Discontinue

CKD

SM－273063－A

INSTRUCTION MANUAL

CLAMP CYLINDER with Fall Prevention Mechanism

UCAC

- 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

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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:

Installation

⚠ WARNING

- When cylinder is fixed and rod end is connected with pin joint:
  In case the load acting direction is not parallel with the rod axial center, the rod and tube may get entangled causing seizure, etc. Hence, make sure that the rod axial center and the load transfer direction are aligned to each other.
- Tighten the lock and connection parts of the cylinder firmly so no parts become loose. In particular, if the cylinder is activated frequently or operated in a place where a large vibration exists, tighten the lock and joint parts securely.

P1

⚠ CAUTION

- Do not give any damage or dent to the sliding part of the piston rod.
- Doing so may cause the packing to be damaged, resulting in air leak.
- Carefully avoid other object from hitting the tube. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.

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OPERATION

⚠ WARNING

- Do not apply the rotational force (torque) to the rod when the lock is activated. Doing so may cause the holding force to lower, resulting in personal injury. Additionally, operate the product in a mechanism that the rod does not rotate.

P7

⚠ CAUTION

- When the cylinder is locked, it may fall approximately 1 mm (piston rod movement) due to limitations on its structure.
- If there is no air pressure when the product is operated with it mounted in the vertical direction, the holding force may cease when operating the manual release, causing the rod to move (lower) by its own weight.

  If such trouble can be foreseen, make the following preparations before operating the manual release to ensure the safety.

  (1) Move the load to its lower end.

  (2) Put the stopper on the load.

P7

⚠ WARNING

- Supply the pressure to the port B so that no load is applied to the lock mechanism, and then release the lock. When the pressure is supplied to the port A with the piston locked after both ports A and B have been exhausted, the lock may not be released or the rod may jump up even though the lock is released, causing the operator to be in danger.
- If the cylinder is held with the pressure applied to the lock mechanism, the lock may be released. To avoid such troubles, a 3-position closed center or 3-position P, A, B connection solenoid valve must not be used.

P9

⚠ CAUTION

- If a back pressure is applied to the cylinder when it is locked, the lock may be released. Therefore, a single type or manifold individual ex-haust type solenoid valve mast be used.
- In case common exhaust type solenoid valves are used, adopt such control system that prevents locking part from having exhaust pressure from other pneumatic circuits, when the cylinder is in locking operation without pressure.
  Shut off the air source for maintenance work.
- Do not operate the cylinder with the bypass tube removed. Doing so may cause the lock response to be delayed.

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UCAC
SELTOP CYLINDER
Manual No. SM-273063-A

NOTE : Letters & figures enclosed within Gothic style bracket (examples such as [C2-4PP07] · [V2-503-B] etc.) are editorial symbols being unrelated with contents of the book.

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1. UNPACKING

1) Make sure that the type No. on the nameplate of the delivered Clamp 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 range for this cylinder is 5 to 60°C.
2) Use cylinder with bellows over its rod within the area with much dust.
3) When cylinder is fixed and rod end is guided:
   In case the piston rod of cylinder and the load are misaligned, the bushes and packings of the cylinder are extremely worn out. Hence, connect them with CKD floating connector (spherical bearing).

⚠ WARNING

- When cylinder is fixed and rod end is connected with pin joint:
  In case the load acting direction is not parallel with the rod axial center, the rod and tube may get entangled causing seizure, etc. Hence, make sure that the rod axial center and the load transfer direction are aligned to each other.
- Tighten the lock and connection parts of the cylinder firmly so no parts become loose. In particular, if the cylinder is activated frequently or operated in a place where a large vibration exists, tighten the lock and joint parts securely.

⚠ CAUTION

- Do not give any damage or dent to the sliding part of the piston rod.
- Doing so may cause the packing to be damaged, resulting in air leak.
- Carefully avoid other object from hitting the tube. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.

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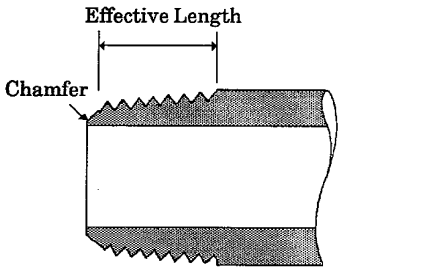
2.2 Piping

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 an effective sectional area which is needed for the cylinder to drive at the specified speed.

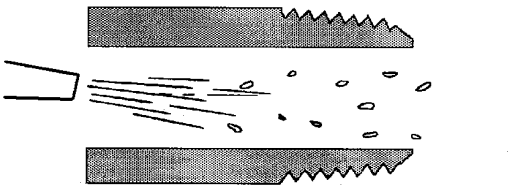
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust and foreign substances in the drain of the pipe.

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



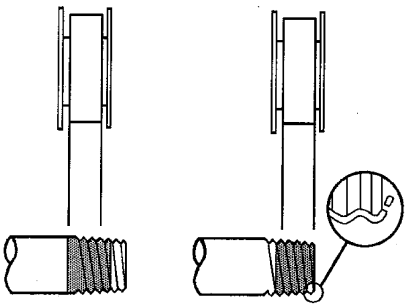
[C0-400-A]

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

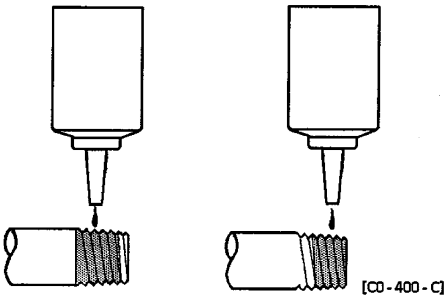

[C0-400-B]

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

● Seal Tape


(Right) (False)

● Sealant (Paste or liquid)


(Right) (False)

[C0-400-C]

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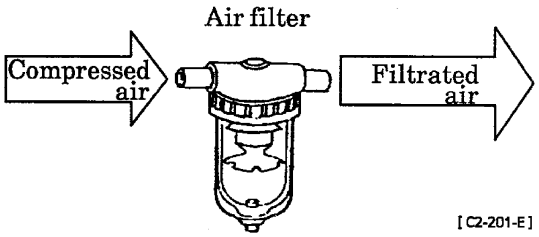
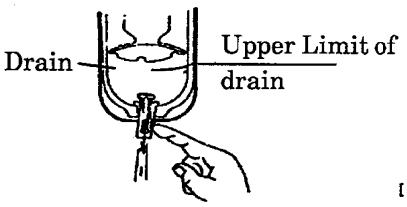
2.3 Fluid

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 5μm or less), flow rate and its mounting location (as nearest to the directional control valve as possible).



