CKD

SM－323966－A

INSTRUCTION MANUAL

TIGHT CYLINDER
(Speed controller built-in type)

CMK2－Z

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

CKD Corporation
The 2nd edition

For Safety Use

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

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

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

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

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

⚠ Precautions

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

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TIGHT CYLINDER
(Speed controller built-in type)
Manual No. SM-323966-A

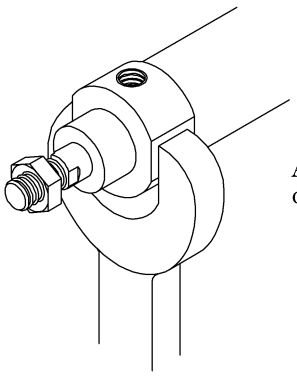
1. UNPACKING

1) Make sure that the type No. on the nameplate of the delivered Selex Cylinder matches the type No. you ordered.
2) Check the appearance for any damage.
3) Stop up the piping port with a sealing plug to prevent the entry of foreign substances into the cylinder. Remove the sealing plug before piping.

2. INSTALLATION

2.1 Installation

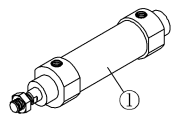
1) The ambient temperature for this cylinder is -10 to 60℃ (No freezing).
2) Use cylinder with bellows over its rod within the area with much dust.
3) Carefully avoid other object from hitting the tube. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.
4) Assembly of mounting bracket:
   Apply an open ended spanner onto double sided machined surface of mounting end cover as shown below when to hold the tube while attaching the mounting bracket.
   The mounting brackets are supplied with the cylinder at the time of delivery. Install them as shown in the upper figures on next page.



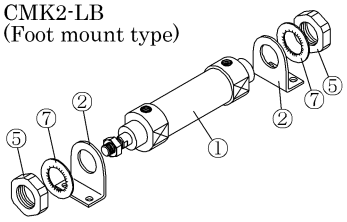
Apply an open ended spanner onto the double sided machined surface.

Assembly of mounting bracket (same as disassembling)

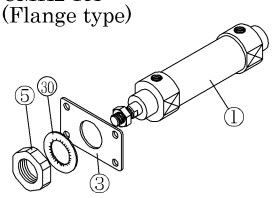
CMK2-00 (Basic type)



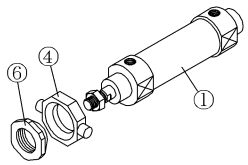
CMK2-LB (Foot mount type)



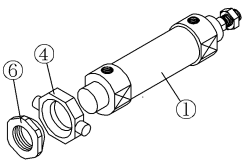
CMK2-FA (Flange type)



CMK2-TA (Rod side trunnion type)



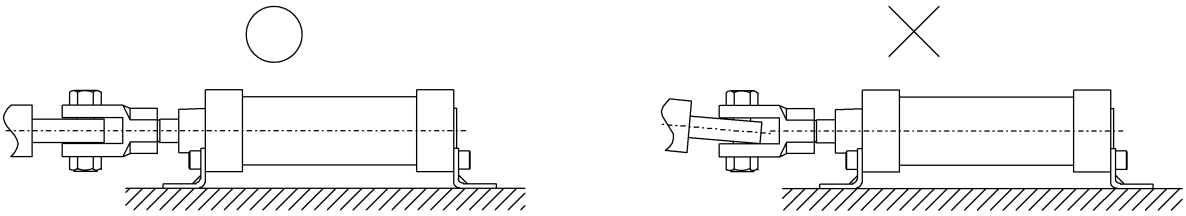
CMA2-TB (Head side trunnion type)



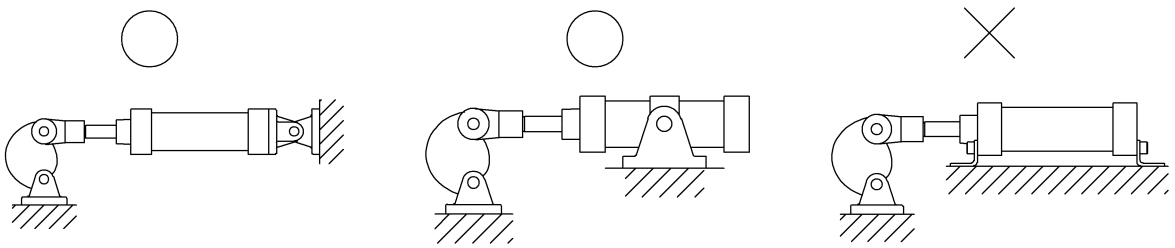
No.	Parts name	No.	Parts name
①	Cylinder body	⑥	Nut (for both TA type and TB type)
②	Foot bracket	⑦	Mounting Washer (for LB type and FA type)
③	Flange		
④	Trunnion (Axis type)		
⑤	Nut (for both LB type and FA type)		

5) 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.

