CKD

SM-258067-A

INSTRUCTION MANUAL

SUPER COMPACT CYLINDER WITH FREE POSITION LOCKING

USSD 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

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 for proper operation.

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

⚠ Precautions

- 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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USSD Series
Super Compact Cylinder with Free-Position Locking
Manual No. SM 258067-A

1. PRODUCT

1.1 Cylinder Specification

Common specification

Model code & class / Item		USSD USSD-L (With switch)			USSD-K USSD-KL (With switch)		
Media		Compressed air					
Max.working pressure	MPa	1					
Min.working pressure	MPa	0.25 (No load)					
Ambient temperature	°C	−10 to 60 (No freezing)					
Tube bore	mm	ϕ20	ϕ25	ϕ32	ϕ40	ϕ50	ϕ63
Connecting port dia.		M5×0.8		Rc1/8		Rc1/4	
Locking force	N	150	235	386	603	943	1497
Operational piston speed	mm/s	50 to 500(ϕ20 to ϕ50), 50 to 300(ϕ63)					
Lubrication		Not required					
Option		Male thread at the rod end(N)					

Specifications for different models

Model code & class / Item		USSD USSD-L (With switch)	USSD-K USSD-KL (With switch)
Stroke tolerance	mm	+ 1.0 0	+ 2.0 0
Cushion		Without cushion	Rubbercushion

Stroke

Model code	Tube bore	Standard stroke (mm)	Max. stroke(mm)	Min. stroke (mm)
USSD USSD-L	ϕ20	5, 10, 15, 20, 25, 30	30	5
	ϕ25, ϕ32, ϕ40, ϕ50	5, 10, 15, 20, 25, 30, 40, 50	50	
	ϕ63	5, 10, 20, 30, 40, 50		
USSD-K USSD-KL	ϕ20	5, 10, 15, 20, 25, 30, 40, 50	200	5
	ϕ25, ϕ32, ϕ40, ϕ50	10, 15, 20, 25, 30, 40, 50 60, 70, 80, 90, 100	300	
	ϕ63	10, 20, 30, 40, 50, 60, 70 80, 90, 100		

1.2 Switch Specification

Model code	Reed switch	
Items	T0H · T0V	T5H · T5V
Application	for Relay and Programmable Controller	for Programmable Controller, Relay, IC circuit (No Lamp) : Series connection
Power Supply Voltage	——	
Load Voltage & Current	DC24V, 5 to 50mA AC100V, 7 to 20mA	DC24V, 50mA or less AC100V, 20mA or less
Current consumption	——	
Internal Voltage Drop	2.4V or less	0V
Lamp	LED is lit when Power is ON	——
Leak Current	0	
Length of Lead wire (Note 1)	Standard 1m (Oil resistance Vinyl cabtyre cord, 2-wire 0.2mm^2)	
Max. Shock	30G	
Insulation Resistance	20MΩ or more with DC 500Vmeggar tester	
Withstand voltage	Should be no abnormality for 1 minute charging AC1000V	
Ambience Temperature	−10 to + 60°C	
Protective Structure	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance	

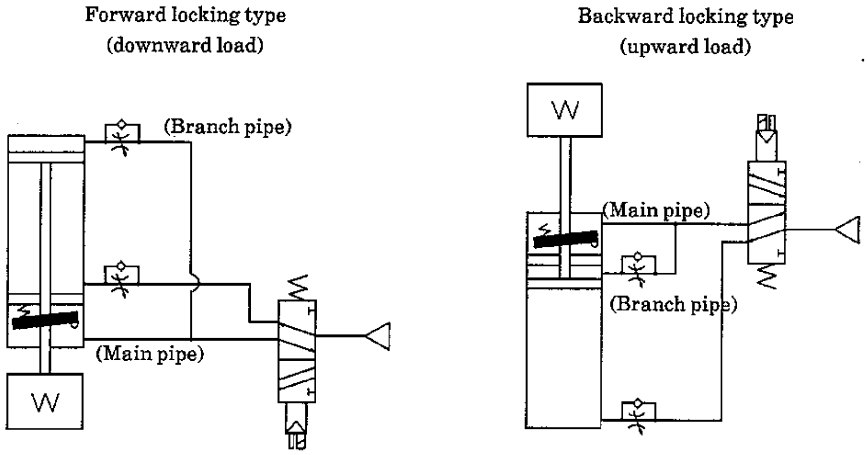
Model code	Solid state type switch	
Items	T2H · T2V	T3H · T3V
Application	Exclusively for Programmable Controller	for Programmable Controller and Relay
Power Supply Voltage	——	DC10 to 28V
Load Voltage & Current	DC10 to 30V 5 to 20mA (Note 2)	DC30V or less 100mA or less
Current consumption	——	10mA or less at DC24V (Power ON)
Internal Voltage Drop	4V or less	0.5V or lower at 100mA
Lamp	LED is lit when Power is ON	
Leak Current	1 mA or less	10μA or less
Length of Lead wire (Note 1)	Standard 1m (Oil resistance Vinyl cabtyre cord, 2-wire 0.2mm^2)	Standard 1m (Oil resistance Vinyl cabtyre cord, 3-wire 0.2mm^2)
Max. Shock	100G	
Insulation Resistance	20MΩ or more with DC 500Vmeggar tester	
Withstand voltage	Should be no abnormality for 1 minute charging AC1000V	
Ambience Temperature	−10 to +60°C	
Protective Structure	IEC Standard IP67, JIS C0920 (water tight type), Oil resistance	

Note 1 : 3m, 5m optional lead wire are available besides standard length.