[C2-201-E]



[C2-201-F]

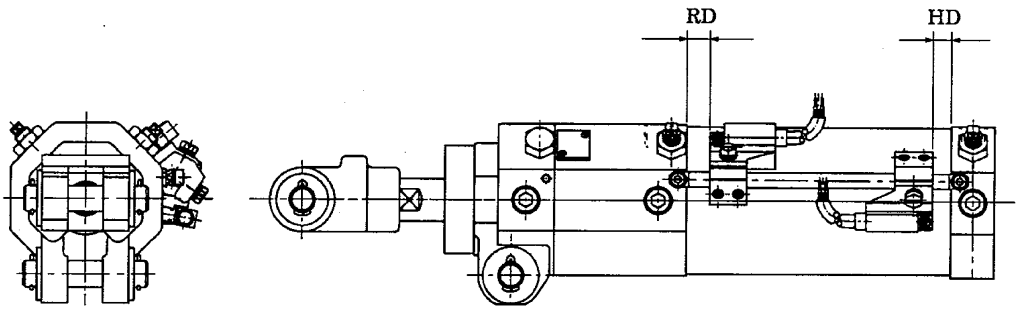
2) Be sure to drain out the accumulation in the filter periodically.

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 Location of mounting Switch

1) Location



(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 highest sensitivity.(See Table 1.)

Discontinue

(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 shoule be located on both side of piston. The intermediate spot between those points is of the highest sensitivity and where the switch is supposed to be installed.

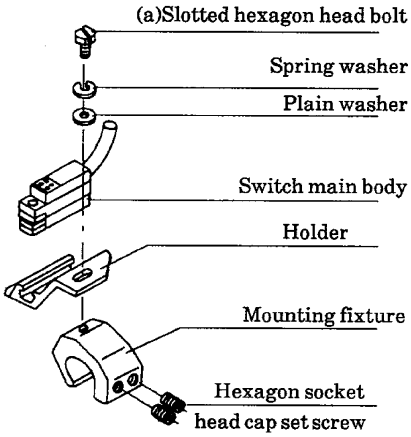
(3) Mounting and adjusting the T-type switch

- Mounting the T-type switch

(a) Pass the spring washer and plain washer through the slotted hexagon head bolt, and then set the switch holder.

(b) Press-fit the mounting fixture into the tie rod of the cylinder. Set the mounting fixture to a desired position and tighten the hexagon socket head cap set screws with a tightening torque of 2.5 - 3.0 N·m.

(c) Finally, adjust the position of the switch main body and tighten the slotted hexagon head bolt with a tightening torque of 1.5 - 1.9 N·m



- Adjusting the T-type switch

(1) Loosen all the hexagon socket head cap set screws. Move the switch together with the mounting fixture to a desired position and tighten the hexagon socket head cap set screws with a tightening torque of 2.5 - 3.0 N·m.

Discontinue

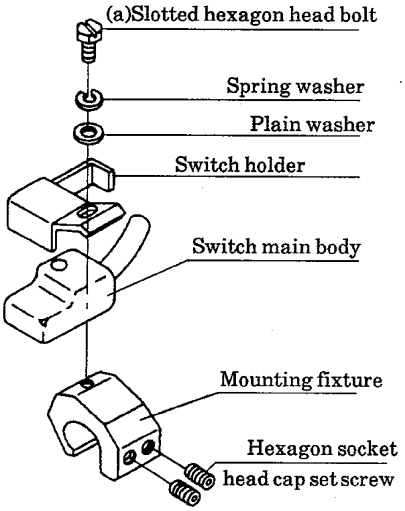
(4) Mounting and adjusting the H-type switch

- Mounting the H-type switch

(a) Pass the spring washer and plain washer through the slotted hexagon head bolt, and then set the switch holder.

(b) Press-fit the mounting fixture into the tie rod of the cylinder. Set the mounting fixture to a desired position and tighten the hexagon socket head cap set screws with a tightening torque of 2.5 - 3.0 N·m.

(c) Finally, adjust the position of the switch main body and tighten the slotted hexagon head bolt with a tightening torque of 1.5 - 1.9 N·m.



- Adjusting the H-type switch

(1) Loosen all the hexagon socket head cap set screws. Move the switch together with the mounting fixture to a desired position and tighten the hexagon socket head cap set screws with a tightening torque of 2.5 - 3.0 N·m.

2) Operating range

The range where switch turns on first and turns off as the piston moves along its stroke is called operating range.

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.

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3) Hysteresis

The distance is called hysteresis between the positions where switch turns ON as piston slides long and where switch turns OFF due to reversing stroke of piston.

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

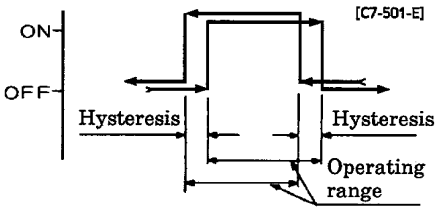

Table 1 (mm)

Model No.	Tube bore	Solid state type switch							
		Best operating position				Operating range		Hysteresis	
		HD on head side		RD on rod side					
		1-color type	2-color type	1-color type	2-color type	1-color type	2-color type	1-color type	2-color type
● 1-color/2-color indication type (T2H/V, T3H/V, T0H/V, T5H/V)									
UCAC	ϕ50	8.5		10.5		2.5 to 6.0	5.9 to 6.8	1.5 or less	1.0 or less
	ϕ63					2.8 to 6.5	6.1 to 6.8		
● Compact critical magnetic proof (H0)									
UCAC	ϕ50	—		—		—	—	—	—
	ϕ63								
● Critical magnetic proof (T2YD)									
UCAC	ϕ50	8.5		10.5		6.5 to 9.5		1.5 or less	
	ϕ63								
UCAC	ϕ50					7 to 10			
	ϕ63								

Model No.	Tube bore	Read switch type switch			
		Best operating position		Operating range	Hysteresis
		HD	RD		
● 1-color/2-color indication type (T2H/V, T3H/V, T0H/V, T5H/V)					
UCAC	ϕ50	8.5	10.5	7.8 to 11.3	3 or less
	ϕ63			8.2 to 11.4	
● Compact critical magnetic proof (H0)					
UCAC	ϕ50	4	6	5 to 8	3 or less
	ϕ63			5 to 8.5	
● Critical magnetic proof (T2YD)					
UCAC	ϕ50	—	—	—	—
	ϕ63				
UCAC	ϕ50				
	ϕ63				

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3. OPERATION

3.1 Cautions for handling

1) This product is a cylinder with the fall prevention mechanism (holding of cylinder stop state). Emergency stop (stop from the cylinder activation state) cannot be performed.

⚠ WARNING

- Do not apply the rotational force (torque) to the rod when the lock is activated. Doing so may cause the holding force to lower, resulting in personal injury. Additionally, operate the product in a mechanism that the rod does not rotate.