6) 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.6)



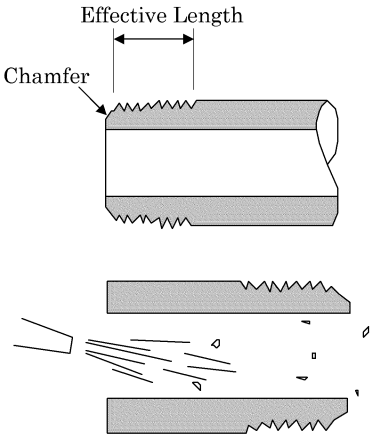
7) When the load acting direction changes with the cylinder operation:
Use an oscillating cylinder (clevis type or trunnion type) capable of making revolution to a certain angle.



Clevis type　　Trunnion type　　Foot type

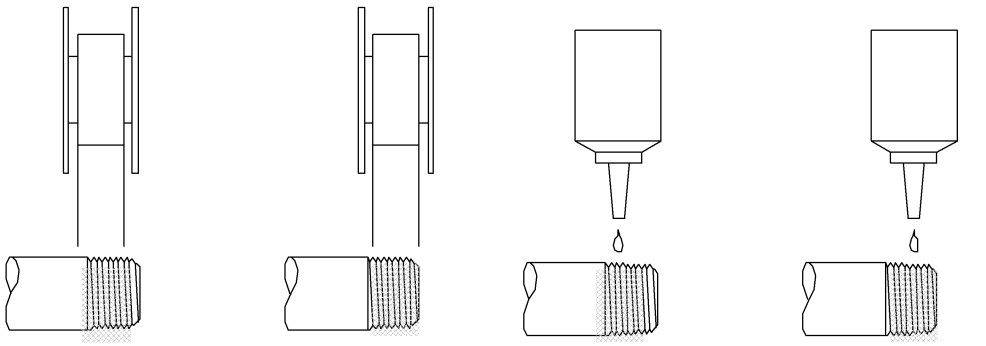
2.2 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.
2) See to it that the pipe connecting cylinder and solenoid valve has effective cross-sectional area which is needed for the cylinder to drive at the specified speed.
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.
4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.
5) Flush air into the pipe to blow out foreign substances and chips before piping.



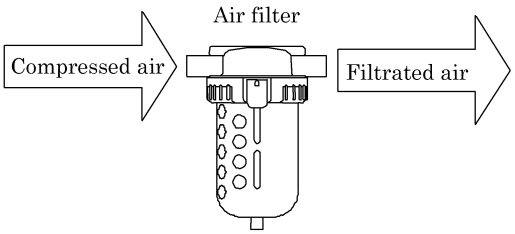
6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

●Seal Tape　　●Sealant (liquid)

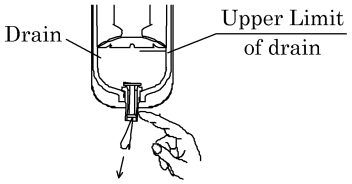


2.3 Fluid

1) It is necessary to use dehumidified air that has been filtered from compressed air. Carefully select an adequate filter that has an adequate filtration rate (preferably 5 μ m or less), flow rate and its mounting location (as nearest to the direc-tional control valve as possible).



2) Be sure to drain out the accumula-tion in the filter periodically.

