CKD

SM-10214-A

Instruction Manual

Unit Cylinder

UCA2 (Metal Bush Bearing Type)

UCA2-B (Ball Bearing Type)

- Be sure to read this instruction manual before using the product.
- In particular, read the safety instructions carefully.
- Keep this instruction manual in a safe place so that it can be taken out and read immediately when needed.

CKD
3rd Edition

To Use This Product Safely

To use this product safely, you need to have basic knowledge of pneumatic equipment, including materials, pipes, electricity, and mechanisms (a level that conforms to Japanese Industrial Standards JIS B 8370, General rules for pneumatic systems).

We cannot be held responsible for any accidents caused by persons without knowledge or by improper handling.

There are so many different uses for the product that it is impossible for us to keep track of them. Depending on the conditions of use, the product may not perform as expected or may lead to an accident. Be sure to check the product specifications and understand the usage instructions carefully before making a decision.

Although various safety measures have been implemented for this product, improper handling by the customer may lead to an accident. To prevent this from happening, **be sure to read the instruction manual carefully and fully understand its contents before using the product.**

In addition to the handling precautions described in the main text, please also note the following items.

⚠ Caution

- When disassembling and inspecting the actuator, be sure to release the residual pressure and check it before performing the work.
- Do not enter or put your hands inside the actuator drive when the actuator is in operation.
- There is a risk of electric shock if you touch the electrical wiring connections (bare live parts) of actuators that have solenoid valves, actuators that have switches, etc. Before disassembling or inspecting the product, be sure to turn off the power. In addition, do not touch the live parts with wet hands.

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UCA2, UCA2-B
Unit Cylinder (Metal Bush Bearing Type, Ball Bearing Type)
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1. Unpacking

1) Check that the product model number you ordered is the same as the model number in the MODEL field of the product nameplate.

2) Check that there is no external damage.

3) Store it with a sealing plug attached to prevent foreign matter from entering the cylinder via the piping ports.
Remove the sealing plug when doing piping.

2. Matters Related to Installation

2.1 Installation

1) The applicable ambient temperature range for this cylinder is -10 to 60ºC. (However, freezing must not occur.)
Use it within this temperature range.

2) Be careful not to scratch or dent the sliding part of the piston rod.
Doing so may cause damage to the packing parts or air leaks.

3) Do not make any dents, scratches, etc. that may impair the flatness of the body mounting surface and both sides' plate mounting surfaces.

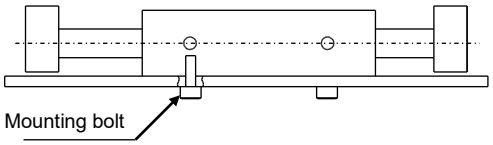
4) When mounting it, make sure that no foreign matter such as cutting chips get into the counterbore of the stopper.
Otherwise, they may cause damage to the shock absorber.

5) When mounting the body, be careful, because any twisting or bending of the piston rod will cause abnormally high operating resistance and premature wear of the bearing, resulting in poor accuracy and air leaks.

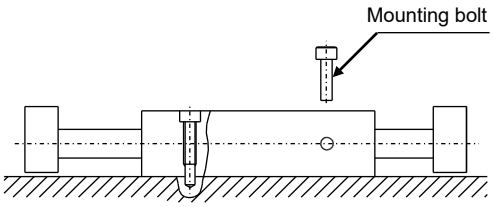
6) Keep the center of gravity of the load as close as possible to the center of the unit cylinder.

2.2 Mounting method

1) In the case of having the body fixed in place (model name: UCA2-(B)-X)
There are two mounting methods, as shown in the figure below.



Mounting from the bottom

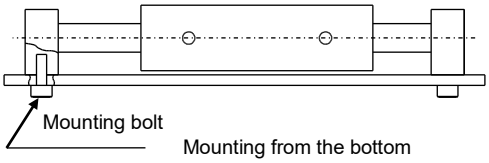


Mounting from the top

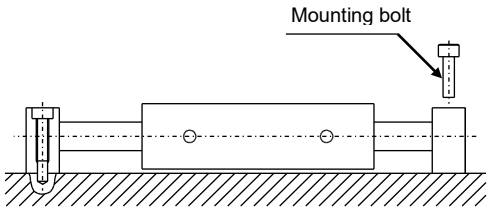
Use hexagon socket head bolts for mounting from the top.
Refer to the table on the right for the hexagon socket head bolts to be used.

Item Tube inner diameter (mm)	Size of hexagon socket head bolt	Quantity
φ10	M3 × 22 ℓ	4
φ16	M4 × 30 ℓ	4
φ25	M5 × 35 ℓ	4
φ32	M6 × 40 ℓ	4

2) In the case of having the end plate fixed in place (model name: UCA2-(B)-Y)
There are two mounting methods, as shown in the figure below.



Mounting from the bottom



Mounting from the top

Use hexagon socket head bolts for mounting from the top.
Refer to the table on the right for the hexagon socket head bolts to be used.

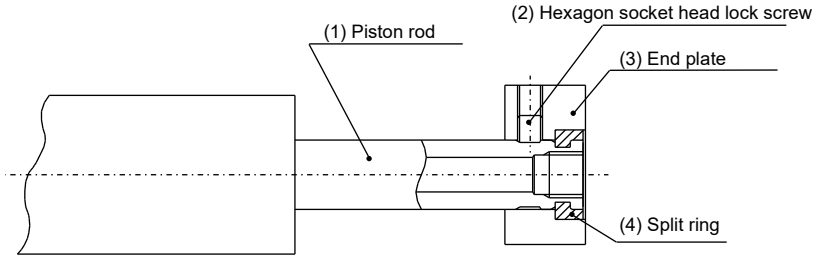
Item Tube inner diameter (mm)	Size of hexagon socket head bolt	Quantity
φ10	M3 × 22 ℓ	4
φ16	M4 × 30 ℓ	4
φ25	M5 × 35 ℓ	4
φ32	M6 × 40 ℓ	4

2.3 How to remove the end plate

1) Loosen hexagon socket head lock screw (2). The sizes of the hexagon socket head lock screws are as shown in the table below.

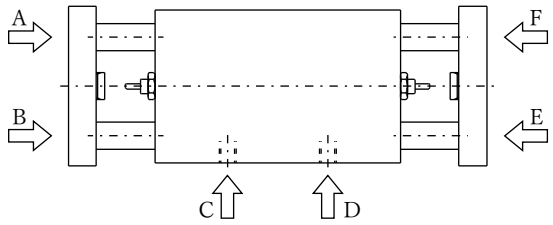
Item Tube inner diameter (mm)	Size of hexagon socket head bolt	Quantity
φ10	M4 × 4 ℓ	4
φ16	M4 × 4 ℓ	4
φ25	M4 × 4 ℓ	4
φ32	M4 × 4 ℓ	4

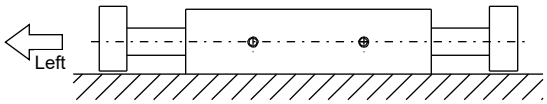
2) Move end plate (3) approximately 10 mm to the left and remove split ring (4). Then, remove the end plate by moving it to the right.



2.4 How to do the air piping

1) In the case of having the body fixed in place (model name: UCA2-(B)-X)

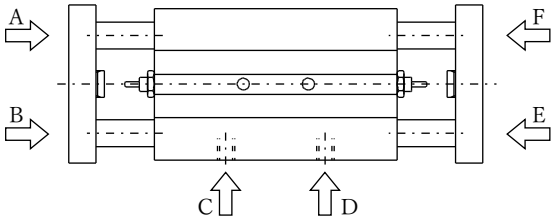


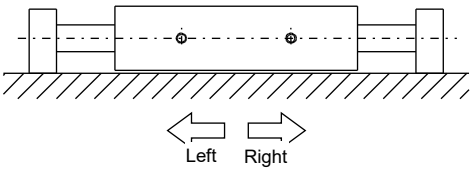


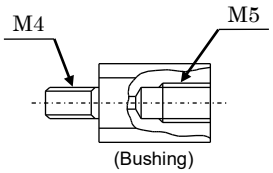
In the case of having the body fixed in place, the relationship between the pressure port and the piston rod operating direction is as shown in the table on the right. Therefore, plug any unused piping ports before use.