⚠ CAUTION

- When the cylinder is locked, it may fall approximately 1 mm (piston rod movement) due to limitations on its structure.
- If there is no air pressure when the product is operated with it mounted in the vertical direction, the holding force may cease when operating the manual release, causing the rod to move (lower) by its own weight.
  If such trouble can be foreseen, make the following preparations before operating the manual release to ensure the safety.
  (1) Move the load to its lower end.
  (2) Put the stopper on the load.

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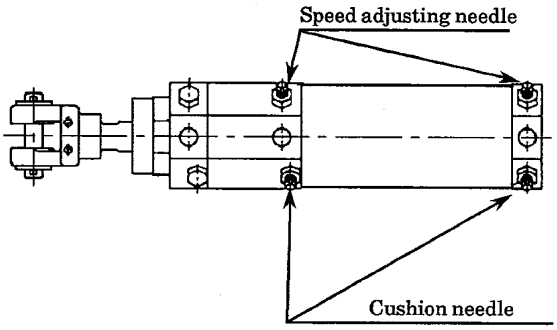
3.2 Tolerable energy absorption

1) The supply pressure to the cylinder is specified in section 6.1, Specifications. Always operate the cylinder within this pressure range.
2) To adjust the piston speed, mount the speed controller as shown in the basic circuit diagram on page 9 and gradually open the speed controller from its close position until the piston speed enters its specifications.
3) The speed and cushion activation have been adjusted with no-load at delivery. To change the speed and cushion activation corresponding to the load at site, adjust the speed and cushion adjusting needles.

As the needle is tightened (turned clockwise), the activation becomes stronger. After the adjusting needles have been adjusted correctly, tighten the needle nuts firmly to set the adjusting needles.



$$\text{Kinetic energy (J)} = \frac{1}{2} \times \text{Weight (kg)} \times \{\text{Speed (m/s)}\}^2$$

Table 2 Cushion characteristic table

Tube bore (mm)	Air cushion	
	Effective cushion length (mm)	Tolerable energy absorption (J)
ϕ50	13.5	6.54
ϕ63	13.5	11.63

4) If this product is used to operate a unit having an excessive inertia, this may cause the cylinder main body to be damaged or malfunction. Always operate the product within its allowable range. Additionally, if the product is operated beyond the allowable range, installation of a separate shock absorber must be taken into consideration.

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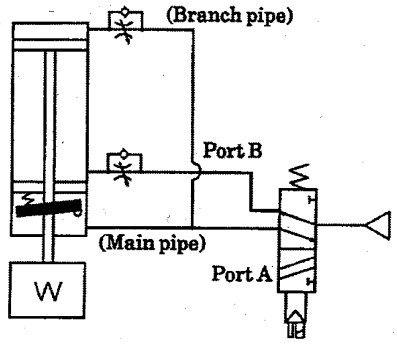
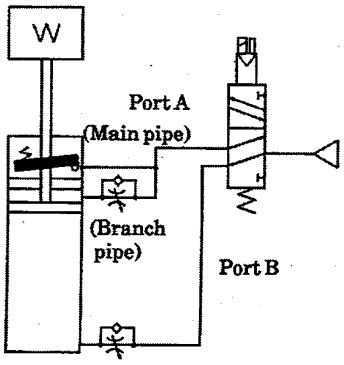
3.3 Basic circuit diagram

Forward locking type (F type)
(Downward load)



Backward locking type (B type)
(Upward load)



⚠ WARNING

- Supply the pressure to the port B so that no load is applied to the lock mechanism, and then release the lock. When the pressure is supplied to the port A with the piston locked after both ports A and B have been exhausted, the lock may not be released or the rod may jump up even though the lock is released, causing the operator to be in danger.
- If the cylinder is held with the pressure applied to the lock mechanism, the lock may be released. To avoid such troubles, a 3-position closed center or 3-position P, A, B connection solenoid valve must not be used.

⚠ CAUTION

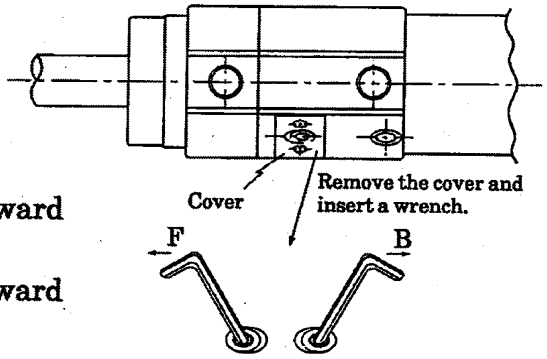
- If a back pressure is applied to the cylinder when it is locked, the lock may be released. Therefore, a single type or manifold individual ex-haust type solenoid valve mast be used.
- In case common exhaust type solenoid valves are used, adopt such control system that prevents locking part from having exhaust pressure from other pneumatic circuits, when the cylinder is in locking operation without pressure.
  Shut off the air source for maintenance work.
- Do not operate the cylinder with the bypass tube removed. Doing so may cause the lock response to be delayed.

3.4 Performing the manual release

Remove the cover and insert a 3 mm-hexagon wrench into the release hole and move it in the direction indicated by an arrow mark ←.

For F-type, move the wrench toward the rod side.

For B-type, move the wrench toward the head side.



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3.5 Operating the Cylinder

3.5.1 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). Use the critical magnetic proof switch (H0, T2YD) if the strong magnetic field or large current (large magnet or spot welding machine) exists around the installation place. 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 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) 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.

5) Shock

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

6) Switch lead wire colors

T, H Series	2-wire type	Brown (+) Blue (−)
	3-wire type	Brown (+) Black (output) Blue (−)
T Series (With preventive maintenance output)	3-wire type	Brown (+) Orange(preventive maintenance output) Blue (−)
	4-wire type	Brown (+) Black (regular output) Orange(preventive maintenance output) Blue (−)

Discontinue

3.5.2 Operational Cautions, Non contact type switch (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.

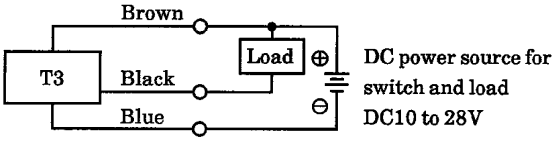

Fig.1 Basic Circuit Example (1)
(The same power source is used for switch and load.)

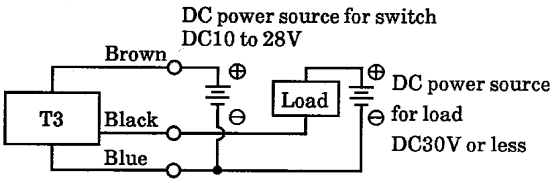

Fig.2 Basic Circuit Example (2) (Different power sources are used for switch and load.)