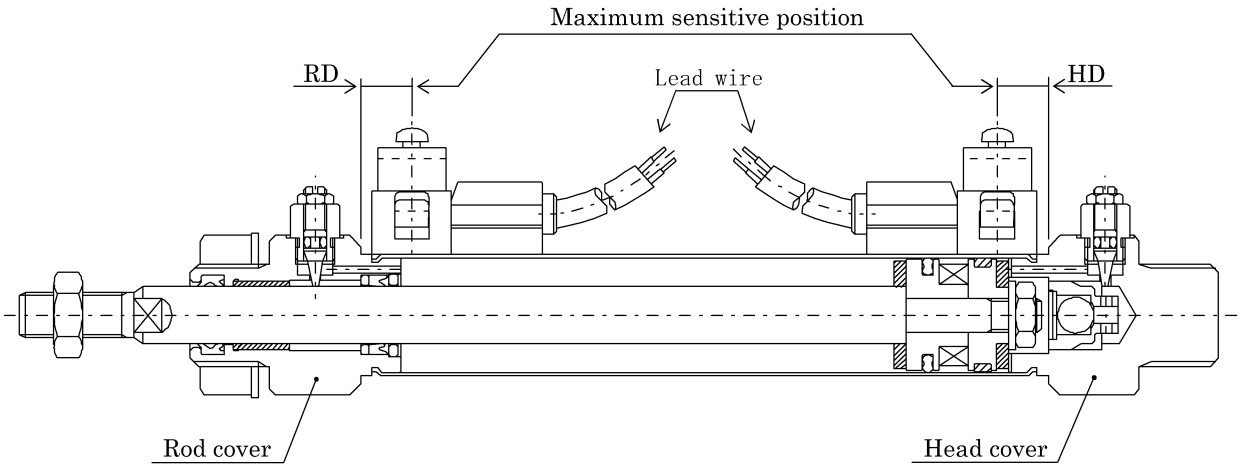


3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.

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 Switches on a Cylinder

1) Location of mounting switches on a cylinder.

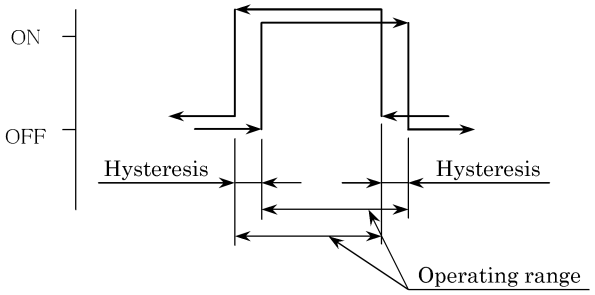


(1) At the stroke end
Refer the illustration above. Mount switches within the rod side dimension RD as well as the head side dimension HD for the purpose of having switches function at the points of the maximum sensitive position.

(2) Intermediate of stroke
Move the piston where it is anticipated to stop and fix it tentatively Slide a switch carefully along the side of cylinder over the piston to find out the spot where switch turns on. This type spot should be located on both side of piston. The intermediate spot between those posits is of the maximum sensitive position and where the switch is supposed to be installed.

(3) Location around the circumference of cylinder
There is no restriction. Install switch(es) wherever easy to utilize it.

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



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

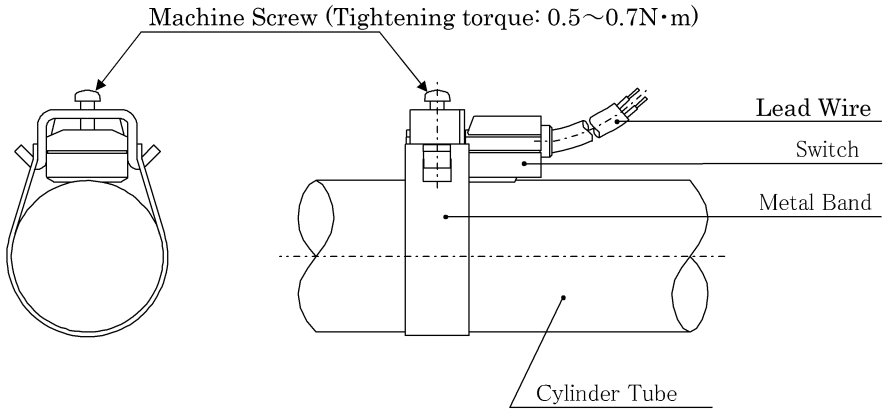
4) Relocation of Switch and Replacement

(1) Relocation

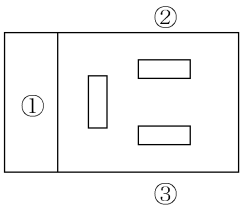
Push Switch body together with mounting band along the side of cylinder, after loosening Set screw (Machine screw) and tighten set screw once required location is determined. Move Switch body only while holding band in position for minor adjustment of location.

(2) Replacement of Switch

Take Switch body out of mounting metal band after loosening Set screw. Leave band and bracket in an old position on cylinder. Fix new switch to former metal band and tighten set screw upon determination of required location. It makes work easy to slightly turn switch while pushing it into bracket, when working on short stroke cylinder. (Apply tightening torque of 0.5～0.7N・m to tighten the screw.)



