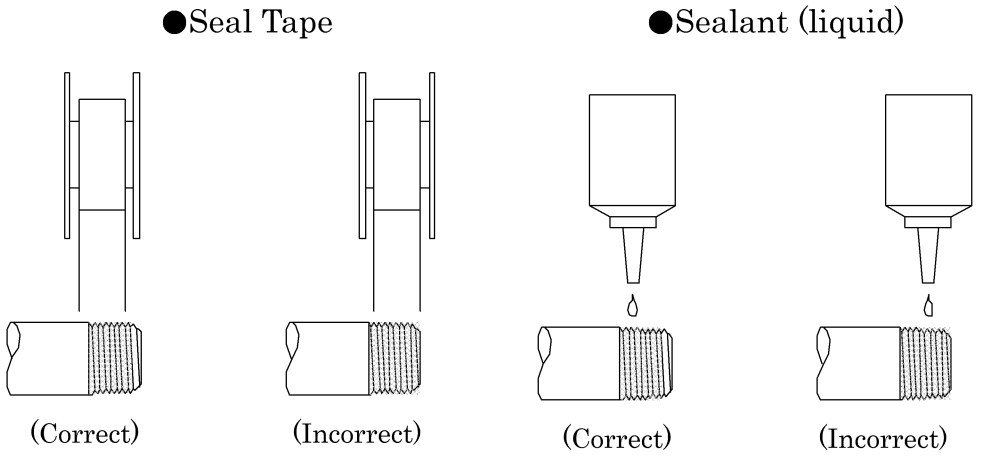
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

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

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

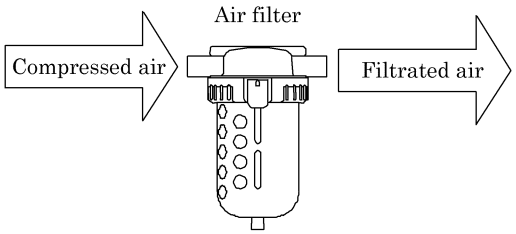


6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

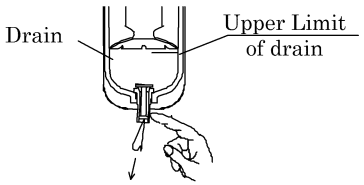


2.3 Fluid

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.

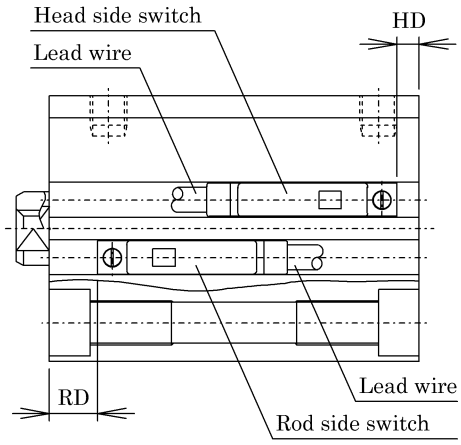
4) This cylinder does not require lubrication.

2.4 Location of mounting Switches on a Cylinder

1) Location of mounting switches on a cylinder.

(1) At the stroke end

Refer the illustration above. Mount switches within the rod side dimension RD as well as the head side dimension HD for the purpose of having switches function at the points of the 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.

(3) Relocation of switch

Slide switch body along cylinder tube after loosening mounting screws and tighten screws when located the maximum sensitive position.

(4) 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 0.5 to 0.7N・m)

2) Operating range

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

The center of the range is the mostly sensitive position. Setting switch at this point eliminates majority of external disturbance and provides the most stabile actuation of switch.

3) Hysteresis

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

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

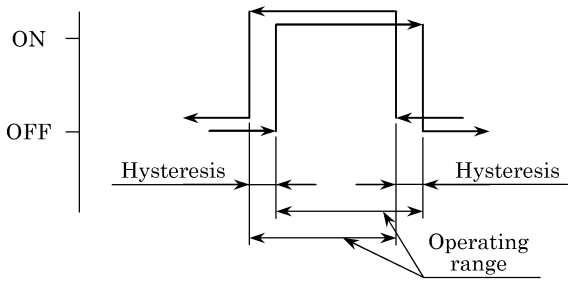


Table of maximum sensitive position (HD · RD), Operating range and Hysteresis (mm)

Item / Bore size (mm)	Reed switch type (T0H/V、T5H/V)			
	Best operating position		Operating range	Hysteresis
	HD	RD		
φ16	1	0	8 to 12	3 or less
φ20	0	0	8 to 14	
φ25	0.5	1	10 to 15	
φ32	0.5	2	9 to 13	
φ40	1.5	7	8 to 15	
φ50	1.5	6	10 to 17	
φ63	5.5	5.5	12 to 19	

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

3. OPERATION

3.1 Operating the Cylinder

1) See to it that the air supply pressure to the cylinder is as shown in the "Specification". Operate the cylinder within this pressure range.