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).

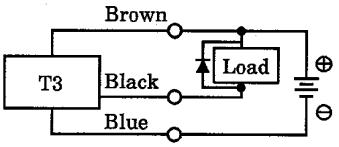

Fig.3 An example of using inducing load together with surge absorptive element (diode). (Hitachi Mfg. made diode V06C or equivalent is recommended.)

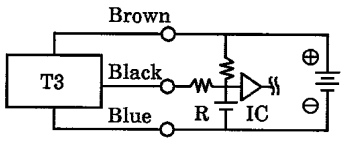

Fig.4 An example of using capacitor type load together with current regulating resister R. Comply with the following formula to figure out required R. $\frac{V}{0.10} = R(\Omega)$

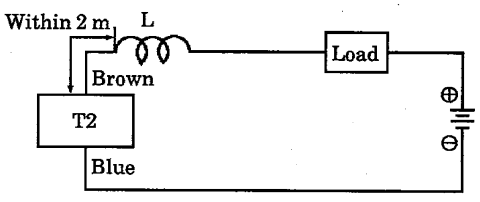

Fig.5 • Choke coil
L= a couple hundred μH to a couple mH surpassing high frequency characteristic
• Install it nearby the switch (within 2 m).

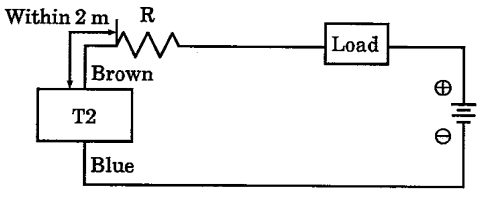

Fig.6 • Dash current restriction resister
R= As much large resister as the load circuit can afford.
• Install it nearby the switch (within 2 m).

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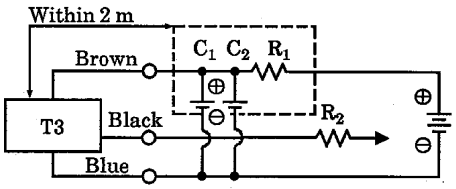


Fig.7

- Electric power noise absorptive circuit
  C_1 = 20 to 50 μF electrolytic capacitor
  (withstanding 50V or more)
  C_2 = 0.01 to 0.1 μF ceramic capacitor
- Dash current restriction resister
  R_1 = 20 to 30 Ω
  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.

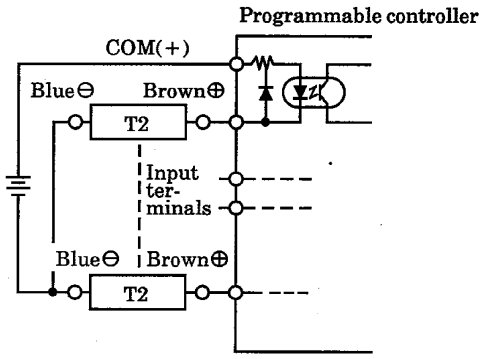


Fig.8 An example of T2 connection to source input type (an external power source)

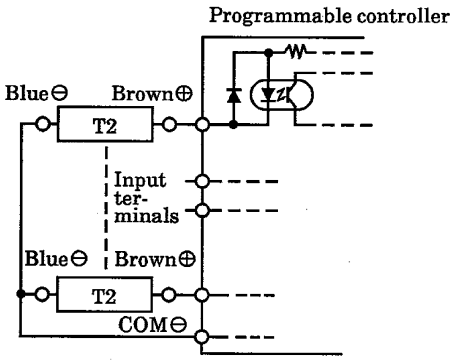


Fig.9 An example of T2 connection to source input type (an internal power source)

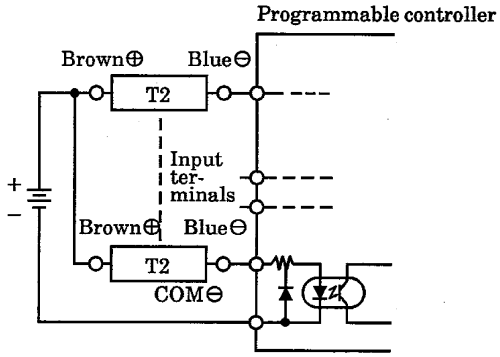


Fig.10 An example of T2 connection to sink input type

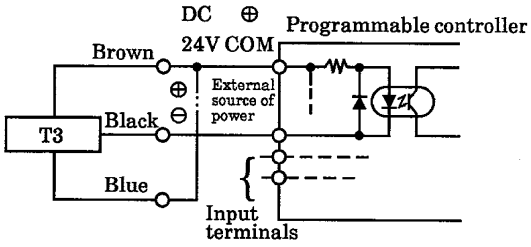


Fig.11 An example of T3 connection to source input type (an external power source)

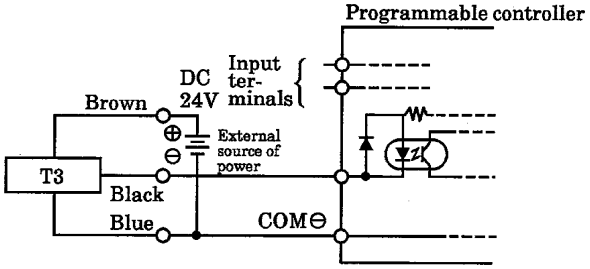


Fig.12 An example of T3 connection to source input type (an internal power source)

Discontinue

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 lamp may exist.

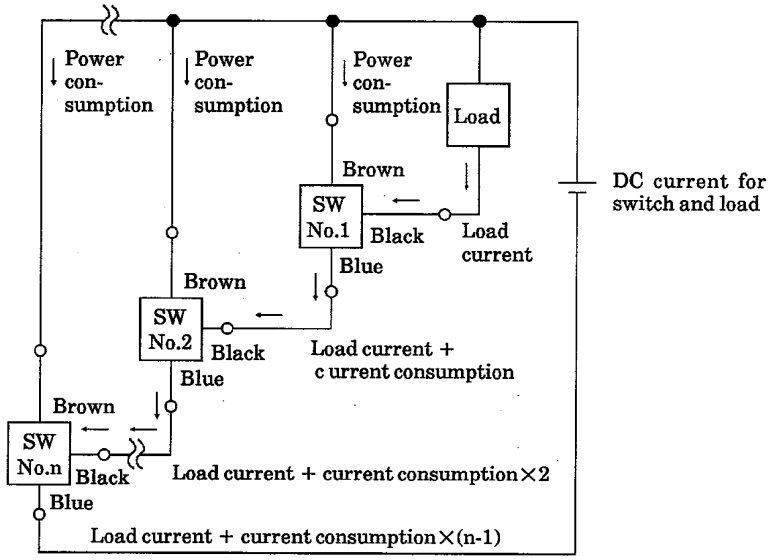
T3 switches hardly ever leak. When less than 10μA, then leakage may occur. Usually dimming and failure of the lamp do not occur.