5) Wiring onto Terminal Box



Terminal / Model	①	②	③
R0(DC)、R2(Y)、R6		+	−
R0(AC)、R1、R4、R5		±	±
R3(Y)	OUT	+	−

3. OPERATION

3.1 Operating the Cylinder

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

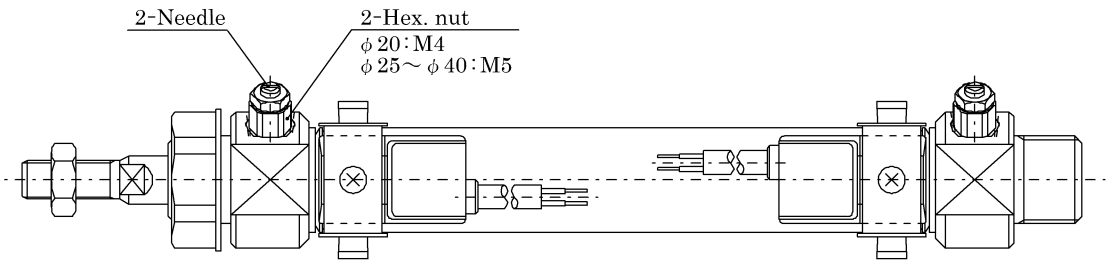
2) The cushion of the cylinder of this type is unadjustable its cushion effect because of being made of rubber. Intend using additional cushion in the event that the kinetic energy is estimated exceeding the value shown in the table1
If kinetic energy such as load is heavy or speed is too fast, exceeding the values given in Table 1, consider of providing a shock absorber.

Table1

Bore size (mm)	Allowable energy absorption (J)
φ20	0.089
φ25	0.137
φ32	0.179
φ40	0.278

3) Adjust the working piston speed referring to the figure below.

〈The working piston speed adjustment method〉



Adjustment of working piston speed can be adjusted with the needle prepared in the cover. After adjustment should fix a needle certainly with a hex. nut. After adjustment loosens a hex. nut, please perform it. Since a rod jumps out and is dangerous when performing speed adjustment, a needle is opened little by little from the state where it was bound tight.

3.2 How to use the Switches

3.2.1 Common items

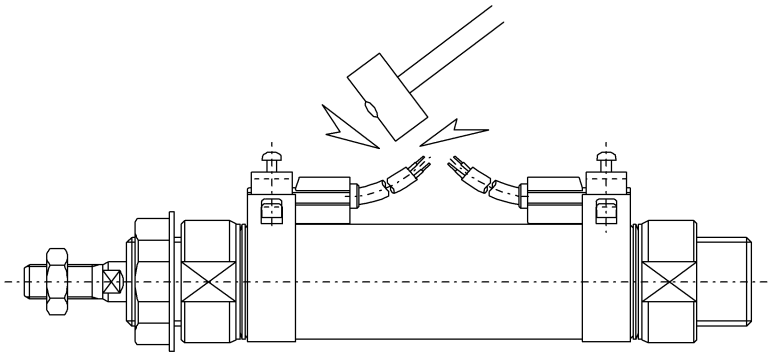
1) Magnetic environment
Avoid installation of switches within the area where strong magnetic field or large current (such as large magnet or spot welding equipment) exist. There may be a certain influence over sensing accuracy due to the interference of each magnetic field in case of parallel connection of cylinders with switch or when a magnetized article very much closely passes by the cylinder switch.

2) Lead wire wiring
Carefully perform the wiring so that a bending stress or tensile strength does not apply to the lead wire repeatedly.
Additionally, connect wires for robot having the bending resistance to movable parts.

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

4) Intermediate position detection
When activating the switch halfway of the stroke, the relay may not respond if the working piston speed is too fast.
When the operation time of the relay is 20 ms, operate the product at a working piston speed of 500 mm/s or less.

5) Impact
Do not apply a large vibration or impact to the product when transporting the cylinder, or mounting or adjusting the switch.



3.2.2 Reed switch (R0, R4, R5, R6)

1) Lead wire connections
Do not connect the lead wires of the switch to the power supply directly. Always connect the loads in series. For R0 switch, carefully check following items (1), (2).

(1) When using the switch for DC power supply, connect the brown and blue lines to the positive and negative sides, respectively. If these lines are connected reversely, the switch is activated, but the indicator light is not lit.

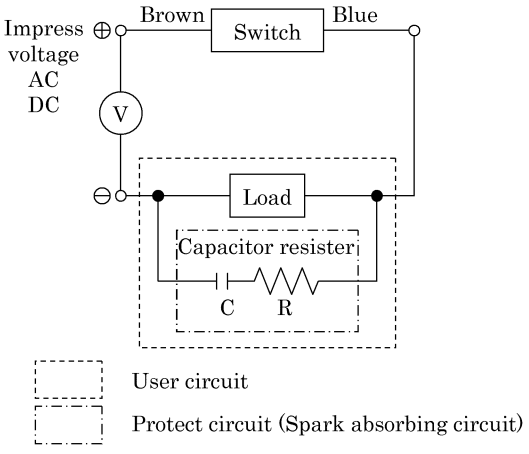
(2) When the switch is connected to an AC relay or a programmable controller input, the indicator light on the switch is not lit if the half-wave rectification is performed in the connected circuit. If this occurs, reverse the polarities of the switch lead wire connection. The indicator light may then be lit.
Note that the R4 and R5 switches have no polarities.