Note 2 : Max. Load Current (20mA) is at 25°C. It may drop lower than 20mA when ambient temperature rises higher than 25°C.(60°C or less at 5 to 10mA)

1.3 Fundamental Circuit Diagram

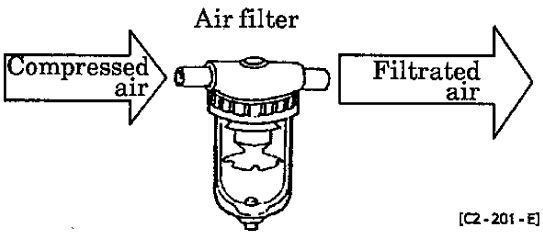
1) The air pipe of this cylinder must be branched at a position after the valve as shown in the Fig. below. Two pipes are connected to the position locking part (the pipe to the lock release port is determined as main pipe) and cylinder part (the pipe to cylinder port is determined as branch pipe). Additionally, the main pipe is made thicker and shorter than the branch pipe.
2) If the cylinder action becomes faster than the lock release, the lock may not be released or the piston rod may project even after the lock has been released. To prevent such troubles, the piping is so designed that the lock release becomes faster than the cylinder action.
3) If the back pressure is applied during locking, the lock may be released. Therefore, an individual solenoid valve or solenoid valve with the individual exhaust manifold needs to be used.
4) If the pipe is individually connected to the position locking part or if the piping other than that shown in the Fig. below is performed, contact CKD.



2. CAUTION

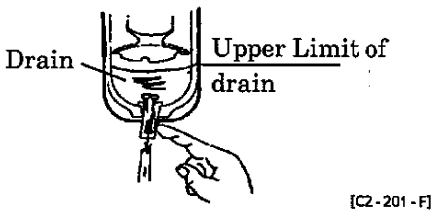
2.1 Fluid

1) Use the compressed air, filtrated and dehumidified. Carefully select a filter of an adequate filtration rate (5μm or lower preferred), flow rate and its mounting location (as closest to solenoid valve as possible).



2) Be sure to drain out the accumulation in filter periodically.

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

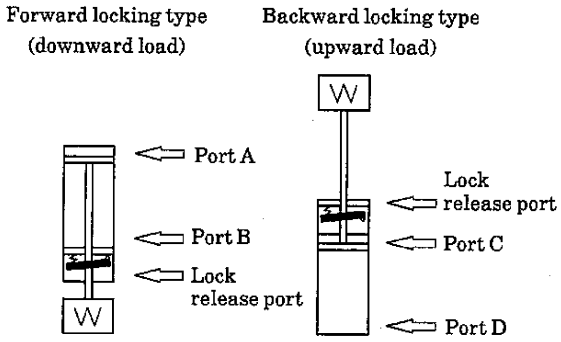


4) This cylinder has the oilless specification.
If the locking part is lubricated, this may cause the retention force to lower. Never attempt to lubricate this cylinder.

3. OPERATION

3.1 Cautions for Handling

1) This product is a cylinder with position locking (retention of the cylinder stationary status) mechanism. If this cylinder is used for the emergency stop or urgent stop (stop from the cylinder action state), contact CKD.
2) If any rotational force (torque) is applied to the rod when the lock is operated, the retention force is lowered, causing personal injury. To prevent such trouble, do not apply the rotational force to the rod. Additionally, operate this cylinder in a mechanism, in which the rod is not rotated.
3) The piston rod may drop approximately 1 mm (movement of piston rod) due to the structure of this cylinder.
4) When releasing the lock, apply the pressure to the port B or port D so that the load is not applied to the lock mechanism, and then release the lock. If the pressure is applied to the port A or port C with all ports exhausted and the piston locked, the lock may not be released or the piston rod may project even after the lock has been released, causing personal injury.



5) If the cylinder is locked after it has been operated with the lock released for an extended period of time, the response delay may occur in the lock. The cylinder must not be left with the pressure applied to the lock. The lock is operated every time the cylinder is operated.
(Use the fundamental circuit diagram shown on page 3.)
6) If there is no air pressure when the cylinder is operated with it mounted vertically, the retention force may cease when releasing manually, and then the rod may be moved (lowered) by own weight of the load.