Pressure port	A	B	C	D	E	F
Direction of piston motion	Flat	Flat	Left	Right	Flat	Flat

2) In the case of having the end plate fixed in place (model name: UCA2-(B)-Y)







In the case of having the end plate fixed in place, the relationship between the pressure port and the body operating direction is as shown in the table on the right. Therefore, plug any unused piping ports before use.
In addition, when using UCA2-(B)-Y-10, before use, attach the bushings that come with the pressure ports you are using.

Pressure port	A	B	C	D	E	F
Direction of body motion	Left	Right	Flat	Flat	Right	Left

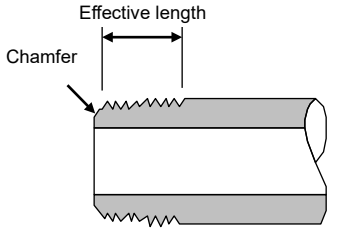
2.5 Piping

1) For piping materials beyond the air filter, use corrosion-resistant materials such as galvanized pipes, nylon tubes, rubber tubes, etc.

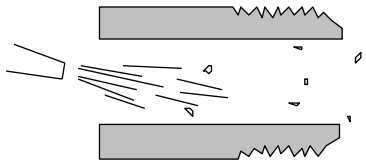
2) For piping that connects the cylinder and solenoid valve, use piping with an effective cross-sectional area that is just sufficient for the cylinder to achieve the specified piston speed.

3) To remove rust, foreign matter, and drainage from the pipe, install the air filter as close to the solenoid valve as possible.

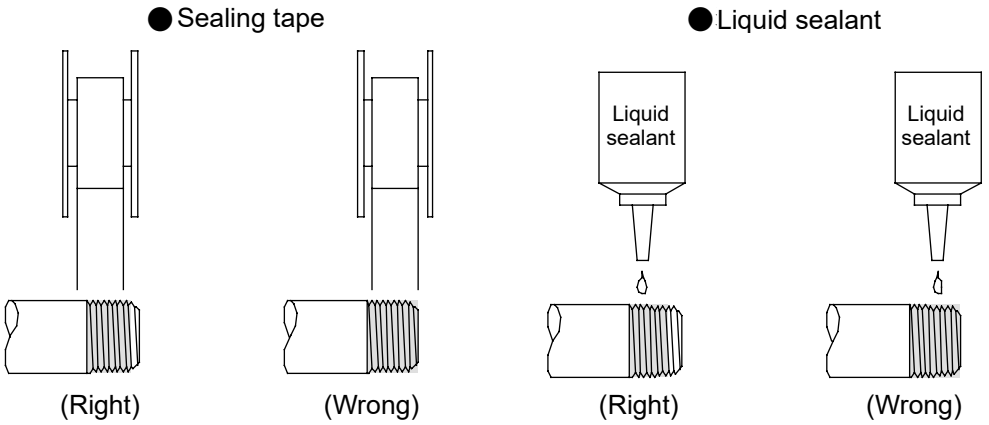
4) The screw length of the gas pipe must comply with the effective screw length. In addition, chamfer the tip of the screw by about half a pitch.



5) Before doing piping, flush the inside of the pipe with air to remove foreign matter, cutting chips, etc. from the pipe.

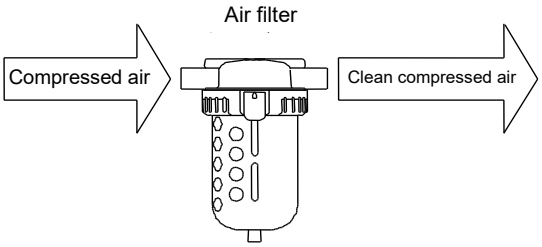


6) Use sealing tape or sealant for piping, but apply it up to about two threads back from the tip of the screw to prevent tape scraps or sealant residue from entering the pipes or equipment.

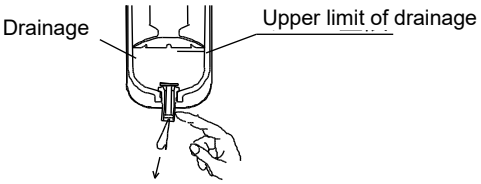


2.6 Fluids used

1) The compressed air used should be clean and low in moisture, and should be passed through an air filter. For this reason, use an air filter in the circuit and be careful about the filtration level (preferably 5 μm or less), flow rate, mounting position (close to the directional control valve), etc.



2) Discharge the drainage accumulated in the air filter regularly before it exceeds the specified line.



3) If carbides (carbon or tar-like substances) from the compressor oil get mixed into the circuit, it will cause the solenoid valve and cylinder to malfunction. Be very careful about the maintenance and inspection of the compressor.

4) This cylinder can be used without lubrication. If you lubricate it, use turbine oil Class 1, ISO VG 32.

2.7 Switch mounting

1) Switch mounting position

(1) When mounting at the stroke end

To operate switches in the maximum sensitivity positions, mount one in each of the locations shown by the RA and RB dimensions.

Body mounting type (X)

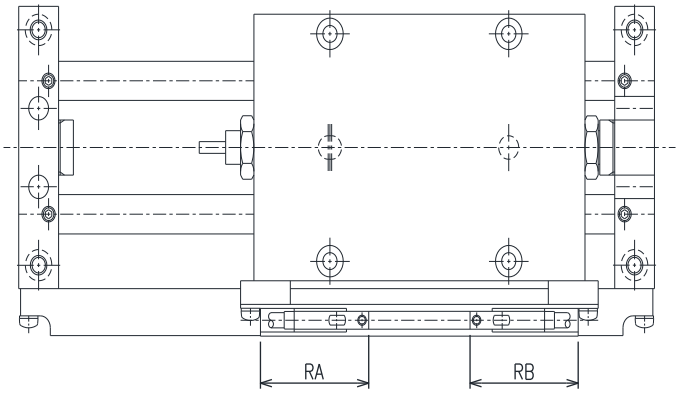
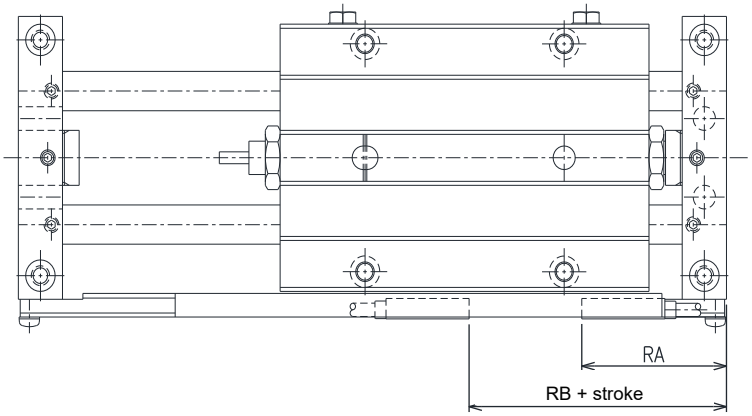


Plate mounting type (Y)



(2) When mounting in an intermediate position

For detecting mid-stroke, fix the piston in the detection position then move the switch back and forth over the piston to find the position where each switch first turns on. The midpoint between these two positions is the position of maximum sensitivity for the piston, and this is the mounting position.

(3) How to move the switch

Loosen the fastening screw, move it along the rail, and tighten it in the specified position. The tightening torque is 0.1 to 0.2 N·m.

(4) How to replace the switch

Loosen the fastening screw and remove the switch body from the groove. Next, insert the replacement switch into the groove and tighten it in place.