2) Contact protective measures
When an inductive load, such as relay is used or the wire length exceeds that stated in Table2, always install a contact protective circuit.

Table2

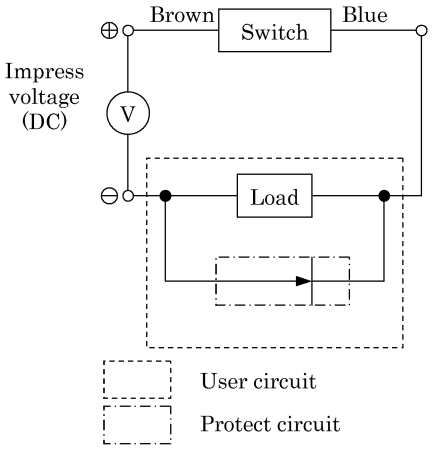
Switch	Electric power	Length of wire
R0, 5, 6	DC	100m
R0, 5	AC	10m
R4	AC	50m

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



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

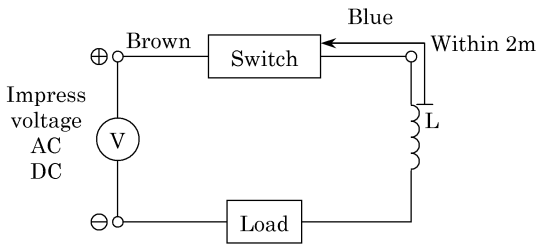
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

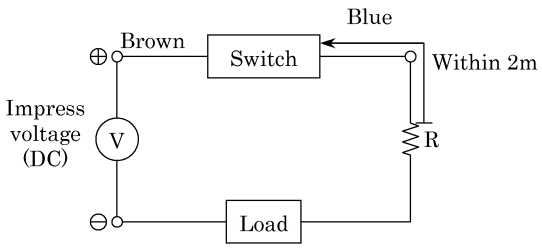
(2) Protective circuit when the wire length exceeds that stated Table 2



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

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

Fig.3



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

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

Fig.4

(3) Contact capacity
Do not use a load exceeding the maximum contact capacity of the switch. Additionally, if the current is lower than the rated current value, the indicator light may not be lit. (R0, R6)

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

(5) Series connection
When multiple R0 switches are used with they connected in series, the voltage drop at the switch becomes the sum of voltage drop values of all switches.
Therefore, the voltage applied to the load becomes a voltage that the voltage drop at the switch is subtracted from the power supply voltage. Thus, always check the minimum operating voltage value of the load.

Example: The following shows the voltage drop at the switch when three R0 switches are connected in series.

2.4V × 3 = 7.2 V

Since the voltage drop at the R5 switch is 0V, as many switches as required can be connected in series. When one R0 switch is used for checking of operation and R5 switch is used for other switches, they can be used with the voltage drop equivalent to one R0 switch (2.4V). In this case, the indicator light is lit only when all switches are turned ON.
If two R4 switches are connected at 100V AC or three or more R4 switches are connected at 200V AC, the indicator light is not lit. Additionally, the R6 switch cannot be connected in series.

(6) Parallel connection

When multiple R0 and R5 switches are connected in parallel, there are no limitations on the number of switches. When multiple R4 and R6 switches are connected in parallel, the leakage current increases for the number of switches. Therefore, carefully check the load specifications to determine the number of switches to be connected.

However, if multiple R0 and R6 switches are turned ON at the same time, the indicator light becomes dark or is not lit. For R4 switch, if even one R4 switch is turned ON, all indicator lights go off.

3.2.3 Solid state switch (R1, R2(Y), R3(Y))

1) Lead wire connections

Do not connect the lead wires of the switch to the power supply directly. Always connect the loads in series.

(1) For R2(Y) switch, connect the brown and blue lines to the positive and negative sides, respectively. If these lines are connected reversely, the switch and load are always kept activated. In this case, the indicator light is not lit.

For R3(Y) switch, pay special attention to Fig. 2 below.

(2) Always connect the lead wires while referring to the colors shown on the lead wires. At this time, turn OFF the power to the unit in the electrical circuit on the connection side before starting the wire connection work.

For R3(Y) switch, if the wiring is performed incorrectly or the load is short-circuited, this may cause the switch, as well as the electrical circuit on the load side to break. Carefully connect the lead wires so that they are not connected incorrectly or short-circuited.

Additionally, the work with the power supplied may cause the switch and electrical circuit to break if the work is performed in an incorrect manner even though the incorrect wiring is not performed.