If the above situation is predicted, perform the manual release after the following preparations have been taken in order to ensure the safety.
(1) Move the load to its lower limit.
(2) Put the stopper on the load.
(3) Apply the air pressure to the cylinder to make the load balanced.

3.2 Tolerable Kinetic Energy

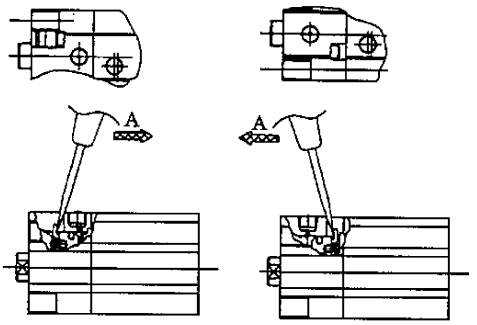
1) The supply pressure to the cylinder is described in section 1.1, Cylinder specification. Operate the cylinder within this pressure range.
2) Install a speed controller as shown in the fundamental circuit diagram shown on page 3. Gradually open the speed controller from the close state to adjust the piston speed within the product specification.
3) Since the USSD and USSD-L models have no cushions, these models cannot absorb the kinetic energy. Additionally, even though the USSD-K and USSD-KL models have cushions, install an external stopper if the kinetic energy is large.
The following table shows the tolerable kinetic energy of the USSD-K and USSD-KL models.

Tube bore (mm)	Rubber cushion Tolerable kinetic energy (J)
ϕ20	0.157
ϕ25	0.157
ϕ32	0.401
ϕ40	0.627
ϕ50	0.980
ϕ63	1.560

4) If a unit having an excessive inertia is operated, this may cause the cylinder main body to be damaged or malfunction. Always operate the cylinder within the allowable range.

3.3 Performing The Manual Release

1) Remove the cover and insert a slotted screwdriver. Lightly lay down the screwdriver in the direction A indicated by an arrow. The release lever is then raised, the lock is released, and then the piston rod becomes free. (No cover is provided if the diameter is ϕ25 or less.)

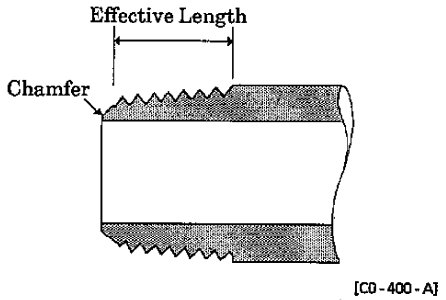


Backward locking type (Lockdirection →)　　Forward locking type (Lockdirection ←)

4. INSTALLATION

4.1 Piping

1) For piping beyond the filter, use pipes that hardly get corroded such as galvanized pipes, nylon tubes, rubber tubes, etc.
2) See to it that the pipe connecting cylinder and solenoid valve has effective sectional area needed for the cylinder to drive at specified speed.
3) Install filter preferably adjacent upper-stream to solenoid valve for eliminating rust, foreign substance and drain in the pipe.
4) Strictly 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.



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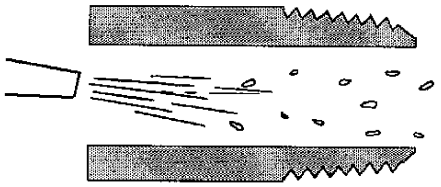
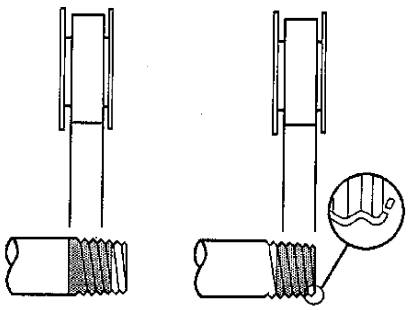
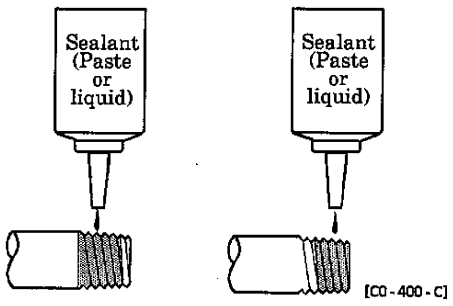

[CO-400-B]

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

● Seal Tape


Correct Incorrect

● Sealant (Paste or liquid)



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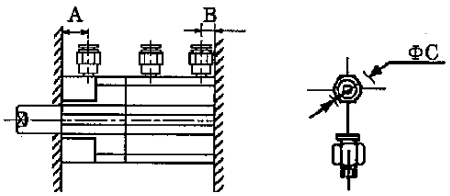
Correct Incorrect

7) Usable pipe joint is limited. Select an appropriate joint while referring to the table below.