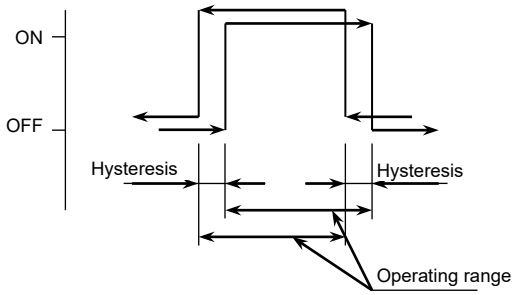
2) Operating range

This is the range through which the piston moves, turns the switch on, and then moves further in the same direction until it turns off.

The center of the operating range is the position of maximum sensitivity. Setting this position as the piston stop position makes it less susceptible to external disturbances and stabilizes switch operation.

3) Hysteresis

This is the distance from the position where the piston moves and turns the switch on to the position where it moves in the opposite direction and turns the switch off.



If the piston stops during this time, the switch operation becomes unstable and susceptible to external disturbances.

Switch maximum sensitivity position (RA, RB)

UCA2-[L, BL]-X (Unit: mm)

Item	Contactless switches (T2, T3, T2W, T3W)						Contact switches (T0, T5)					
	Maximum sensitivity position				Operating range	Hysteresis	Maximum sensitivity position		Operating range	Hysteresis		
Tube inner diameter	T2, T3		T2W, T3W				T0, T5					
	RA	RB	RA	RB			RA	RB				
φ10	32		30.5		1.5 to 4	1.5 or less	32.7		4.5 to 8	3 or less		
φ16												
φ25												
φ32												

UCA2-[L, BL]-Y (Unit: mm)

Item	Contactless switches (T2, T3, T2W, T3W)						Contact switches (T0, T5)					
	Maximum sensitivity position				Operating range	Hysteresis	Maximum sensitivity position		Operating range	Hysteresis		
Tube inner diameter	T2, T3		T2W, T3W				T0, T5					
	RA	RB	RA	RB			RA	RB				
φ10	32	14	30.5	15.5	1.5 to 4	1.5 or less	32.7	13.3	4.5 to 8	3 or less		
φ16	38	20	36.5	21.5			38.7	19.3				
φ25	42	24	40.5	25.5			42.7	23.3				
φ32												

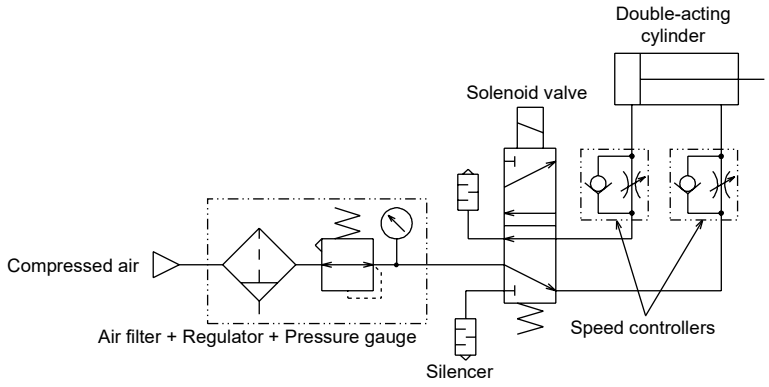
3. Matters Related to Usage

3.1 How to use the cylinder

(1) The supply pressure to the cylinder is as specified in the product specifications. Use it within this pressure range.

(2) Adjust the piston speed by installing speed controllers as shown in the basic circuit diagram below.

● Basic circuit diagram



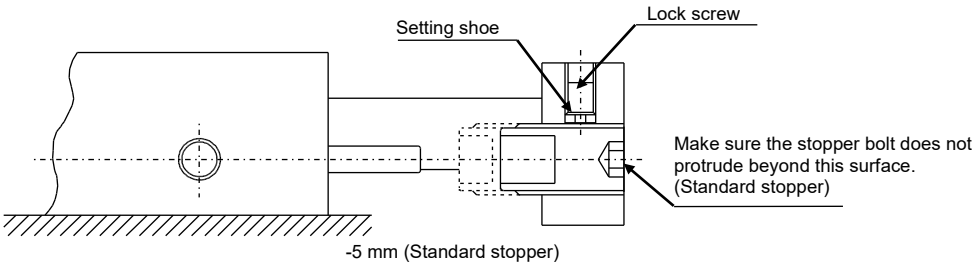
3.2 How to adjust the stopper

To adjust the stroke, loosen the lock screw and then turn the stopper bolt to adjust it. After adjustment, tighten the lock screw.

Recommended tightening torque: 1.4 N・m

Make sure that the standard stopper does not protrude beyond the end plate. The maximum adjustable amount for each side is -5 mm.

For single-sided adjustment stopper P1 and double-sided adjustment stopper P2, do not make the stopper protrude beyond the amount of protrusion at the time of shipment.



3.3 Shock absorber

The energy absorption capacity of the shock absorber built into the main unit is fixed. Therefore, the amount of energy absorption cannot be adjusted. In addition, do not to remove the shock absorber from the main unit. If you need to remove the shock absorber, follow the steps below.

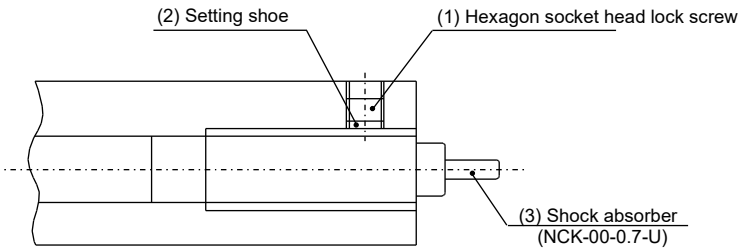
1) In the case of φ10

(1) Remove hexagon socket head lock screw (1). Also, when you do so, be careful not to lose setting shoe (2).
(2) Pinch and turn the neck of shock absorber (3) with your fingers. If the screw is too hard to turn, use a tool such as a spanner to remove it. Furthermore, the durability of the shock absorber is 3 million operations.

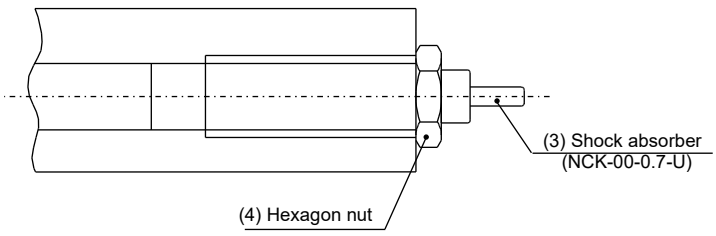
2) In the case of φ16 to φ32

A. When shipped as a product
a. Remove hexagon nut (4). (It can be removed together with shock absorber (3).)
B. In the case of mounting repair parts
a. Remove hexagon nut (4).
b. There is a spanner hook at the end of the threaded part of shock absorber (3), so use a spanner, etc., to remove it. Furthermore, the durability of the shock absorber is 3 million operations.

- φ10



- φ16 to φ32



3.4 How to use the switches

3.4.1 Common points to note

1) Magnetic environment

Avoid using them in areas with strong magnetic fields or large currents (large magnets, spot welding machines, etc.). When installing cylinders with switches in close proximity in parallel, or when magnetic objects move very close to the cylinders, mutual interference may occur, potentially affecting detection accuracy.

2) Lead wire protection

Be careful when wiring to avoid repeated bending stress and tensile force on the lead wires. Connect flex-resistant wires, such as those for robots, to the moving parts for use.

3) Ambient temperature

Do not use at high temperatures (over 60ºC).

Avoid using magnetic components and electronic components in high-temperature environments due to their temperature characteristics.