〈Example: Connection of R3(Y) switch〉

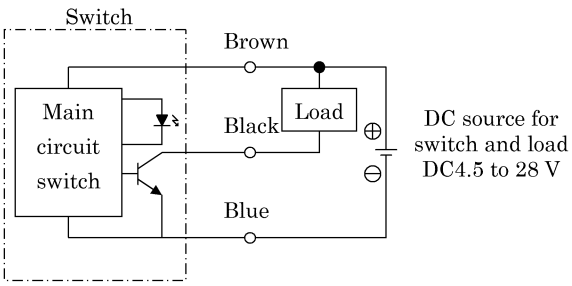


Fig.1 Fundamental circuit Example (1)
(In case the same source of power is used.)

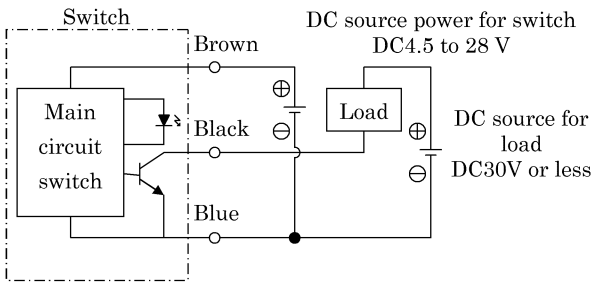


Fig.2 Fundamental circuit Example (2)
(In case individual sources of power are used.)

2) Connection load

The R1 switch can be connected to a load, such as AC programmable controller, relay, solenoid, or solenoid valve.

The R2(Y) switch is specially designed as a programmable controller switch. Since this switch uses two wires, it is connected to either the sink input or source input.

The R3(Y) switch can be connected to a load, such as digital IC, microcomputer, programmable controller, relay, solenoid, or solenoid valve.

When selecting or designing a load, carefully check the static electrical characteristics, as well as transient electrical characteristics (rush current when the switch is turned ON or surge voltage when the switch is turned OFF) so that they do not exceed the switch ratings. Additionally, if the electrical characteristics may exceed the switch ratings, appropriate protective measures are taken (surge absorbing element or rush current limiting resistance, etc.).

4. MAINTENANCE

4.1 Periodical Inspection

1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.
2) Inspection items
   (1) Check the bolts and nuts fitting the piston rod end bracket and mounting bracket for slackening.
   (2) Check to see that the cylinder operates smoothly.
   (3) Check any change of the working piston speed and cycle time.
   (4) Check for internal and/or external leakage.
   (5) Check the piston rod for flaw (scratch) and deformation.
   (6) Check the stroke for abnormality.

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

5. TROUBLE SHOOTING

1) Cylinder

Trouble	Causes	Remedies
Does not operate.	No pressure or inadequate pressure.	Provide an adequate pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Broken piston packing	Replace the cylinder.
Does not function smoothly.	Speed is below the low speed limit	Limit the load variation and consider the adoption of low pressure cylinder.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Exertion of transverse (lateral) load.	Install a guide. Revise the installation state and/or change the mounting style.
	Excessive load.	Increase the pressure itself and/or the inner diameter of the tube.
	Speed control valve is built in the way of "Meter in" circuit.	Change the meter-out circuit of the speed control valve.
Breakage and/or deformation	Impact force due to high speed operation	Turn the speed down. Reduce the load and/or install a mechanism with more secured cushion effect (e.g.external cushion mechanism).
	Exertion of transverse load.	Install a guide. Reverse the installation state and/or change the mounting style.

Note : The cylinder of this type is unable to be disassembled because of being caulked type assembly.
Replace cylinder in its entirety when some trouble is discovered.

2) Switch

Troubles	Causes	Remedies
Indicator light is not lit.	Deposited contact point	Replace the switch.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	Damaged indicator light	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
Switch does not function right.	Broken circuit	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
	Improper voltage	Correct voltage to specified.
	Incorrect location of switch	Correct its location.
	Aberrant position of switch	Set it back to original position and tighten the mounting device. Tightening torque is 0.5 to 0.7 N·m
	Incorrect direction of switch mounting	Correct the direction of the switch mounting.
	Relay is unable to respond properly	Replace the relay with a recommended one.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	Excessive speed of piston if it is to sense an intermediate point of stroke	Reduce the speed of piston. Connect switches in parallel Use “R6” type
Switch does not return.	Piston is not moving	Make the piston move.
	Deposited contact point	Replace the switch
	Excessive load (relay) than rated capacity	Replace the relay with a recommended one or replace the switch.
	The ambient temperature is out of the specification range	Adjust the ambient temperature within the range of -10 to 60℃
	Existence of a foreign magnetic field	Shield the magnetic field.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.

Note1. Refer ”2.4 Location of mounting Switches on a Cylinder” as for replacing a switch and correcting its location.