Item / Tube bore (mm)	Port diameter	Port dimension A	Port dimension B	Usable joint	O.D. of joint ϕC	Unusable joint
ϕ20	M5×0.8	10	5.5	SC3G-M5-4 SC3G-M5-6 GSS4-M5-S GSS4-M5 GSL4-M5 GSL6-M5	ϕ11 or less	GSS6-M5
ϕ25		12	6			
ϕ32	Rc1/8	12	8	SC3G-6-4・6・8 GSS4-6 GSS6-6 GSS8-6 GSL4-6 GSL6-6	ϕ15 or less	GSS10-6 GSL8-6 GSL10-6
ϕ40		15	8.5			
ϕ40	Rc1/4	15	10.5	SC3G-8-6・8・10 GSS4-8 GSS6-8 GSS10-8 GSL4 to 12-8	ϕ21 or less	GSS-12-8
ϕ50		15.5	11			
ϕ63		15.5	11			

4.2 Installation

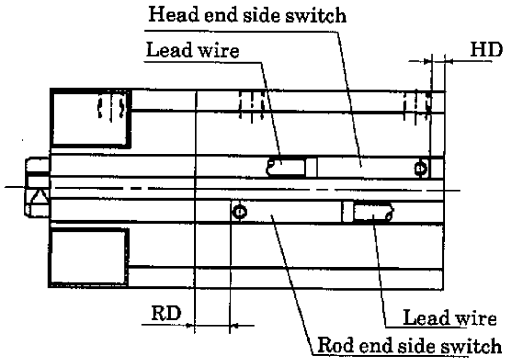
1) The ambient temperature range for this cylinder is −10 to 60°C.
2) Install cylinder body with a hexagon socket head cap screw directly.
3) As for the rod nose screw, there are internal thread type and external thread type. Use it to application.
4) Attach a guide so that no lateral load is exerted onto the piston rod.
(Example) Apply no lateral load at all for the purpose of a stopper.

4.3 Switch Mounting

1) Switch mounting location

(1) Stroke end mounting

Install one switch at the distance of RD away from rod end and the other at the distance of HD away from cylinder head, so as to have each switch function at its most sensitive location.



(2) Mounting it at an intermediate point of stroke

At first, fix the piston rod at the point where rod is made to stop. Slide a switch along the surface of cylinder longitudinally. Mark the first location where switch turns ON while keep sliding till near the stroke end. Reverse direction of sliding and mark the second location where switch turns ON. The center point of those two points is the most sensitive point of the switch and it is the switch mounting location, accordingly.

(3) Switch movement

Loosen the clamp screw (set screw) and move the switch main body along with the switch groove. Set the switch at the specified position and tighten the clamp screw to secure the switch.

(4) Switch replacement

Loosen the clamp screw (set screw) and remove the switch main body from the groove. Next, put a new switch in the groove, set the switch at the specified position, and tighten the clamp screw to secure the switch.

(The tightening torque of the clamp screw is 0.1 to 0.2 N·m.)

2) Operating range

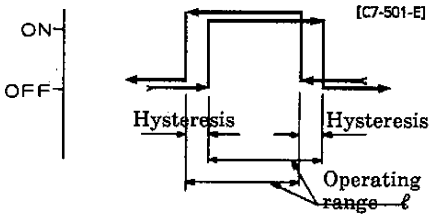
It is the distance of two positions where switch turns ON, while piston continues its stroke in one directin, and where it turns OFF.

The center point of scope of function is the most sensitive point of switch. Selection of this point for piston stopping makes the external magnetic disturbance the least and provides the most stable function of switch.

3) Hysteresis

(1) It is the distance of two points where switch turns ON as piston travels in one direction and where switch turns OFF while piston travels reversely.

(2) Beware of that the function of switch becomes unstable when piston stops within this distance and easily affected by the disturbance.



USSD-L

Best operating position (HD、RD), Operating range, Hysteresis

(mm)

Item / Tube bore(mm)	Solid state type (T2H/V, T3H/V)				Reed switch type (T0H/V, T5H/V)			
	Best operating position		Operating range	Hysteresis	Best operating position		Operating range	Hysteresis
	HD	RD			HD	RD		
ϕ20	3	6.5	3 to 8	1.5 or less	3	6.5	6 to 14	3 or less
ϕ25	3	9.5	3 to 9		3	9.5	5 to 14	
ϕ32	3.5	9	3 to 8		3.5	9	5 to 12	
ϕ40	7	12	3 to 9		7	12	6 to 14	
ϕ50	7.5	12.5	3 to 9		7.5	12.5	6 to 14	
ϕ63	12.5	13	3 to 9		12.5	13	7 to 15	

※ Switches are mounted at the most sensitive locations (HD, RD) ex-factory.

Note : For 5-stroke application, the HD and RD positions are set for each application. Therefore, the HD and RD positions may vary from those stated in the above table.