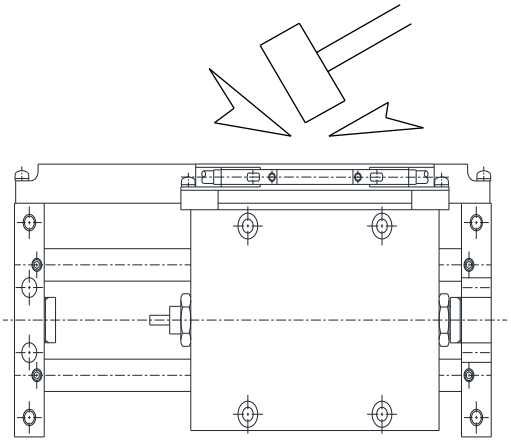
4) Middle position detection

When activating the switch mid-stroke, be aware that if the piston speed is too high, the relay will fail to respond.

(E.g.) When the relay operation time is 20 ms, the piston speed should be 500 mm/s or less.

5) Impact

When transporting cylinders or installing or adjusting switches, do not give them strong vibrations or impacts.



3.4.2 Notes on contactless switches (T2, T3)

1) Lead wire connection

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

Incorrect wiring or short-circuiting the load will not only damage the switch but also the electrical circuit on the load side. Even if there is no faulty wiring, working while the power is on may result in damage to the switch load electrical circuit depending on the work procedure.

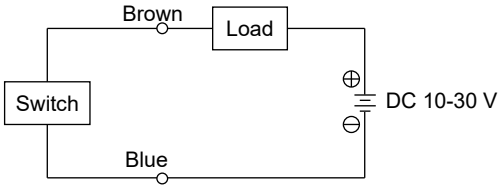


Figure 1. Example of T2 basic circuit

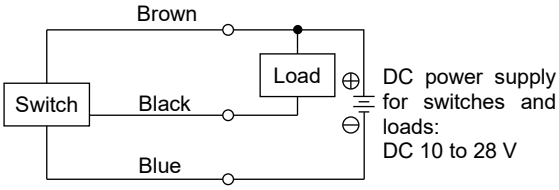


Figure 2. Example of T3 basic circuit (1)
(In the case where the switch power supply and the load power supply are the same)

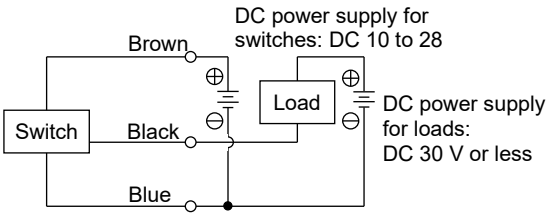


Figure 3. Example of T3 basic circuit (2)
(In the case where the switch power supply and the load power supply are different)

2) Output circuit protection

When connecting and using inductive loads (relays, solenoid valves), surge voltages will be generated when the switch is turned off. Therefore, be sure to install the protection circuit shown in Figure 4.

When connecting and using a capacitive load (capacitor), inrush current occurs when the switch is turned on. Therefore, be sure to install the protection circuit shown in Figure 5.

If the lead wire length exceeds 10 m, be sure to install a protective circuit as shown in Figures 6 and 7 (for T2) and Figure 8 (for T3).

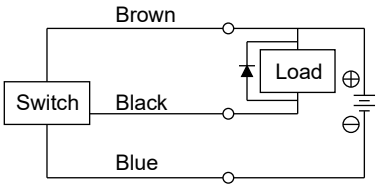


Figure 4 Example of using a surge absorption element (diode) in an inductive load. Use V06C diode by Hitachi, Ltd. or equivalent.

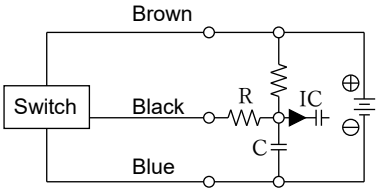


Figure 5. Example of a capacitive load with a current-limiting resistor R.
In this case, use a resistor R (Ω) equal to or greater than the following formula.

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

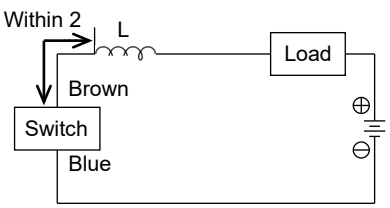


Figure 6. • Choke coil
L = several hundred μH to several mH
Excellent high-frequency characteristics
• Wire close to the switch (within 2 m)

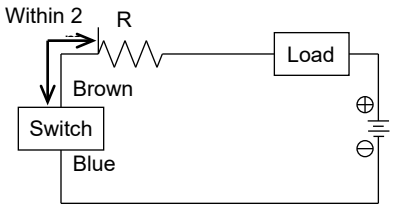


Figure 7 • Inrush current limiting resistor
R = Resistance as large as the load circuit allows
• Wire close to the switch (within 2 m)

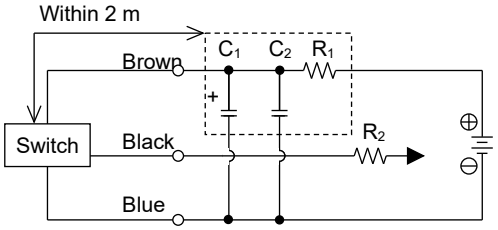


Figure 8. • Power supply noise absorption circuit
C_1 = 20 to 50 µF, Electrolytic capacitor
(Pressure resistance: 50 V or higher)
C_2 = 0.01 to 0.1 µF, Ceramic capacitor
R_1 = 20 to 30 Ω
• Inrush current limiting resistor
R_2 = Use a resistor as large as the load circuit allows
• Wire close to the switch (within 2 m)

3) Connecting to the programmable controller (sequencer)

The connection method varies depending on the type of programmable controller. Refer to Figures 9 to 13 for the connection.

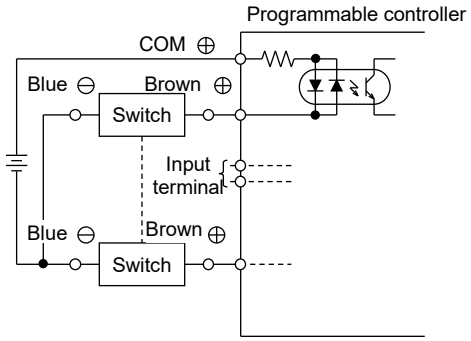


Figure 9. Example of T2 connection to source input (with external power supply) type

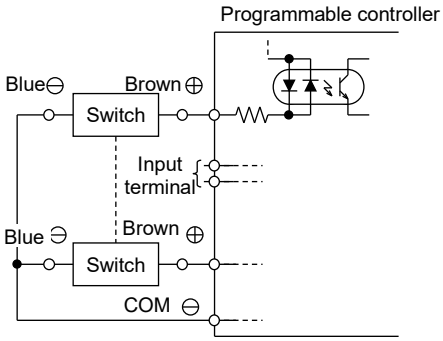


Figure 10.Example of T2 connection to source input (built-in power supply) type

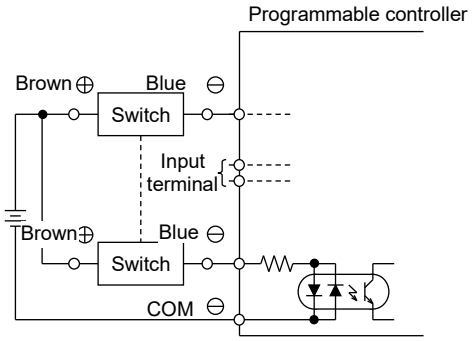


Figure 11.Example of T2 connection to sink input (with external power supply) type

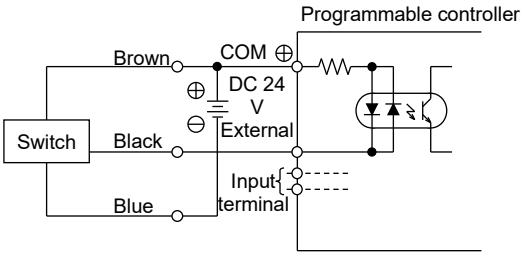


Figure 12.Example of T3 connection to source input (with external power supply) type

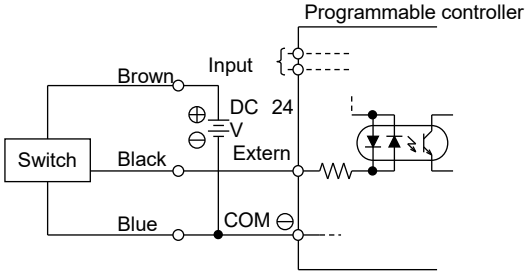


Figure 13.Example of T3 connection to source input (built-in power supply) type

4) Parallel connection

The T2 switch increases leakage current by the number of connections, so determine the number of connections after confirming the input specifications of the connected load, the programmable controller. However, the indicator light may be dim or may not light up.