6. HOW TO ORDER

6.1 Product Number Coding

CMK2-Z – a – b – c – d – e – f g

(a) Mounting style		(b) Bore size (mm)		(c) Stroke (mm)	
00	Basic type	20	ϕ 20	Standard stroke	Maximum stroke
LB	End angle type (both sides)	25	ϕ 25		
LS	End angle type (one side)	32	ϕ 32	25	750
FA	Rod side flange type	40	ϕ 40	50	
FB	Head side flange type			75	
CA	Eye type			100	
CB	Clevis type			125	
CC	Fixed eye type			150	
TA	Rod side trunnion type			175	
TB	Head side trunnion type			200	
				250	
				300	

(d) Switch model						(e) Qty. of switch	
Grommet	Water-proof terminal box	terminal box	Function	Switch type	Lead wire	R	Rod side, 1 ea
						H	Head side,1 ea
R0※	R0A	R0B	AC/DC Relay, for PC	Reed	2-wire	D	2 ea
R4※	R4A	R4B	AC High capacity			T	3 ea
R5※	R5A	R5B	AC/DC Relay, for PC, IC circuit, without indicator light				
R6※	R6A	R6B	DC Self holding (PC)				
R1※	R1A	R1B	PC, relay, for small solenoid valve	Solid state			
R2(Y)※	R2(Y)A	R2(Y)B	For PC exclusively				
R3(Y)※	R3(Y)A	R3(Y)B	For PC, relay, IC Circuit, solenoid valve		3-wire		

(f) Options		(g) Accessory	
J	Bellow: Nylon tarpaulin	I	Rod eye
L	Bellow: Silicone rubber glass cloth	Y	Rod clevis
F	Push-in joint (straight)	B2	Clevis bracket
FE	Push-in joint (elbow)		
M	Changed piston rod material to stainless steel		
V	Boss Cut		
P	Copper and PTFE free		

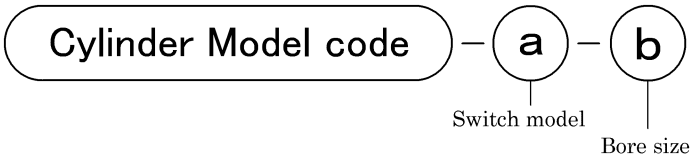
※ mark indicates the length of lead wire.

※ Lead wire length	
No code	1m (Standard)
3	3m (Option)
5	5m (Option)

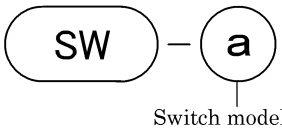
● Coding example
CMK2-Z-LB-32-100-R3-D-I
Tight cylinder (speed controller built-in type), End angle type (both sides), Bore size ϕ 32, Stroke 100,
Switch R3, 2 ea., Rod eye.

6.2 Component parts Model coding

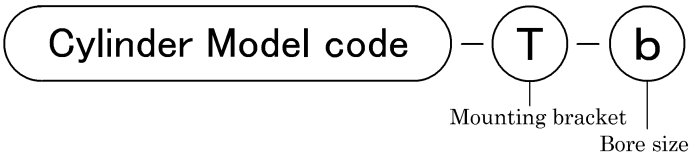
(1) Switch body + Mounting bracket



(2) Switch alone



(3) Set of mounting bracket



(a) Switch model			(b) Bore size (mm)	
Grommet	Water-proof terminal box	Terminal box	20	ϕ 20
			25	ϕ 25
R0※	R0A	R0B	32	ϕ 32
R4※	R4A	R4B	40	ϕ 40
R5※	R5A	R5B		
R6※	R6A	R6B		
R1※	R1A	R1B		
R2(Y)※	R2(Y)A	R2(Y)B		
R3(Y)※	R3(Y)A	R3(Y)B		

※ mark indicates the length of lead wire.

※ Lead wire length	
No code	1m (Standard)
3	3m (Option)
5	5m (Option)

7. SPECIFICATION

7.1 Product Specifications

Model / Item		CMK2-Z			
Bore size	mm	φ20	φ25	φ32	φ40
Actuation		Double-acting type・Speed controller built-in type			
Working fluid		Compressed Air			
Max. working pressure	MPa	1.0			
Min. working pressure	MPa	0.1			
Proof pressure	MPa	1.6			
Ambient temperature	℃	−10～60 (No freezing)			
Port size		Rc1/8			
Stroke tolerance	mm	$^{+2.0}_{0}$ (less than 200) $^{+2.4}_{0}$ (over than 200 and 750 or less)			
Working piston speed	mm/s	50～300			
Cushion		Rubber cushion			
Lubrication		Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)			
Copper and PTFE free specification		Option			
Allowable energy absorption	J	0.089	0.137	0.179	0.278