USSD-KL

Best operating position (HD、RD), Operating range, Hysteresis

(mm)

Item / Tube bore(mm)	Solid state type (T2H/V, T3H/V)				Reed switch type (T0H/V, T5H/V)			
	Best operating position		Operating range	Hysteresis	Best operating position		Operating range	Hysteresis
	HD	RD			HD	RD		
ϕ20	6(12.5)	8.5(13.5)	3 to 8	1.5 or less	6(12.5)	8.5(13.5)	6 to 14	or less3
ϕ25	5.5(14)	12(17)	3 to 9		5.5(14)	12(17)	5 to 14	
ϕ32	8.5(16)	14(14)	3 to 8		8.5(16)	14(14)	5 to 12	
ϕ40	9.5(19)	19.5(19.5)	3 to 9		9.5(19)	19.5(19.5)	6 to 14	
ϕ50	10(19)	20(25)	3 to 9		10(19)	20(25)	6 to 14	
ϕ63	17.5(23)	18(23)	3 to 9		17.5(23)	18(23)	7 to 15	

※ Switches are mounted at the most sensitive locations (HD, RD) ex-factory.

Note : For 5-stroke application, the HD and RD positions are set for each application. Therefore, the HD and RD positions may vary from those stated in the above table.
Additionally, the values in ( ) apply to the HD and RD positions for ϕ20 exceeding 100 strokes, ϕ25 exceeding 150 strokes, ϕ32 to 50 exceeding 150 strokes, or ϕ63 to 100 exceeding strokes.

5. OPERATION

5.1 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 a speed controller as shown in "Fundamental Circuit Diagram" on page 4 to control the piston speed.

5.2 Operating the Switches

5.2.1 General Cautions

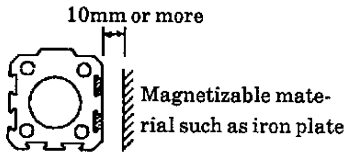
1) Magnetic environment
   Avoid usage of these switches within the area where strong magnetic field or large current exisis (such as a large magnet or spot welding equipment). Position censoring errors will be resulted when installing many cylinders with switches in parallel or magnetized piece come across the cylinder due to intervention among each other.
2) Protection of lead wire
   Pay consideration to eliminate repeating bending stress or stretching of lead wire while laying the wire. To the moving portion, use such wire of flexibility as for building a robot.
3) Service temperature
   It is unsuitable to operate it in high temperature (above 60°C) due to thermal characteristics of magnetic parts and electronic parts. Eliminate operation in such high temperature.
4) Intermediate position sensing
   Beware of unstable respondence of relay when piston speed is excessive in the event of intending actuation of switch in the way of piston stroke.

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

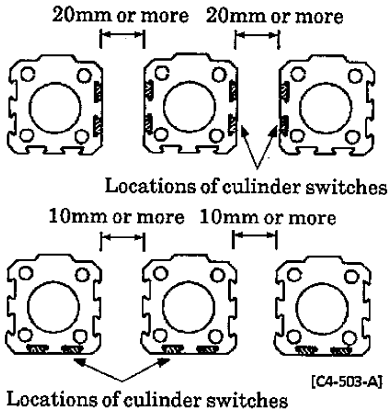
5) Shock

Carefully avoid big shock or vibration during transportation of cylinder or mounting and adjusting 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 of 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).



8) Changing switch lead wire colors

The colors of the switch lead wires have been changed, as shown in the following table, in response to the revision of the JIS standard and the subsequent revision of the NECA (Nippon Electric Controllers Association) standard.

		Before change	After change
M, S, R A, T, K V, H Series	2-wire type	White (+)	Brown (+)
		Black (−)	Blue (−)
	3-wire type	Red (+)	Brown (+)
		White (output)	Black (output)
		Black (−)	Blue (−)
T, K Series (equipped with preventive maintenance output)	3-wire type	White (+)	Brown (+)
		Yellow(preventive maintenance output)	Orange(preventive maintenance output)
		Black (−)	Blue (−)
	4-wire type	Red (+)	Brown (+)
		White (regular output)	Black (regular output)
		Yellow(preventive maintenance output)	Orange(preventive maintenance output)
		Black (−)	Blue (−)

5.2.2 Operational Cautions, Solid satate type Switch(T2, T3)

1) Connection of lead wire

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.

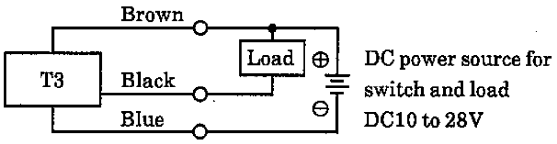


Fig.1 Basic Circuit Example (1)
(The same power source is used for switch and load.)

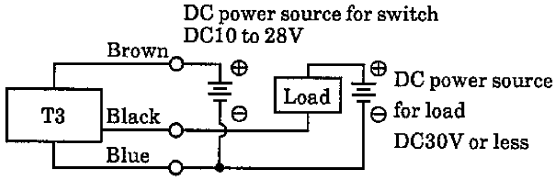


Fig.2 Basic Circuit Example (2) (Different power sources are used for switch and load.)