5) Serial connection

When two or more T2 switches are connected in series, the voltage drop is equal to the sum of the voltage drops in all of the connected switches. The voltage applied to the load is the result of subtracting the total voltage drop from the power source voltage. It is necessary to determine the number of switches to be connected based on the specifications of the load.

When two or more T3 switches are connected in series, the voltage drop is equal to the sum of the voltage drops in all the connected switches as in the case of the T2 switches. The current flowing through the switches is equivalent to the sum of the current consumption of the connected switches as shown in the figure below and the load current. Determine the number of switches to be connected based on the specifications of the load so that the current will not exceed the maximum load current.

T3 switch



Discontinue

3.5.3 Operational Cautions, Contact type switch (T0, T5)

1) Connection of lead cord

Instead of connecting the cord 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 cords as white ⊕ and black ⊖. 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 cords for switch is reversed.

2) Capacity of contact points

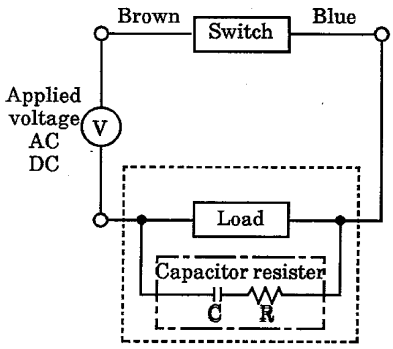
Avoid using a load exceeding the max. capacity of contact points. On the other hand, in case of T0 model, switch lamp may not be lit sometimes when current is lower than the rated current.

3) Protection of contact point

Install such a protective circuit as illustrated in either Fig 13 or 14, as follows, when inducing a type load such as a relay is to be used.

Provide a contact protection circuit as shown in Figs. 15 and 16 if the wiring length exceeds the length shown in below table.

Voltage	Wire length
DC	100m
AC	10m

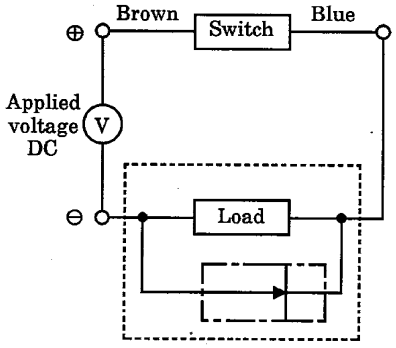


User circuit

Protective circuit (Spark absorbing circuit)

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

Fig.13 When capacitor resister is used.



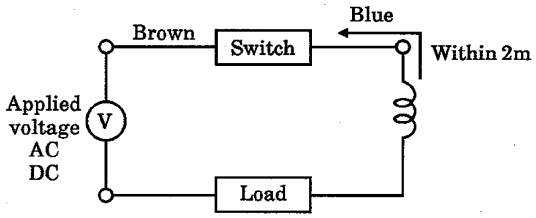
User circuit

Protective circuit

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

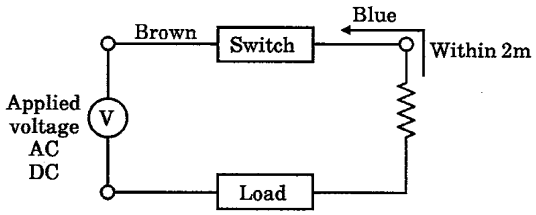
Fig.14 When diode is used.

Discontinue



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

Fig.15



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

Fig.16

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) 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.

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 T0, sometimes, cause a dimmed lamp or complete lamp failure.

Discontinue

3.5.4 Cautions for high magnetic field switch (H0)

- Welding current proof performance

1) Switch

The cylinder switch uses a lead switch to detect the position.

Lead switch senses magnetic flux in direction along axis of cylinder. There is, therefore, a risk of wrong performance when magnetic flux penetrates the switch in the direction of cylinder axis. For instance, as for current on the cable of spot welding equipment, magnetic flux concentric to the axis of current is generated. (Fig. 17)

Accordingly, there are much potential of wrong actuation of switch when cable runs aside or above of switch. (Fig. 18)

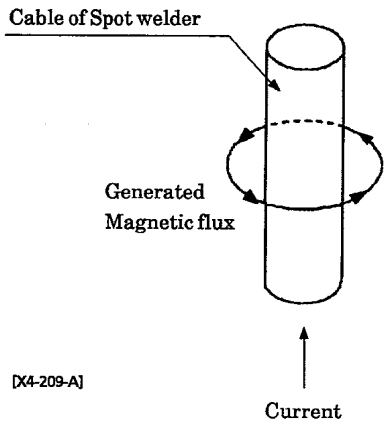


Fig. 17 Ampere's right screw rule

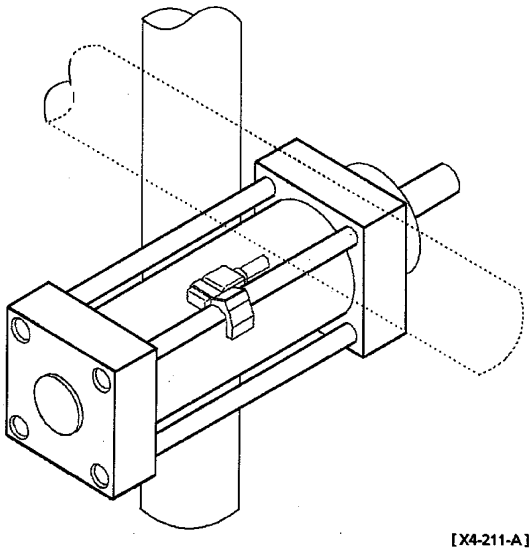


Fig. 18 Relative location (1) of Switch and Welder cable

Discontinue

It is, therefore, advisable to place Cable and Switch apart more distance than shown in the Graph, right. (Fig. 19)

This graph (Fig. 19) is, however, a characteristic with provision of relative positioning of two items as per Illustrated in Fig. 20.

The followings are, therefore, our suggestions.

① Mount Switch to keep its cen-ter apart of that of Magnet within ±1mm.

② Minimum stroke enabling to sense is 25mm.

③ Design the system as per Illus-trated (Fig. 20), in case of be-ing unable to avoid effect of ambient magnetic field during the course of piston stroke.

<In case there are two cables.>

There are likely multiple effect of magnetic flux due to geometric effect when both cables are coincidentally charged current simultaneously.

In case the location of switch falls within the circle of cable, it is almost unable to expect correct performance of switch although it fluctuates depending upon diameter of cable loop.