The T3 switch increases leakage current by the number of connections, but the leakage current value is extremely small (10 μA or less), so it does not cause problems under normal usage. In addition, the indicator light will not dim or go out.

3.4.3 Notes on contact switches (T0, T5)

1) Lead wire connection

Do not connect the switch lead wire directly to the power supply. Always connect the load in series. Also, for T0, please note the following items (A) and (B).

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

(B) When connected to an AC relays or programmable controller input, and half-wave rectification is being performed in such a circuit, the switch indicator light may not light up. In that case, reversing the polarity of the switch lead wire connection will illuminate the indicator light.

2) Contact protection measures

When using inductive loads such as relays, or when the wiring length exceeds the values in Table 1, be sure to install a contact protection circuit.

(1) Protection when connecting inductive loads

Table 1.

Power supply	Wiring length
DC	100 m
AC	10 m

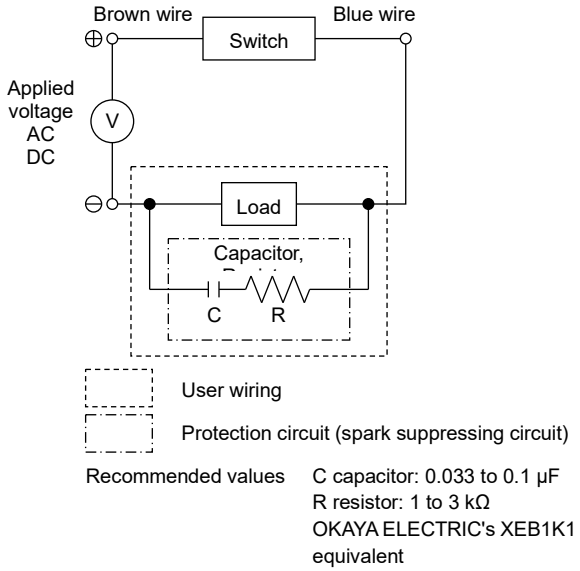


Figure 1. When using a capacitor and resistor

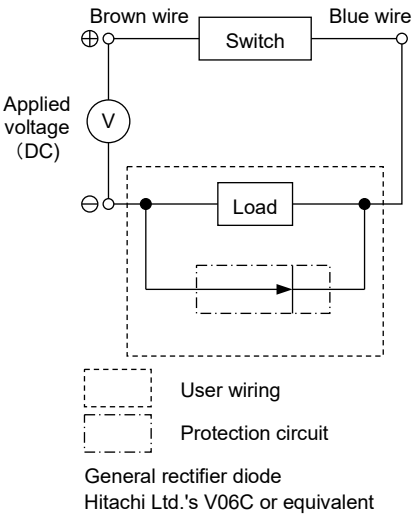
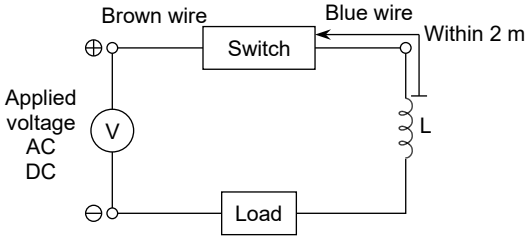


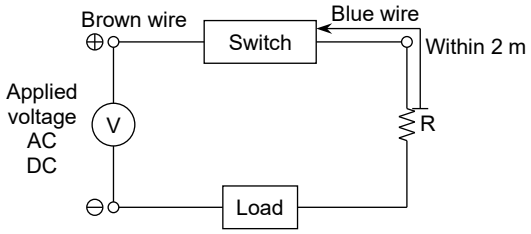
Figure 2. When using a diode

(2) Protection when the wiring route length exceeds the values in Table 1.



• Choke coil
L = several hundred μH to several mH
Excellent high-frequency characteristics
• Wire close to the switch (within 2 m)

Figure 3.



• Inrush current limiting resistor
R = Resistance as large as the load circuit allows
• Wire close to the switch (within 2 m)

Figure 4.

3) Contact capacity

Avoid using loads that exceed the switch's maximum contact capacity. In addition, the indicator light may not light up when the current falls below the rated value.

4) Relay

Use the following equivalent relays.

OMRON ····· MY type
FUJI ELECTRIC····· HH5 type
Panasonic ····· HC type

5) Series connection

When multiple T0 switches are connected in series, the voltage drop across the switches is the sum of the voltage drops across all connected switches.

For checking operation, using one T0 and the others as T5 provides a voltage drop equivalent to one T0 (approximately 2.4 V).

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

6) Parallel connection

When connecting multiple switches in parallel, there is no limit to the number of switches that can be connected. However, in the case of T0, the switch indicator light may dim or fail to illuminate.

4. Matters Related to Maintenance

4.1 Periodic check

1) To ensure optimal use of the cylinder, perform periodic inspections once or twice a year.

2) Inspection items

(1) Check for loosening of bolts and nuts used to secure the piston rod end bracket and support bracket.
(2) Check whether the operating condition is smooth.
(3) Check for changes in piston speed and cycle time.
(4) Check for external and internal leaks
(5) Check for scratches and deformation on the piston rod.
(6) Check for any abnormalities in the stroke.

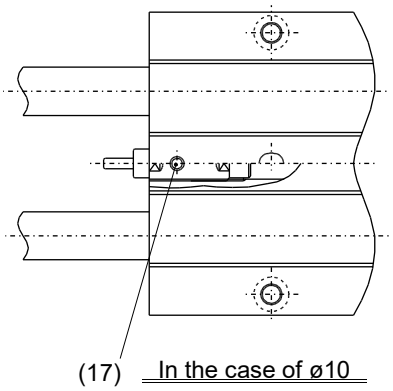
Check the above points, and if any abnormalities are found, refer to "5. Failures and Countermeasures." If any looseness is found, tighten it further.

4.2 Disassembling

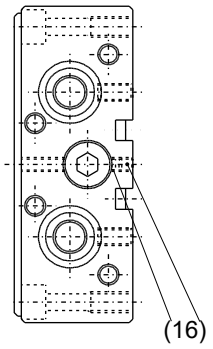
1) This cylinder can be disassembled.
If any malfunctions occur, such as air leaks, disassemble the unit by referring to the internal structure drawing and replace the parts listed in the consumable parts list.