2) Protection of output circuit

Install some protective circuit as illustrated in Fig. 3 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. 4 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. 5 or 6 (in case of model T2) and Fig 7 (in case of model T3).

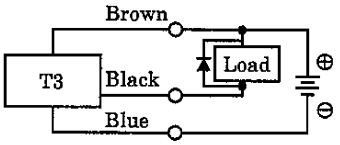


Fig.3 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)

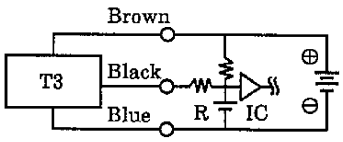


Fig.4 An example of using capacitor type load together with current regulating resister R. Comply with the following formula to figure out required R. $\frac{V}{0.10} = R\,(\Omega)$

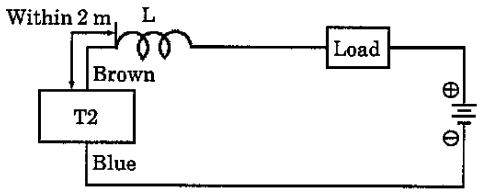


Fig.5 • Choke coil
L= a couple hundred μH to a couple mH surpassing high frequency characteristic
• Install it nearby the switch (within 2 m).

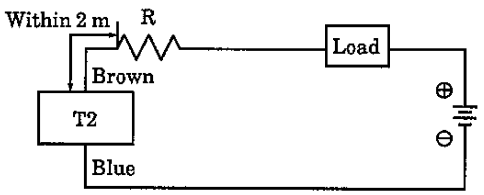


Fig.6 • Dash current restriction resister
R= As much large resister as the load circuit can afford.
• Install it nearby the switch (within 2 m).

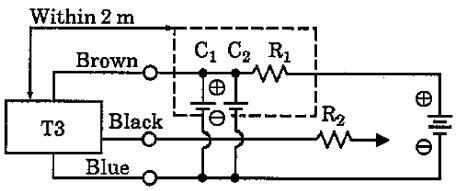


Fig.7

- Electric power noise absorptive circuit
  C_1 = 20 to 50μF electrolytic capacitor
  (withstanding 50V or more)
  C_2 = 0.01 to 0.1μF ceramic capacitor
- Dash current restriction resister
  R_1 = 20 to 30Ω
  R_2 = As much large resister as the load circuit can afford.
- Install it nearby the switch (within 2 m).

3) Connection to a programmable controller (Sequencer)

Type of connection varies depending upon the model of the programmable controller. Refer to the following Fig. 8 to 12 respectively.

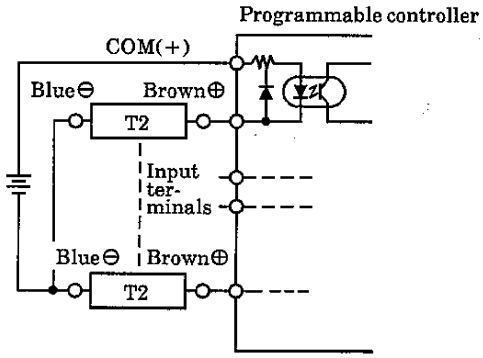


Fig.8 An example of T2 connection to source input type (an external power source)

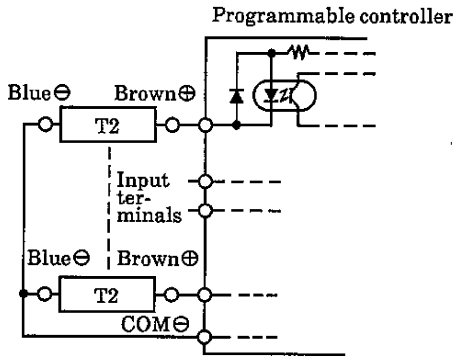


Fig.9 An example of T2 connection to source input type (an internal power source)

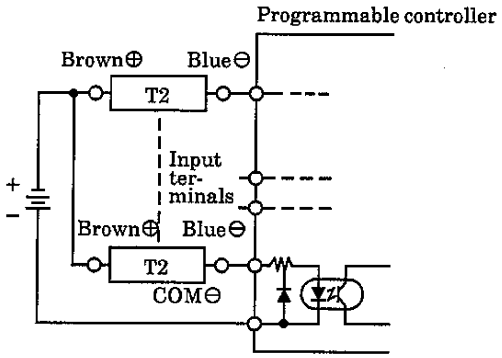


Fig.10 An example of T2 connection to sink input type

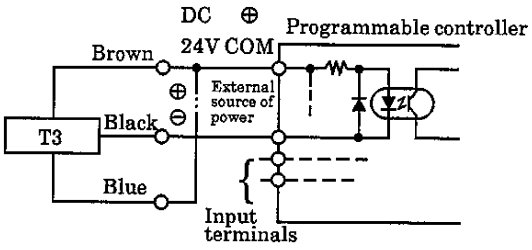


Fig.11 An example of T3 connection to source input type (an external power source)