2) Install an external stopper when the dynamic energy is large, as it does not absorb the kinetic energy since it has no cushion.

3) Install an appropriate speed controller to adjust the working piston speed.

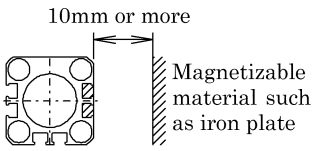
3.2 How to use the Switches

3.2.1 Common items

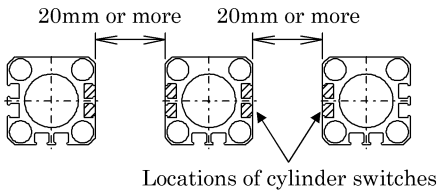
1) Magnetic environment
Do not operate this product in a place where a strong magnetic field or large current (large magnet or spot welder, etc.) exists. If a cylinder with the switch is installed in parallel to this product or the magnetic substance moves near the cylinder, the mutual interference may occur and affect the detection accuracy.

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

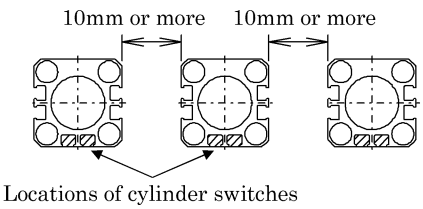
3) Operating temperature
Do not operate the product at a high temperature. (150℃)
Always avoid operation of the product in a hot place due to temperature characteristics of magnetic and electronics parts.



4) Intermediate position detection
When activating the switch halfway of the stroke, the relay may not respond if the 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) Shock resistance
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 ironplate near by cylinder switch is apt to cause malfunction of cylinder switches. Keep it from cylinder surface at least10mm away (This is applicable for all bore sizes of tube).
7) It usually causes malfunction cylinder switches when plural cylinders are laid adjoining. Keep a space between each other as illustrated to right (This is applicable for all bore sizes of tube).

3.2.2 Reed switch (ET0H, ET0V)

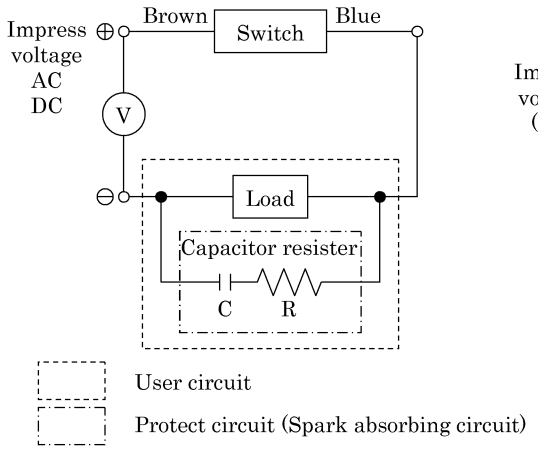
1) Lead wire connections
Do not connect the lead wires of the switch to the power supply directly. Always connect the loads in series. Carefully check following items (1), (2).
(1) When using the switch for DC power supply, connect the brown and blue lines to the positive and negative sides, respectively. If these lines are connected reversely, the switch is activated, but the indicator light is not lit.
(2) 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.
Note that the R4 and R5 switches have no polarities.

2) Contact protective measures
When an inductive load, such as relay is used or the wire length exceeds that stated in Table 1, always install a contact protective circuit.

Table 1

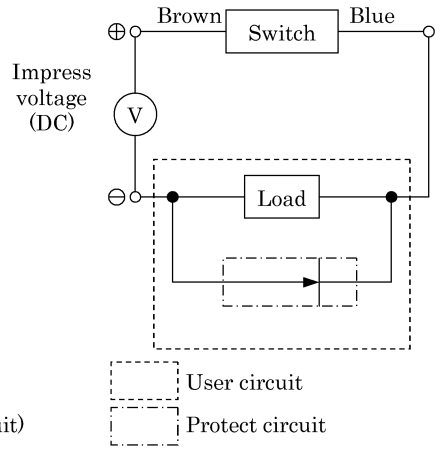
Electric power	Length of wire
DC	100m
AC	10m