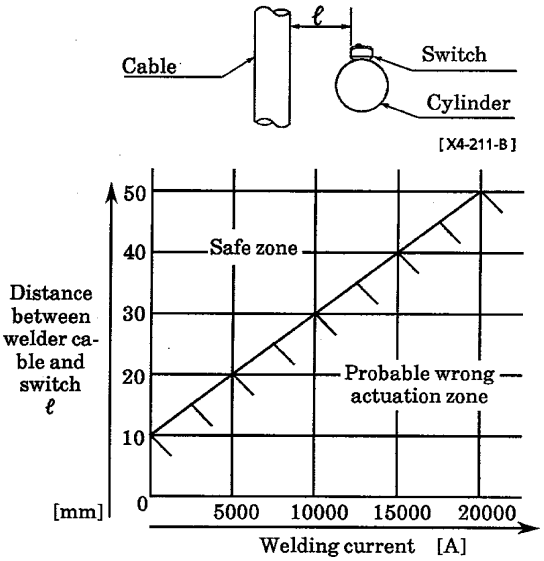


Fig. 19 Spot welding current - erroneous operation distance characteristic
(Safe zone including switch ON and OFF)

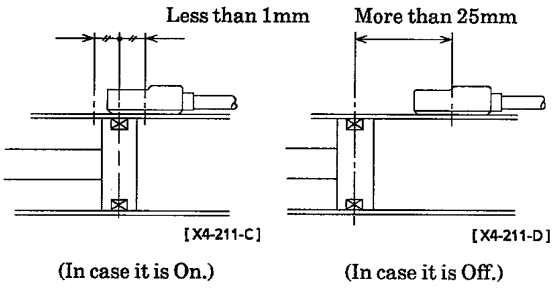


Fig. 20 Relative positioning between Switch and Piston magnet

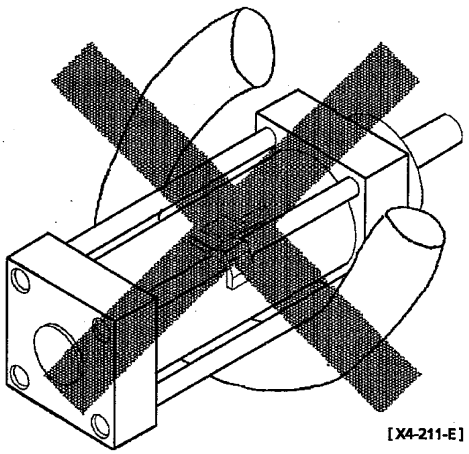


Fig. 21 Relative position (2) between switch and welding cable

Discontinue

2) Cylinder (Magnet)

A magnet is built in the cylinder piston. The piston of model H series has magnet sintered with rare earth built-in whereas the normal cylinder has normal magnet sintered with ferrite. Therefore, beware of that there are no interchangeability between those two series.

Magnet sintered with rare earth has following features, such as;

- Damping magnetic force caused by AC hardly takes place.
- Retainable fairly stabled magnetic force against thermal fluctuation.
- Powerful magnetic flux is expectable.

Magnetic damping will not take place up to 15,000A even the case of cable contacting with cylinder. Place cable apart from cylinder with the distance shown in Graph (Fig. 22) in the event the current is to exceed 15,000A.

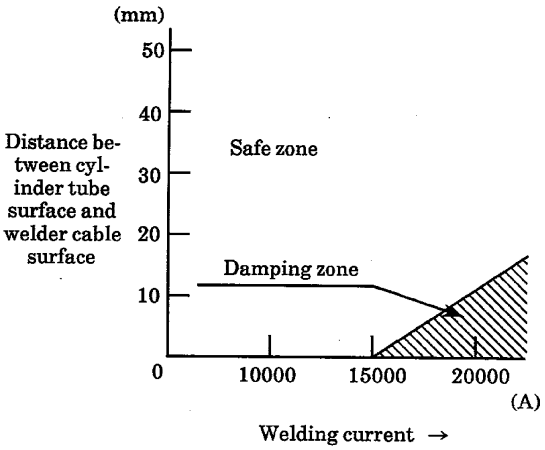


Fig. 22 Spot welding current - Piston magnet characteristic

It is still advisable to avoid direct contact of cylinder with cable because the aging of cylinder packings may progress remarkably.

※Remarks : High magnetic field switch is not interchangeable with normal type switch. Normal switch mounted on High magnetic field switch type cylinder may cause double actuations or sometimes triple actuations. High magnetic field switch mounted on normal cylinder, on the contrary, will not be able to be actuated.

3) Sputter proof characteristic

The switch body and lead wire will not flare nor melt in sumoundings where weld sputterings splash, because the switch body uses metal and self distinguish resin (UL94-V0), and the lead wire uses non flammable.

Discontinue

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

ⓐ Check the bolts and nuts fitting the piston rod end fittings and supporting fittings for slackening.

ⓑ Check to see that the cylinder operates smoothly.

ⓒ Check any change of the piston speed and cycle time.

ⓓ Check for internal and/or external leakage.

ⓔ Check the piston rod for flaw (scratch) and deformation.

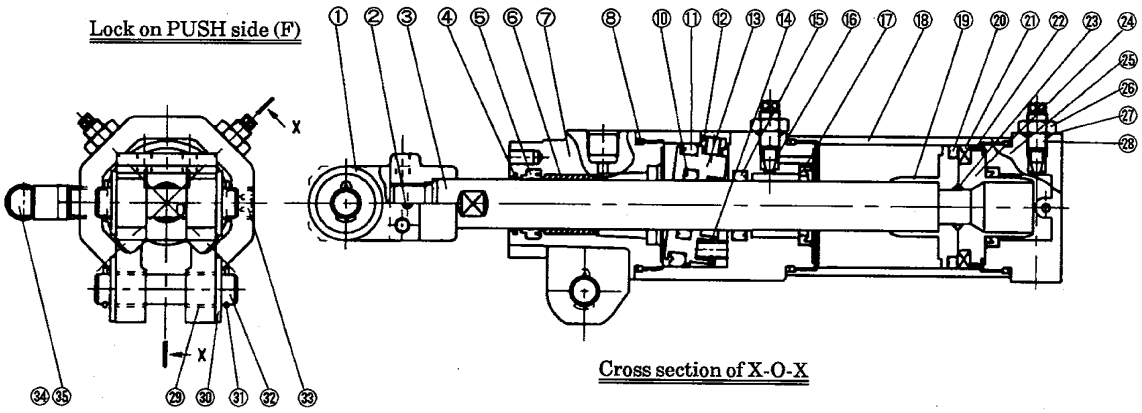
ⓕ Check the stroke for abnormality.

Carry out additional tightening or disassembling cylinder for correction as required, should there be any slackening abnormality.