2) Internal structure drawing and parts list

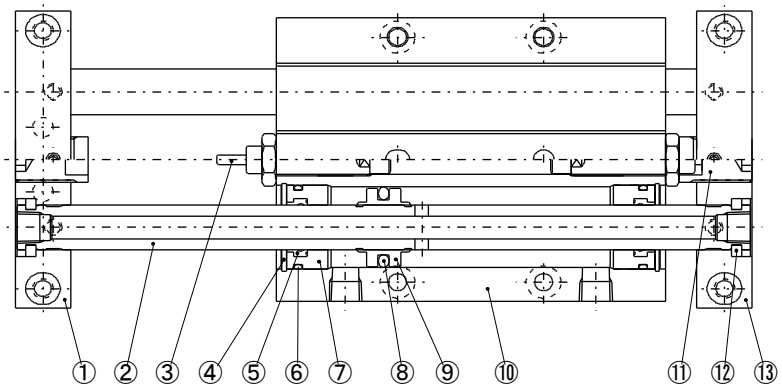
[Metal bush bearing type]

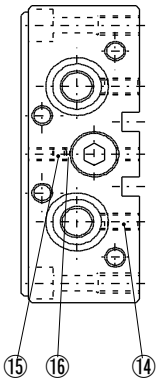


In the case of ø10



In the case of UCA2-X-25, 32



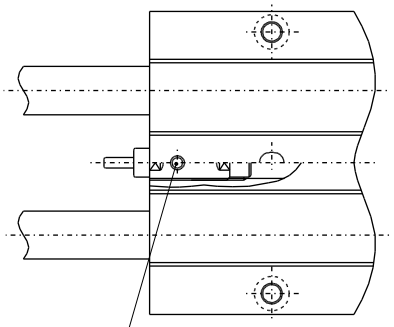


Item No.	Parts name	Material	Remarks	Item No.	Parts name	Material	Remarks
1	End plate (A)	Aluminum alloy		10	Cylinder body	Aluminum alloy	
2	Piston rod	Steel		11	Stopper	Steel	
3	Shock absorber		φ10: UCA2-10-NCK φ16 to 32: UCA2-16-NCK	12	Split ring	Steel	
4	Snap ring	Steel		13	End plate (B)	Aluminum alloy	
5	Rod packing	Nitrile rubber		14	Hexagon socket head lock screw	Steel	With dry lock glue
6	Rod metal gasket	Nitrile rubber		15	Hexagon socket head lock screw	Steel	
7	Rod metal	Aluminum alloy		16	Setting shoe	Aluminum alloy	
8	Piston packing	Nitrile rubber		17	Hexagon socket head lock screw	Steel	
9	Piston	Aluminum alloy					

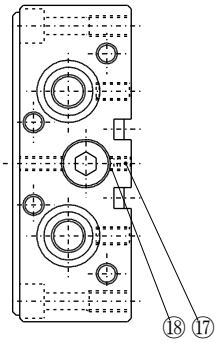
Expendable parts list (When ordering, specify the kit number.)

Item No.		(5)	(6)	(8)	(14)
Tube inner diameter (mm)	Parts name / Kit No.	Rod packing	Rod metal gasket	Piston packing	Hexagon socket head lock screw
φ10	UCA2-10K	PDU-6	AS568-012	DYP-10	F4-206231
φ16	UCA2-16K	PDU-10	AS568-016	DYP-16	F4-206231
φ25	UCA2-25K	PDU-14	AS568-020	PSD-25	F4-206232
φ32	UCA2-32K	PDU-16	AS568-026	PSD-32	F4-206233

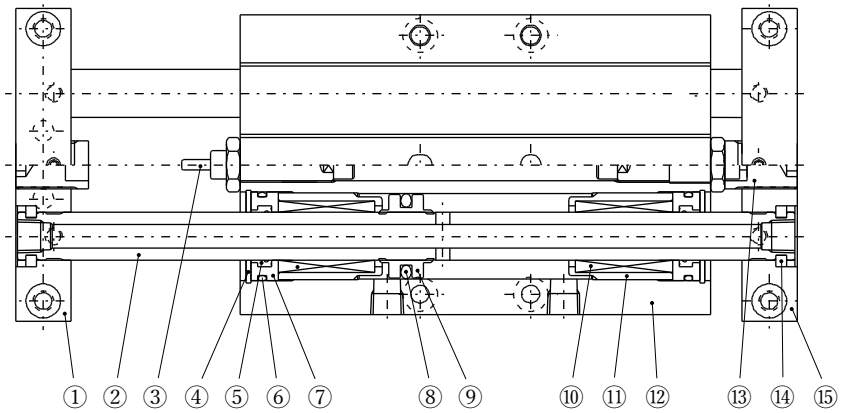
[Ball bearing type]

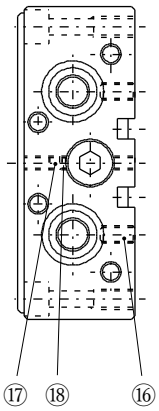


⑰ In the case of φ10



In the case of UCA2-X-25, 32





Item No.	Parts name	Material	Remarks	Item No.	Parts name	Material	Remarks
1	End plate (A)	Aluminum alloy		11	Housing	Aluminum alloy	
2	Piston rod	Steel		12	Cylinder body	Aluminum alloy	
3	Shock absorber		φ10: UCA2-10-NCK φ16 to 32: UCA2-16-NCK	13	Stopper	Steel	
4	Snap ring	Steel		14	Split ring	Steel	
5	Rod packing	Nitrile rubber		15	End plate (B)	Aluminum alloy	
6	Rod metal gasket	Nitrile rubber		16	Hexagon socket head lock screw	Alloy steel	With dry lock glue
7	Rod metal	Aluminum alloy		17	Hexagon socket head lock screw	Alloy steel	
8	Piston packing	Nitrile rubber		18	Setting shoe	Aluminum alloy	
9	Piston	Aluminum alloy		19	Hexagon socket head lock screw	Alloy steel	
10	Ball bushing	Aluminum alloy	φ10: LM6, φ16: LM10 φ25: KH14, φ32: KH16				

Expendable parts list (When ordering, specify the kit number.)

Item No.		(5)	(6)	(8)	(16)
Tube inner diameter (mm)	Parts name / Kit No.	Rod packing	Rod metal gasket	Piston packing	Hexagon socket head lock screw
φ10	UCA2-10K	PDU-6	AS568-012	DYP-10	F4-206231
φ16	UCA2-16K	PDU-10	AS568-016	DYP-16	F4-206231
φ25	UCA2-25K	PDU-14	AS568-020	PSD-25	F4-206232
φ32	UCA2-32K	PDU-16	AS568-026	PSD-32	F4-206233

5. Failures and Countermeasures

1) Cylinder

Malfunction	Cause	Countermeasure
Not working	No pressure, insufficient pressure	Securing a pressure source
	No signal to the directional control valve	Correcting the control circuit
	The mounting core is not protruding	Correcting the installation condition
	The piston packing is damaged	Replacing the packing
Not working smoothly	Speed lower than the piston's operating speed	Mitigating the load fluctuation
	The mounting core is not protruding	Correcting the installation condition
	Lateral load is applied	Correcting the installation condition
	The load is heavy	Increasing the pressure Increasing the tube inner diameter
	The speed control valve is installed for the meter-in circuit	Installing the speed control valve for the meter-out circuit
Damage/Deformation	Impact force due to high-speed operation	Slowing down the speed Reducing the load Installing a more reliable cushioning mechanism (External cushioning mechanism, etc.)
	Lateral load is applied	Correcting the installation condition

2) Switch

Malfunction	Cause	Countermeasure
The indicator light does not flash	Welding of contact points	Replacing the switch
	Exceeding the rated load	Replacing with the recommended relay or replacing the switch
	The indicator light is damaged	Replacing the switch
	External signal failure	Re-checking the external circuit
The switch does not work	Disconnection	Replacing the switch
	External signal failure	Re-checking the external circuit
	Voltage difference	Setting to the indicated voltage
	Differences in mounting positions	Installing in the correct position
	Misalignment of the mounting position	Correcting the misalignment and retightening
	The switch is facing the opposite direction	Setting it to the correct orientation
	The load (relay) fails to respond during stroke detection	Slowing down the speed Replacing with the recommended relay
	Exceeding the rated load	Replacing with the recommended relay or replacing the switch
The switch does not reset	The piston is not moving	Moving the piston
	Welding of contact points	Replacing the switch
	Exceeding the rated relay	Replacing with the recommended relay or replacing the switch
	Ambient temperature is out of the specifications	Setting the temperature range of -10 to 60ºC
	There is a magnetic field nearby	Applying a magnetic shield
	External signal failure	Re-checking the external circuit

6. Model number display method

6.1 Model No.

[Metal bush bearing type]

● Without switch

● With switch

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

(a) Mounting type		(b) Tube inner diameter (mm)		(c) Pipe thread type	
X	Body mounting	10	φ10	Nil	Rc screw
Y	Plate mounting	16	φ16	NN	NPT thread (φ25 or larger) (made-to-order item)
		25	φ25	GN	Parallel pipe thread (φ25 or larger) (made-to-order item)
		32	φ32		

(d) Stroke (mm)					
Tube inner diameter (φ)		10	16	25	32
25	25	●	●	●	●
50	50	●	●	●	●
75	75	●	●	●	●
100	100	●	●	●	●
125	125		●	●	●
150	150		●	●	●
175	175		●	●	●
200	200		●	●	●

(e) Switch model No. (Note 1)			
Lead wire Straight type	Lead wire L-shaped type	Contact point	Lead wire
T0H*	T0V*	With contacts	2-wire
T5H*	T5V*		
T2H*	T2V*	Contactless	
T3H*	T3V*		3-wire
T2WH*	T2WV*		2-wire
T3WH*	T3WV*		3-wire

"*" indicates lead wire length.