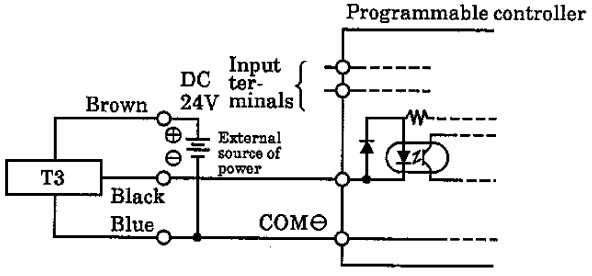


Fig.12 An example of T3 connection to source input type (an internal power source)

4) Series connection

The total voltage loss when series connected T2 switches acwireing to the number of switches connected. Therefore confirm the input specifications of programmable controllers which are connecting load. However, it may dim lamp or sometimes no lamp may be lit.

T3 switches, on the contrary, leak current is usually very minor (10μA or lower) to the extent of negligible, although leakage increases acwireing total number of switches connected. Therefore, there is no incident of dim lamp or no lit lamp

5) Magnetic environment

Avoid usage of these switches within the area where strong magnetic field or large current exists (such as a large magnet or spot welding equipment). Position censoring errors will be resulted when installing many cylinders with switch in parallel or magnetized piece come across the cylinders due to intervention among each other.

6) Protection of lead wire

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

5.2.3 Operational Cautions, Reed switch type Switch (T0, T5)

1) Connection of lead wire

Instead of connecting the wire to the power source directly, always connect to the load in series. In case of model T0 connection, pay the following precautions.

Ⓐ For DC connection, use such polarities of wires as brown ⊕ and blue ⊖. The switch still functions right with reversed polarities but lamp is not lit.

Ⓑ For AC connection to either relay or input terminal to programmable controller, Switch lamp sometimes is not lit in case when half-wave rectification is being carried out. Lamp is lit, in this occasion, when polarities of wires for switch is reversed.

2) Capacity of contact points

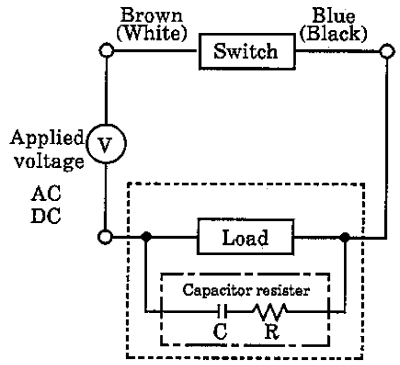
Avoid using a load exceeding the max. capacity of contact points. On the other hand, in case of T0 model, switch lamp may not be lit sometimes when current is lower than the rated current.

3) Protection of contact point

Install such a contact protection circuit as illustrated in either Fig 1 or 2, as follows, when inducing a type load such as a relay is to be used.

If the wire length exceeds the value stated in the table below, install the contact protective circuit shown in Fig. 3 or 4.

Current	Wire length
DC	100m
AC	10m

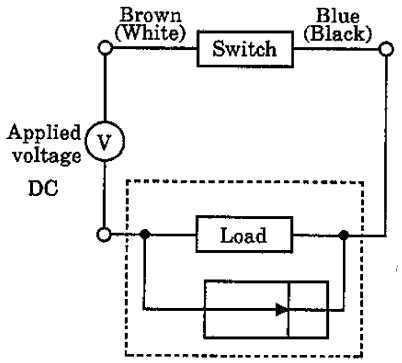


User circuit

Protective circuit (Spark absorbing circuit)

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

Fig. 1 When capacitor resister is used.

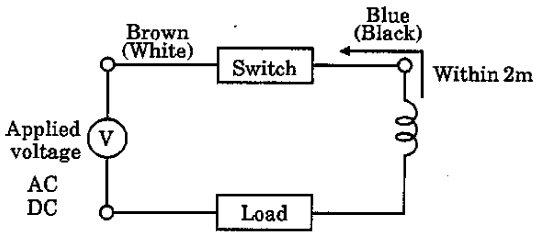


User circuit

Protective circuit

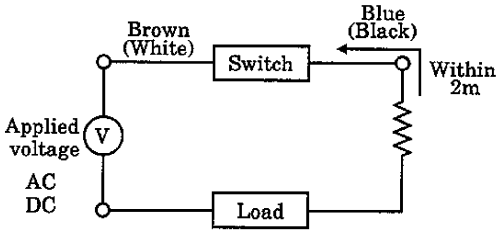
Rectifying diode, general use
Hitachi Mfg. product V06C or equivalent

Fig.2 When diode is used.