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



Recommended value
C (Capacitor) 0.033 to 0.1 μ F
R (Resister)1 to 3k Ω
XEB1K1 Okaya Denki Mfg or equivalent

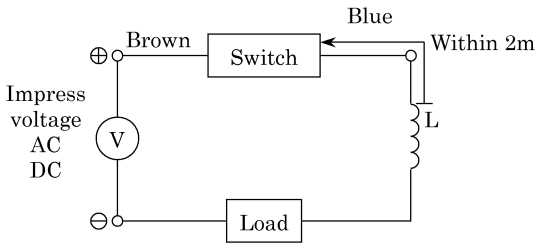
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

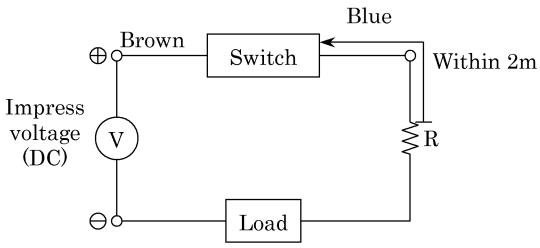
(2) Protective circuit when the wire length exceeds that stated Table 1



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

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

Fig.3



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

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

Fig.4

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

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

5) Serial connection
Total voltage loss, when connected ET0 switches in series, equals to the sum of respective voltage loss of each switch.
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. 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 piston speed and cycle time.
   (4) Check for internal and/or external leakage.
   (5) Check the piston rod for flaw (scratch) and deformation.
   (6) Check the stroke for abnormality.

   See “Trouble shooting”, 5 should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

4.2 Disassembly

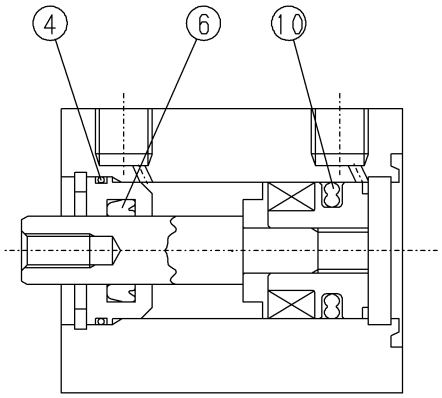
1) This cylinder is able to be disassembled.
   Replace component parts listed in Expendable parts List by disassembling cylinder referring to internal structure diagram when air leakage is ever occurred.
2) Remove piston rod and rod metal after removing C shape snap ring for the purpose of disassembly.

4.3 Assembly

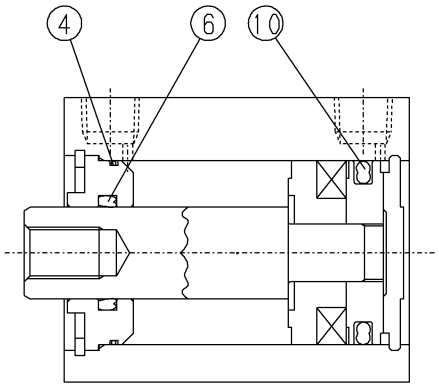
1) Clean each component parts.
2) Take reversed sequence of disassembly to assemble cylinder after cleaning parts. Carefully avoid giving damage to packings to prevent malfunction or air leakage.
3) Apply a film of high grade grease (Fluorine grease) over the inner surface of cylinder tube, outer surface of piston and packings.

4.4 Internal structure drawings and Expendable parts list

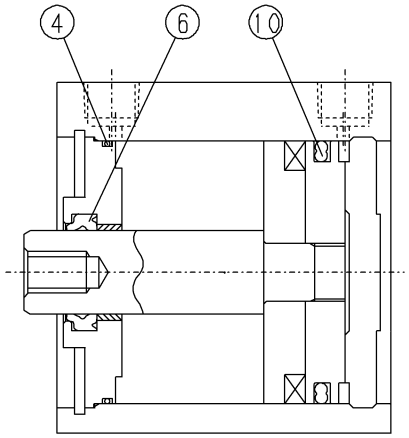
・ SSD-T1L φ16 to φ25
(Double acting, Heat resistance
,Small heat-resistance switch)



・ SSD-T1L φ32 to φ50
(Double acting, Heat resistance
,Small heat-resistance switch)



・ SSD- φ63
(Double acting, Heat resistance
,Small heat-resistance switch)



Expendable parts list (Specify the kit No. on your purchase order.)