* Lead wire length		(f) Number of switches (Note 2)		
Nil	1 m (standard)	RA	With one	Plate A side
3	3 m (Optional)	RB		Plate B side
5	5 m (Optional)	D	With two	
		T	With three	

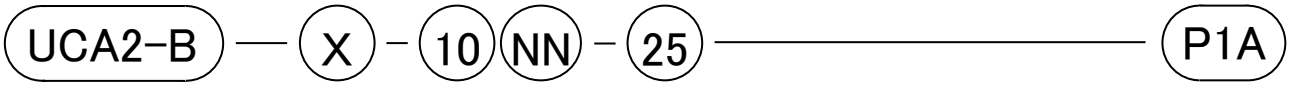
(g) Options		
P1A	Single-sided adjustment stopper	Plate A side
P1B		Plate B side
P2	Double-sided adjustment stopper	

Note 1: Without the switch, the magnet is not installed.
The switch-equipped version (without a switch) comes with a magnet and magnetic rail, but no switch rail.

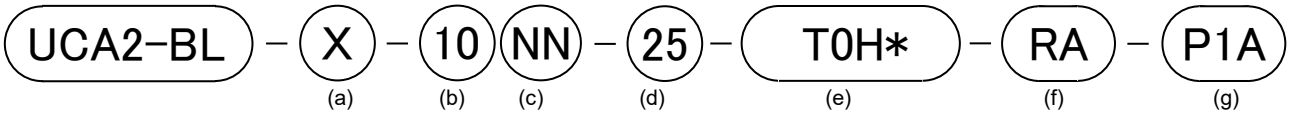
Note 2 Minimum stroke with one switch: 10 mm
Minimum stroke with two switches: 20 mm
Minimum stroke with three switches: 75 mm

[Ball bearing type]

● Without switch



● With switch



(a) Mounting type		(b) Tube inner diameter (mm)		(c) Pipe thread type	
X	Body mounting	10	φ10	Nil	Rc screw
Y	Plate mounting	16	φ16	NN	NPT thread (φ25 or larger) (made-to-order item)
		25	φ25	GN	Parallel pipe thread (φ25 or larger) (made-to-order item)
		32	φ32		

(d) Stroke (mm)					
Tube inner diameter (φ)		10	16	25	32
25	25	●	●	●	●
50	50	●	●	●	●
75	75	●	●	●	●
100	100	●	●	●	●
125	125		●	●	●
150	150		●	●	●
175	175		●	●	●
200	200		●	●	●

(e) Switch model No. (Note 1)			
Lead wire Straight type	Lead wire L-shaped type	Contact point	Lead wire
T0H*	T0V*	With contacts	2-wire
T5H*	T5V*		
T2H*	T2V*	Contactless	
T3H*	T3V*		3-wire
T2WH*	T2WV*		2-wire
T3WH*	T3WV*		3-wire

"*" indicates lead wire length.

* Lead wire length		(f) Number of switches (Note 2)		
Nil	1 m (standard)	RA	With one	Plate A side
3	3 m (Optional)	RB		Plate B side
5	5 m (Optional)	D	With two	
		T	With three	

(g) Options		
P1A	Single-sided adjustment stopper	Plate A side
P1B		Plate B side
P2	Double-sided adjustment stopper	

Note 1: Without the switch, the magnet is not installed.
The switch-equipped version (without a switch) comes with a magnet and magnetic rail, but no switch rail.

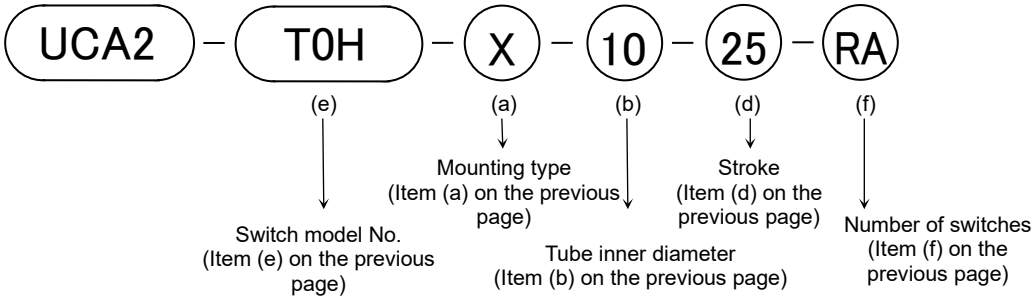
Note 2: Minimum stroke with one switch: 10 mm
Minimum stroke with two switches: 20 mm
Minimum stroke with three switches: 75 mm

6.2 Part model No.

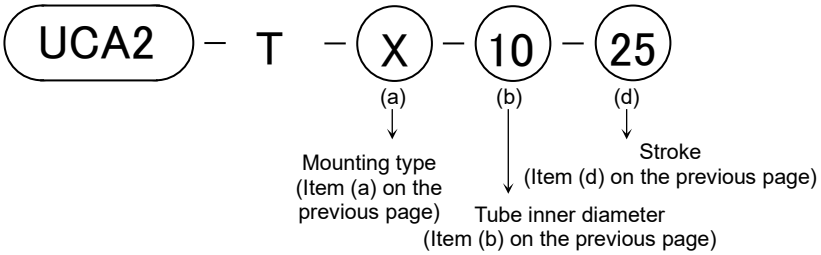
● Switch single unit model No.

[Metal bush bearing type]

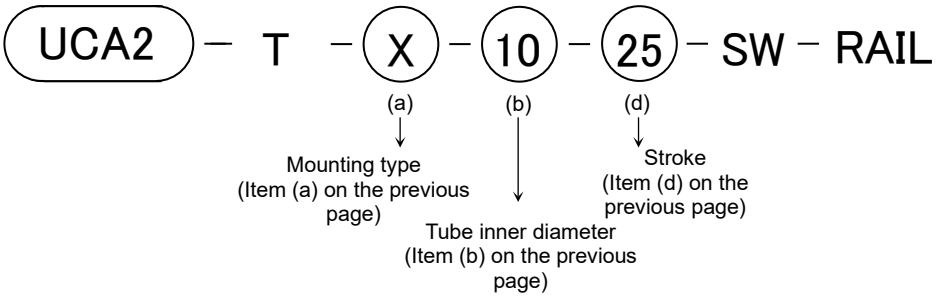
1) Switch body + mounting bracket set (including switch rail)



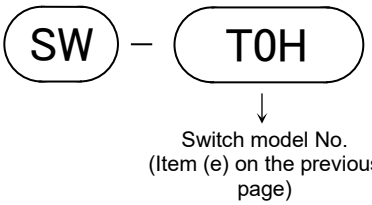
2) Mounting bracket set (including switch rail) + magnet



3) Mounting bracket set (including switch rail)



4) Switch body only



● Shock absorber kit model No.