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

Fig. 3



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

Fig. 4

4) Relay

Use such products as specified below or equivalent.

OMRON Corporation	Model MY
FUJI ELECTRIC CORP	Model HH5
Matsushita Electric Works Ltd.	Model HC

5) Series 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 switches T5s. Lamp 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 T0s, sometimes, cause a dimmed lamp or complete lamp failure.

7) Magnetic environment

Avoid usage of these switches within the area where strong magnetic fields or large currents exist. (such as a large magnet or spot welding equipment) Position censoring errors will result when installing many cylinders with switch in parallel or magnetized piece come across the cylinder due to intervention among each other.

8) Protection of lead wire

Pay consideration to eliminate repeating bending stress or stretching of lead wire while laying the wire. For the moving portion, use a wire of flexibility as for building a robot.

6. MAINTENANCE

6.1 Cylinder

Trouble	Cause	Countermeasure
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 supporting system.
	Broken packing	Replace the Cylinder.
Does not function smoothly	Lowest speed than rated	Reduce the load. Consider the use of hydraulic cylinder.
	Improper or misalin\gnment of installation	Correct the installation state and / or change the supporting system.
	Exertion of transverse (lateral) load	Install a guide. Revise the installation state and / or change the supporting system.
	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. Install cushion device with more efficiency. (External cushion)
	Exertion of transverse load	Install a guide. Revise the installation state and / or change the supporting system.
Lock cannot be released	No pressure applied to the lock mechanism.	Correct the control circuit.
Lock cannot be activated	Broken spring of the lock metal.	Replace the Cylinder.
	Pressure applied to the lock mechanism.	Correct the control circuit.
	Incorrect selection of the lock direction.	Select the correct lock direction.

Note : Never attempt to disassemble the cylinder. Doing so may cause a fatal accident.

6.2 Switch

Trouble	Possible cause	Countermeasure
Lamp 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
	Damage to the lamp	Replace the lamp
	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
	Incorrect direction of switch mounting	Correct the direction of the switch
	Relay is unable to respond properly within the piston stroke	Adjust speed slow Replace the relay
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch
Switch does not return	Piston is not moving	Correct to have 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
	Improper ambient temperature	Adjust the ambient temperature within the range of −10 to 60°C
	Existence of a foreign magnetic field	Shield the magnetic field
	Inadequate incoming signal	Review the external signal circuit and remove the causes

7. HOW TO ORDER

7.1 Product Type No. Marking

● Cylinder without switch

USSD-K — 20 — 20 — F — N

● Cylinder with switch

USSD-KL — 20 — 20 — F — T0H — D — N

ⓐ ⓑ ⓒ ⓓ ⓔ ⓕ ⓖ

ⓐ Model		ⓑ Tube bore			
USSD	Double acting, Single rod	20	ϕ20	40	ϕ40
USSD-L	Double acting, Single rod, with switch	25	ϕ25	50	ϕ50
USSD-K	Double acting, Single rod, high load type	32	ϕ32	63	ϕ63
USSD-KL	Double acting, Single rod, high load type with switch				

ⓒ Standard stroke		5	10	15	20	25	30	40	50	60	70	80	90	100	Maximum stroke
USSD USSD-L	ϕ20	○	○	○	○	○	○								30
	ϕ25 to ϕ50	○	○	○	○	○	○	○	○						50
	ϕ63	○	○		○		○	○	○						
USSD-K USSD-KL	ϕ20	○	○	○	○	○	○	○	○						200 (Note 1)
	ϕ25 to ϕ50		○	○	○	○	○	○	○	○	○	○	○	○	300 (Note 1)
	ϕ63		○		○		○	○	○	○	○	○	○	○	

※ : It is possible to manufacture a product in units of 10 strokes when the number of strokes is in a range, from the standard stroke to the maximum stroke.

ⓓ Lock direction		ⓔ Switch model code				ⓕ Qty of switch		ⓖ Option	
F	Forward locking type	Lead wire straight type	Lead wire L-shaped type			R	1 ea., Rod end	N	Male thread lod end
B	Backward locking type					H	1 ea., Head end		
						D	2 ea.		
		T0H※	T0V※	Reed switch type	2-wire				
		T5H※	T5V※						
		T2H※	T2V※	Solid state type	3-wire				
		T3H※	T3V※						
		T2YH※	T2YV※	Bi-colors solid type	2-wire				
		T3YH※	T3YV※		3-wire				
		T2YFH※	T2YFV※	Preventive maintenance solid state	3-wire				
		T3YFH※	T3YFV※		4-wire				
		T2YMH※	T2YMV※		3-wire				
		T3YMH※	T3YMV※		4-wire				

※ Lead cord length	
No code	1m (Standard)
3	3m (Optional)
5	5m (Optional)

7.2 Individual Switch Model Coding

● Switch main body only

SW — T0H※

ⓔ

Switch model code