7.2 Switches Specification

Type & Model / Item	Reed switch type switch				
	R0			R4	
Applications	For use with relay, programmable controller			For use with high capacity relay, solenoid valve	
Load Voltage	DC12/24V	AC110V	AC220V	AC110V	AC220V
Load Current	5 to 50mA (Note 2)	7 to 20mA (Note 2)	7 to 10mA (Note 2)	20 to 200mA (Note 2)	10 to 200mA (Note 2)
Internal voltage drop	2.4V or lower			2V or lower	
Indicator light	Lit when LED is on			Lit when neon lamp is off	
Leakage current	0mA			1mA or lower	
Lead wire length (Note 1)	1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.3mm^2)				
Shock resistance	294m/s^2				
Insulation resistance	20 MΩ or more measuring with DC500V megger tester				
Withstand voltage	No abnormalities should occur after applying AC1,500V for 1 minute				
Ambient temperature	-10 to 60℃				
Degree of protection (Note 3)	For Grommet - IEC Standard IP67, JIS C0920 (water tight type), Oil resistance				

Type & Model / Item	Reed switch type switch			
	R5			R6
Applications	For use with programmable controller, relay, IC circuit (without lamp), series connection			For use exclusively with programmable controller (with DC self-holding function)
Load Voltage	DC12/24V	AC100V	AC200V	DC24V
Load Current	50mA or lower	20mA or lower	10mA or lower	5 to 50mA (Note 2)
Internal voltage drop	0V			5V or lower
Indicator light	Without			Lit when LED is on
Leakage current	0mA			0.1mA or lower
Lead wire length (Note 1)	1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.3mm^2)			
Shock resistance	294m/s^2			
Insulation resistance	20 MΩ or more measuring with DC500V megger tester			
Withstand voltage	No abnormalities should occur after applying AC1,500V for 1 minute			
Ambient temperature	-10 to 60℃			
Degree of protection (Note 3)	For Grommet - IEC Standard IP67, JIS C0920 (water tight type), Oil resistance			

Type & Model / Item	Solid state switch		
	R1	R2	R2Y (2-color display)
Applications	For use with programmable controller, relay, compact solenoid valve	For use exclusively with programmable controller	
Power supply voltage	—		
Load voltage	AC85 to 265V	DC10 to 30V	
Load current	5 to 100mA (Note 2)	5 to 30mA (Note 2)	
Current consumption	—		
Internal voltage drop	7V or lower	4V or lower	
Indicator light	Lit when LED is on		LED (Red/Green) (Lights while power is ON)
Leakage current	1mA or lower at ac110V 2mA or lower at ac220V	1mA or lower	1.2mA or lower
Lead wire length (Note 1)	Standard 1 m (Oil-proof vinyl cabtyre cord, 2-wire, 0.3mm^2)		
Shock resistance	980m/s^2		
Insulation resistance	20 MΩ or more measuring with DC500V megger tester		
Withstand voltage	AC1,500V for 1 minute	AC1,000V for 1 minute	
Ambient temperature	-10 to 60℃		
Degree of protection (Note 3)	For Grommet - IEC Standard IP67, JIS C 0920 (water tight type), Oil resistance		

7 SPECIFICATION

Type & Model / Item	Solid state switch	
	R3	R3Y (2-color display)
Applications	For use with programmable controller, relay, IC circuit, compact solenoid valve	
Power supply voltage	DC4.5 to 28V	
Load voltage	DC30V or lower	DC30V or lower
Load current	200mA or lower	150mA or lower
Current consumption	10mA or lower when it is on at DC24V	16mA or lower when it is on at DC24V
Internal voltage drop	0.5V or lower at 150mA	0.5V or lower
Indicator light	Lit when LED is on	LED (Red/Green) (Lights while power is ON)
Leakage current	10 μA or lower	
Lead wire length (Note 1)	Standard 1 m (Oil-proof vinyl cabtyre cord, 3-wire, 0.2mm^2)	
Shock resistance	980m/s^2	
Insulation resistance	20 MΩ or more measuring with DC500V megger tester	
Withstand voltage	AC1,000V for 1 minute	
Ambient temperature	-10 to 60℃	
Product weight (Note 3)	For Grommet - IEC Standard IP67, JIS C 0920 (water tight type), Oil resistance	

Note 1 : 3m or 5m long lead wire is optionally available.

Note 2 : Max. load current above is value at 25 ℃. The current will be lower if the temperature around switch is higher than 25 ℃. (50% at 60℃).

Note 3 : R※B terminal box is not water-proof. The water-proof R※A type box (Matsushita Denko made) is the order made item.