1) For φ10

UCA2-10-NCK

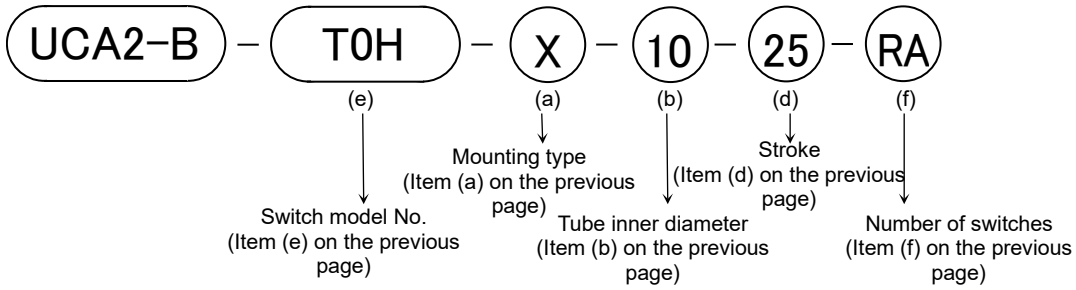
For φ16 to φ32

UCA2-16-NCK

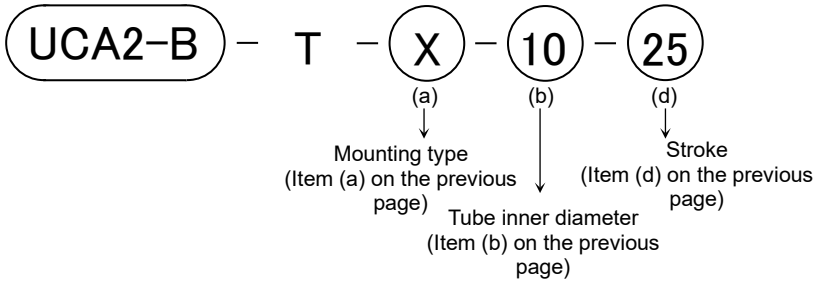
● Switch single unit model No.

[Ball bearing type]

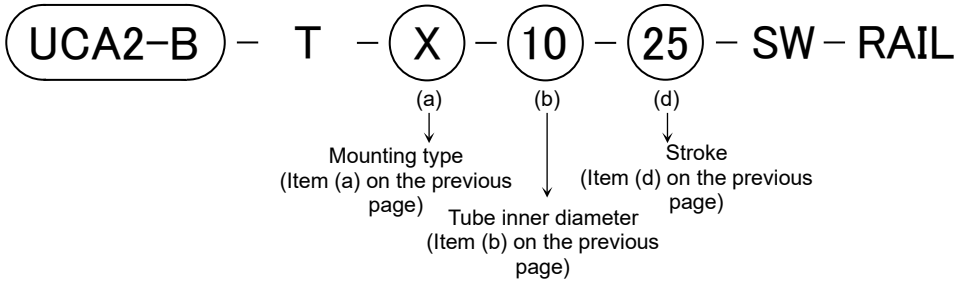
1) Switch body + mounting bracket set (including switch rail)



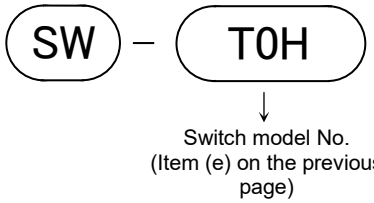
2) Mounting bracket set (including switch rail) + magnet



3) Mounting bracket set (including switch rail)



4) Switch body only



● Shock absorber kit model No.

1) For φ10

UCA2-10-NCK

For φ16 to φ32

UCA2-16-NCK

7. Product Specifications

7.1 Cylinder specifications

Model No. / Item		UCA2 / UCA2-L (with switch)			
Tube inner diameter	mm	φ10	φ16	φ25	φ32
Operation method		Double action type			
Fluids used		Compressed air			
Maximum working pressure	MPa	1.0			
Minimum working pressure	MPa	0.15		0.1	
Pressure resistance	MPa	1.5			
Ambient temperature	ºC	-10 to 60 (but no freezing)			
Connection diameter		M5		Rc 1/8	
Stroke allowable tolerance	mm	+1.0 0			
Operating piston speed	mm/s	30 to 300			
Non-rotating accuracy (Note 1)		±0.1°	±0.05°	±0.02°	
Maximum repetition frequency	times/min	30			
Cushion		Built-in shock absorber			
Lubrication		Not required (When lubricating, using turbine oil Class 1, ISO VG 32)			
Allowable absorbed energy	J	0.25	0.65	2.4	4.5

Note 1.: Value at 0 stroke (excluding piston rod deflection).

Model No. / Item		UCA2-B / UCA2-BL (with switch)			
Tube inner diameter	mm	φ10	φ16	φ25	φ32
Operation method		Double action type			
Fluids used		Compressed air			
Maximum working pressure	MPa	1.0			
Minimum working pressure	MPa	0.15		0.1	
Pressure resistance	MPa	1.5			
Ambient temperature	ºC	-10 to 60 (but no freezing)			
Connection diameter		M5		Rc 1/8	
Stroke allowable tolerance	mm	+1.0 0			
Operating piston speed	mm/s	30 to 300			
Non-rotating accuracy (Note 1)		±0.04°	±0.03°	±0.015°	±0.015°
Maximum repetition frequency	times/min	30			
Cushion		Built-in shock absorber			
Lubrication		Not required (When lubricating, using turbine oil Class 1, ISO VG 32)			
Allowable absorbed energy	J	0.25	0.65	2.4	4.5

Note 1.: Value at 0 stroke (excluding piston rod deflection).

7.2 Switch specifications

Type / Model No.	Contact switch			
Item	T0H, T0V		T5H, T5V	
Application	For programmable controllers and relays		For Programmable controllers, relays, IC circuits (without indicator lights), and series connections	
Power supply voltage	-			
Load voltage	DC 12/24 V	AC 110 V	DC 12/24 V	AC 110 V
Load current	5 to 50 mA	7 to 20mA	50 mA or less	20 mA or less
Current consumption	-			
Internal voltage drop	2.4V or less		0 V	
Indicator light	LED (illuminates when turned on)		No indicator light	
Leakage current	0 mA			
Lead wire length	Standard 1m (Oil-resistant vinyl cabtyre cord, 2-core, 0.2 mm²)			
Impact resistance	294 m/s^2			
Insulation resistance	20 MΩ or more with a DC 500 V megger			
Withstanding voltage	No abnormalities observed after applying AC 1000 V for 1 minute			
Ambient temperature	-10 to 60ºC			
Protective structure	IEC Standard IP67, JIS C 0920 (water tight type), oil-resistant			

Type / Model No.	Contactless switch			
Item	T2H, T2V	T2WH, T2WV	T3H, T3V	T3WH, T3WV
Application	For programmable controllers only		For programmable controllers and relays	
Power supply voltage	-		DC 10 to 28 V	
Load voltage	DC 10-30 V	DC 24 V ±10%		DC 30 V or less
Load current	5 to 20 mA (Note 1)	100 mA or less		50 mA or less
Current consumption	-		10 mA or less at DC 24 V (when turned on)	
Internal voltage drop	4 V or less		0.5 V or less	
Indicator light	LED (illuminates when turned on)	Red/Green LED (Illuminates when turned on)	LED (illuminates when turned on)	Red/Green LED (Illuminates when turned on)
Leakage current	1 mA or less		10 μA or less	
Lead wire length	Standard 1m (Oil-resistant vinyl cabtyre cord, 2-core, 0.2 mm²)		Standard 1m (Oil-resistant vinyl cabtyre cord, 3-core, 0.2 mm²)	
Impact resistance	980 m/s^2			
Insulation resistance	20 MΩ or more with a DC 500 V megger			
Withstanding voltage	No abnormalities observed after applying AC 1000 V for 1 minute			
Ambient temperature	-10 to 60ºC			
Protective structure	IEC Standard IP67, JIS C 0920 (water tight type), oil-resistant			

Note 1: The maximum load current of 20 mA specified above is achieved at 25ºC. When the ambient temperature during switch operation exceeds 25ºC, the current will be lower than 20 mA. (5 to 10 mA at 60ºC.)