Parts No / Parts name / Bore size (mm) / Kit No.	④	⑥	⑩
	Rod metal gasket	Rod packing	Piston packing
φ16	SSD-T-16K	F4-660814-16	MYR-8F	PSD-16F
φ20	SSD-T-20K	F4-165898	MYR-10F	PSD-20F
φ25	SSD-T-25K	F4-165899	MYR-12F	PSD-25F
φ32	SSD-T-32K	F4-660814-32	MYR-16F	PSD-32F
φ40	SSD-T-40K	F4-660814-40	PDU-16F	PSD-40F
φ50	SSD-T-50K	F4-660814-50	PDU-20F	PSD-50F
φ63	SSD-T-63K	AS568-035 Fluorine	PDU-20F	PSD-63F

5. TROUBLE SHOOTING

1) Cylinder

Trouble	Causes	Remedies
Does not operate.	No pressure or inadequate pressure.	Provide an adequate pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Broken piston packing	Replace the piston packing.
Does not function smoothly.	Speed is below the low speed limit	Limit the load variation.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Exertion of transverse (lateral) load.	Install a guide. Revise the installation state and/or change the mounting style.
	Excessive load.	Increase the pressure itself and/or the inner diameter of the tube.
	Speed control valve is built in the way of “Meter in” circuit.	Change the meter-out circuit of the speed control valve.
Breakage and / or deformation	Impact force due to high speed operation	Turn the speed down. Reduce the load and/or install a mechanism with more secured cushion effect (e.g.external cushion mechanism).
	Exertion of transverse load.	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.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	The cylinder speed is fast and the load does not react.	Turn the speed down. Replace the relay with a recommended one.
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 150℃
	Existence of a foreign magnetic field	Shield the magnetic field.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.

6. HOW TO ORDER

6.1 Product Number Coding

SSD-T1L – (16) – (10) – ET0H – (D) – (N) – (LB)

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

Double acting, Heat resistance, Small heat-resistance switch

(a) Bore size (mm)		(b) Standard stroke length		
16	φ16	φ12 to φ20	φ25 to φ50	φ63
20	φ20	10	10	10
25	φ25	15	15	20
32	φ32	20	20	30
40	φ40	25	25	40
50	φ50	30	30	50
63	φ63	30	40	
			50	

(c) Switch model No.			
ET0H	Reed	2-wire	Axial lead wire
ET0V			Radial lead wire

(d) Switch quantity	
R	One on rod side
H	One on head side
D	Two

(e) Option	
N	Rod end male thread

(f) Mounting bracket (Note)	
LB	Axial foot
CB	Clevis

Note : Mounting bracket is attached at shipment.

6.2 Component parts Model coding

SW – (ET0H)

Switch model No. above (c)

7. SPECIFICATION

7.1 Product Specifications

Model code / Item		SSD-T1L						
Bore size	mm	φ16	φ20	φ25	φ32	φ40	φ50	φ63
Actuation		Double-acting type・Heat resistance type						
Working fluid		Compressed Air						
Max. working pressure	MPa	1						
Min. working pressure	MPa	0.1						0.05
Proof pressure	MPa	1.6						
Ambient temperature	℃	5 to 150 (Note1)						
Port size		M5			Rc1/8		Rc1/4	
Stroke tolerance	mm	+1.0 0						
Working piston speed	mm/s	50 to 500						50 to 300
Cushion		None						
Lubrication (Note2)		——						
Option		Rod end male thread (N)						

Note1：External leakage occurs gradually after 500 thousand cycle at ambient temperature 150℃.
Note2：Apply heat proof grease periodically.

7.2 Switch Specification

Type & Model / Item	Reed switch / ET0H, ET0V	
Applications	For use with relay, programmable controller	
Load Voltage	DC12/24V	AC110V
Load current	5 to 50mA	7 to 20mA
Internal voltage drop	2.4V or lower	
Indicator light	LED ON lighting (Note)	
Leakage current	0mA	
Lead wire length	Heat proof fluorine insulation sheath electric wire 1m (0.5SQ (100/0.08) annealed copper wire×2C))	
Shock resistance	294m/s² {30G}	
Insulation resistance	100MΩ over at DC500V megger	
Withstand voltage	No failure at AC1,000V for one minute	
Ambient temperature	-10 to 150℃	
Degree of protection	IEC Standard IP67, JIS C0920 (water tight type)	

Note：For indicator light, LED is used.
Using this product at high temperature gradually decreases visibility.
Even LED does no light, the switch output circuit works correctly because the switch output line is separated.