4.2 Internal structure drawings and Expendable parts list

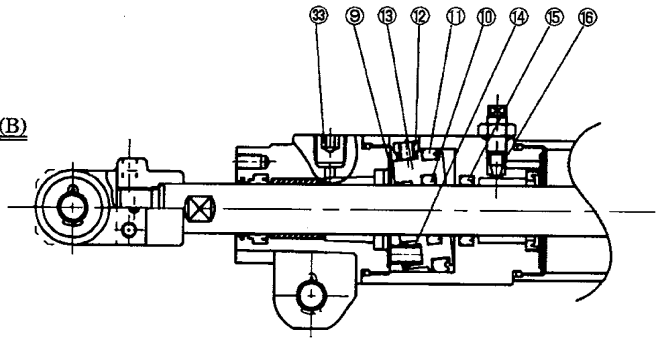
1) Internal structure drawings and expendable parts list of double-acting single rod type cylinder

Lock on PUSH side (F)



Cross section of X-O-X

Lock on PULL side (B)



Cross section of X-O-X

Discontinue

No.	Parts name	Material	Qty	Remarks
1	Rod clevis	FCD400	1	
2	Spring pin	SK5	1	
3	Piston rod	S45C	1	
4	Metallic scraper	C5191W	1	MDH
5	Rod packing	NBR	1	PDU
6	Metal	Copper	1	
7	Rod cover	ADC12	1	
8	Cylinder gasket	NBR	3	
9	Washer	SPC	1	This part is not necessary when using the lock (F) on the PUSH side.
10	Lock rod packing	NBR	1	
11	Lock piston packing	NBR	1	
12	Fulcrum nut	SS400	1	
13	Lock metal	FCD450	1	
14	Lock spring	SWP-B	1	
15	Rod packing	NBR	1	
16	Intermediate cover	A6063	1	
17	Cushion packing	SPCC, U	2	
18	Cylinder tube	A6063	1	
19	Piston(R)	ADC12	1	
20	Piston packing	NBR	1	PSD
21	Piston magnet	DPM	1	
22	Wear ring	POM	1	
23	Piston gasket	NBR	1	
24	Piston(H)	ADC12	1	
25	Head cover	ADC12	1	
26	Hex. nut	C3604	4	
27	Needle gasket	NBR	4	
28	Needle	C3604	4	
29	Bushing for clevis	PTFE	2	
30	Plain washer	SPC	4	
31	Split pin	SWRM	4	
32	Clevis pin	SGD400	2	
33	Sunk plug with sealant	SS400	5(7)	The value in ( ) shows the required quantity when using the lock (B) on the PULL side.
34	Bypass tube		1	This part is not necessary when using the lock (B) on the PULL side.
35	Push-in joint		2	This part is not necessary when using the lock (B) on the PULL side.

Discontinue

5. HOW TO ORDER

5.1 Product model coding (universal)

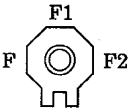
• Without switch

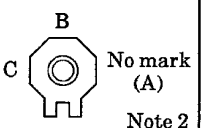
UCAC – a – b c – d e – f ——————— j

• With switch

UCAC – a – b c – d e – f – g – h i – j

ⓐ Clevis width (mm) Note 1		ⓑ Tube bore(mm)		ⓒ Cushion		ⓓ Stroke (mm)	
A	16.5	50	ϕ50	No code	With cushion at both sides	50	50
B	19.5	63	ϕ63	R	With cushion at rod side	75	75
AL	16.5 (Axial foot type)			H	With cushion at head side	100	100
BL	19.5 (Axial foot type)			N	Without cushion	125	125
						150	150

ⓔ Speed adjusting needle		ⓕ Locking direction and bypass tube		
No code	With speed adjusting needle at both sides	F	Forward locking (bypass tube position F, port position F1)	
R	With speed adjusting needle at rod side	F1	Forward locking (bypass tube position F1, port position F2)	
H	With speed adjusting needle at head side	F2	Forward locking (bypass tube position F2, port position F1)	
N	Without speed adjusting needle	B	Backward locking	

ⓖ Switch model				ⓗ Number of switches		ⓘ Switch mounting position	
Lead wire straight type	Lead wire L-shaped type			R	1 ea.,Rod end	No code	
				H	1 ea.,Head end		
				D	2 ea.	B	
T0H※	T0V※	Reed switch type	2-wire			C	
T5H※	T5V※						
T2H※	T2V※	Solid state type	3-wire				
T3H※	T3V※						
T2YH※	T2YV※	bi-colrs indication, Solid state type	2-wire				
T3YH※	T3YV※						

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

※ mark specifies the length of lead cord.

ⓙ Accessories Note 3			
※ Y	Rod clevis (FCD400)		Standard
※Y1	Rod clevis (SS400)		
No code	Without bracket		
I	Rod eye(SS400)		Optional
K	Bellows (Neoplain)		
N	Piston rod projection length is changed with the screw.		
D	With dog	Limit switch mounting bracket	
D1	Without dog		
Q	Toggle bracket		

Note 1 : Clevis pin, split pin, and plain washer are supplied with accessories A, B, AL, and BL. The clevis width is the same as the width of the rod clevis.

Note 2 : The switch cannot be mounted on the surface where the bypass tube is mounted.

Note 3 : Pin, split pin, and plain washer are supplied with accessories ※Y and ※Y1.

Discontinue

5
HOW TO ORDER

5.2 Product model coding (Critical Magnetic Proof)

• Without switch

UCAC-L2 — a — b c — d e — f ——————— j

• With switch

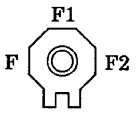
UCAC-L2 — a — b c — d e — f — g — h i — j

ⓐ Clevis width (mm) Note 1		ⓑ Tube bore(mm)	
A	16.5	50	ϕ50
B	19.5	63	ϕ63
AL	16.5 (Axial foot type)		
BL	19.5 (Axial foot type)		

ⓒ Cushion		ⓓ Stroke (mm)	
No code	With cushion at both sides	50	50
R	With cushion at rod side	75	75
H	With cushion at head side	100	100
N	Without cushion	125	125
		150	150

ⓔ Speed adjusting needle	
No code	With cushion at both sides
R	With speed adjusting needle at rod side
H	With speed adjusting needle at head side
N	Without speed adjusting needle

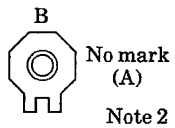
ⓕ Locking direction and bypass tube	
F	Forward locking (bypass tube position F, port position F1)
F1	Forward locking (bypass tube position F1, port position F2)
F2	Forward locking (bypass tube position F2, port position F1)
B	Backward locking



ⓖ Switch model		
H0※	Critical magnetic proof Reed switch type	2-wire
T2YD※	Critical magnetic proof Solid state type switch	2-wire
T2YDT※		

ⓗ Number of switches	
R	1 ea.,Rod end
H	1 ea.,Head end
D	2 ea.

ⓘ Switch mounting position	
No code	No mark (A)
B	
C	



Note 2

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

※ mark specifies the length of lead cord.

ⓙ Accessories Note 3			
※ Y	Rod clevis (FCD40)※1		Standard
※ Y1	Rod clevis (SS400)※1		
No code	Without bracket		
I	Rod eye(SS400)		Optional
K	Bellows (Neoplain)		
N	Piston rod projection length is changed with the screw.		
D	With dog	Limit switch mounting bracket	
D1	Without dog		
Q	Toggle bracket		

Note 1 : Clevis pin, split pin, and plain washer are supplied with accessories A, B, AL, and BL. The clevis width is the same as the width of the rod clevis.

- The clevis width is the same as the width of the rod clevis.
- The minimum switch mounting stroke is 36 mm.
- If the stroke is 50 mm or less, the lead wire faces toward relevant cover.

Note 2 : The switch cannot be mounted on the surface where the bypass tube is mounted.

Note 3 : Pin, split pin, and plain washer are supplied with accessories ※Y and ※Y1.

Discontinue

6. SPECIFICATION

6.1 Specifications

Model code / Item			UCAC / UCAC-L2	
Media			Compressed Air	
Action			Double acting	
Maximum working pressure		MPa	1.0	
Minimum working pressure		MPa	0.25	
Proof pressure		MPa	1.6	
Tube bore		mm	ϕ50	ϕ63
Port size		Rc	1/4	
Standard stroke		mm	50, 75, 100, 125, 150	
Ambient tempreature		°C	5 to 60	
Working piston speed		mm/s	50 to 400	50 to 300
Cushioning			with air cushion	
Tolerable energy absorption J	with cushion		6.54	11.63
	without cushion		0.14	0.21
Lubrication			Not required (Use Turbine oil Class 1, ISO, VG32 if and when lubrication is needed)	
Mounting style			Rod clevis	
Position locking unit			Forward locking or backward locking	
Holding force		N	1470	

Discontinue

6
SPECIFICATION

6.2 Universal switch Specifications

Kind and Model code	Proximity Switch			
Item	T2H · T2V	T2YH · T2YV	T3H · T3V	T3YH · T3YV
Application	For Programmable controller, exclusive		For Programmable controller or Relay	
Voltage of source of power	———		DC10 to 28V	
Load voltage, current	DC10 to 30V		DC30V or less	
Load current	5 to 20mA (※1)		100mA or less	50mA or less
Power consumption	———		10mA or less at DC24V (While Power is ON)	
Internal voltage drop	4V or less		0.5V or less by 100mA	0.5V or less
Lamp	LED (Lights while power is ON)	LED (Red/Green) (Lights while power is ON)	LED (Lights while power is ON)	LED (Red/Green) (Lights while power is ON)
Current leak	1 mA or less		10μA or less	
Length of lead cord (※2)	Standard 1m (Oil proof vinyl, Cabtyre cord, 2-core, 0.2mm²)		Standard 1m (Oil proof vinyl, Cabtyre cord, 3-core, 0.2mm²)	
Max. shock	980m/s²			
Insuration resistance	20MΩ or more by DC 500V megger	100MΩ or more by DC 500V megger	20MΩ or more by DC 500V megger	100MΩ or more by DC 500V megger
Insuration voltage	No abnormalities upon charging AC1000V for one minute.			
Ambient temperature	−10 to +60°C			
Protective structure	IEC Standard IP67, JIS C0920 (Intrusion type without water), Oil proof			

Kind and Model code	Contact point switch	
Item	T0H · T0V	T5H · T5V
Application	For Relay or Programmable controller	For AC/DC programmable controller, relay or IC circuit (not including Lamp), for Series connection
Voltage of source of power	———	
Load voltage	DC12/24V、5 to 50mA	DC12/24V、50mA or less
Load current	AC100V、7 to 20mA	AC100V、20mA or less
Power consumption	———	
Internal voltage drop	2.4V or lower	0V
Lamp	LED (Lights while power is ON)	———
Current leak	0mA	
Length of lead cord (※2)	Standard 1m (Oil proof vinyl, Cabtyre cord, 2-core, 0.2mm²)	
Max. shock	294m/s²	
Insuration resistance	20MΩ or more by DC 500V megger	
Insuration voltage	No abnormalities upon charging AC1000V for one minute.	
Ambient temperature	−10 to + 60°C	
Protective structure	IIEC Standard IP67, JIS C0920 (Intrusion type without water), Oil proof	

Note1 : Max. Load Current (25mA) is at 25°C. It may drop lower than 25mA when ambient temperature rises higher than 25°C. for example : it may be 5~10mA at 60°C)

Note2 : 3m, 5m optional lead wires are available beside standard length.

Discontinue

6.3 High magnetic field switch Specifications

Kind and Model code	Non contact type switch 2 colors	Contact type switch 2 colors	
Item	T2YD	H0	
Application	Programmable controller	For Programmable controller or Relay	
Lamp	LED (Red/Green) (Lights while power is ON)	LED (Green) (Lights while power is ON)	
Load voltage	DC24V±10%	DC12/24V	AC100V
Load current	DC5 to 20mA	5 to 50mA	7 to 20mA
Internal voltage drop	6V or less	5V or less	
Current leak	1.2mA or less	10μA	
Output delay (※ 1) (ON/OFF delay)	30 to 60ms	——	
Length of lead cord (※2)	Standard 1m (Oil proof vinyl, Cabtyre cord, ϕ6, 2-core, 0.5mm^2) (※3)	Standard 1m (Non flammable cavtyre cord, 2-core, 0.5mm^2)	
Insuration resistance	20MΩ or more by DC 500V megger		
Insuration voltage	No abnormalities upon charging AC1000V for one minute.		
Max. shock	980m/s^2	294m/s^2	
Ambient temperature	−10 to + 60°C	−10 to + 60°C	
Protective structure	IIEC Standard IP67, JIS C0920 (Intrusion type without water), Oil proof		

Note1 : Time to the generation of switch output through detection of piston magnet by magnetic sensor
Note2 : 3m, 5m optional lead wires are available beside standard length.
Note3 : Flame-resistant lead wires are optionally available.

6.4 Cylinder Weight

Tube bore (mm)		Product weight at stroke of 0 mm (kg)	Additional weight per stroke of 100 mm (kg)
ϕ50	Forward locking: F	1.65	0.40
	Backward locking: B	1.6	0.39
ϕ63	Forward locking: F	2.2	0.40
	Backward locking: B	2.15	0.39

Accessory weight (kg)			
Rod clevis	Rod eye	Limit switch mounting bracket	Dog bracket
0.37	0.27	0.18	0.08