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SM－213848－A

INSTRUCTION MANUAL

SELTOP CYLINDER

JSC3（φ125 to φ180）

- 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 4th edition

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For Safety Use

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

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

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

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

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

⚠ CAUTION :

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

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JSC3 (ϕ 125 to ϕ 180)
Seltop Cylinder (Large bore size)
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1 UNPACKING 2 INSTALLATION

1. UNPACKING

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

2. INSTALLATION

2.1 Installation

1) Use such bearing of low coefficient of skin friction and of low expansion ratio as ball bearing or roller bearing for the guide of cylinder load for the purpose of retaining positioning accuracy.

2) Use these cylinders within the following range of ambient temperature.

JSC3-N (Standard)	-10 to 60℃ (No freezing)
JSC3-H (Low pressure hydraulic oil type)	5 to 50℃
JSC3-T (Heat resistance type)	5 to 120℃

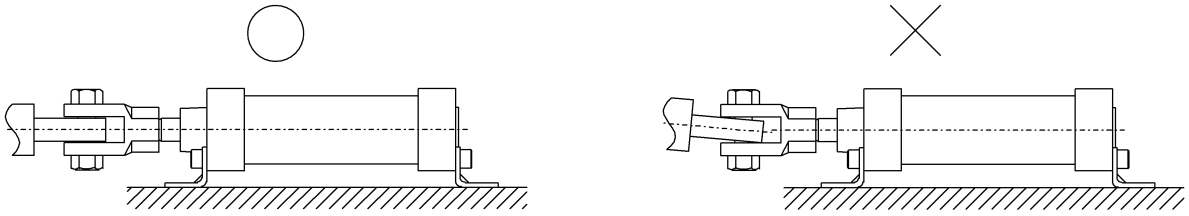
3) Use cylinder with bellows over its rod within the area with much dust.

4) Carefully avoid other object from hitting the tube. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.

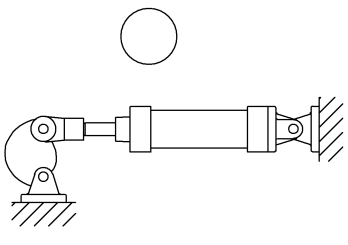
5) For the purpose of retaining improved positioning accuracy within the cushion chamber stroke;
   (1) Avoid to plan to stop position within 40mm from stroke end during coming away stroke from cushion chamber.
   (2) Avoid to plan to make an intermediate stop of piston within the cushion chamber stroke.

6) 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).

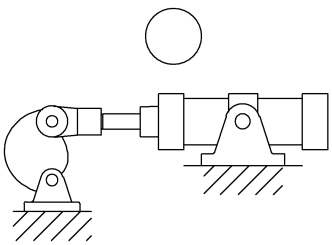
7) When cylinder is fixed and rod end is connected with pin joint;
In case the load acting direction is not parallel with the rod axial center, the rod and tube may get entangled causing seizure, etc. Hence, make sure that the rod axial center and the load transfer direction are aligned to each other.



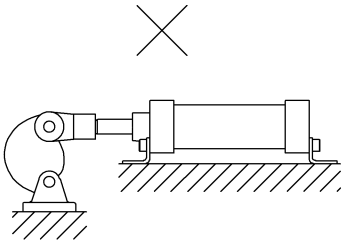
8) When the load acting direction changes with the cylinder operation:
Use an oscillating cylinder (clevis type or trunnion type) capable of making revolution to a certain angle. Furthermore, install the rod and connecting metal (knuckle) so that it moves in the same direction as the cylinder main body does.



Clevis type



Trunnion type



Foot type

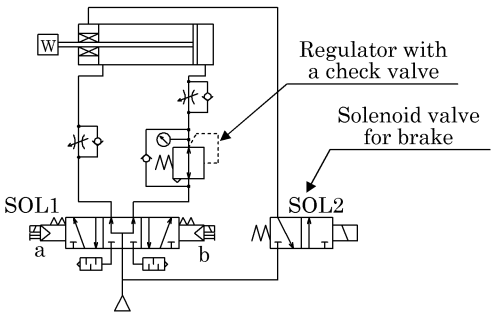
2.2 Fundamental Circuit

1) To retain an accurate operation, comply the following fundamentals and design such circuit as illustrated below.
   ① Supply the pressure to both side of piston when piston is stopped. (This is to eliminate the piston from popping out on succeeding start.)
   ② To make thrust balanced (including the load), install a regulator with a check valve within the circuit which provides larger thrust.
   ③ Install the solenoid valve for brake as close to the brake port as possible.

In case of horizontal load

The ray-out per Fig.1 prevents the piston rod from popping out at the moment the brake system is released as the pressure is delivered on both sides of piston when the cylinder motion is stopped by shifting the solenoid valve to its neutral position. Keep balancing by installing a regulator with a check valve to the circuit of cylinder head side.

Fig.1



SOL1		SOL2	Actuating
a	b		
OFF	OFF	OFF	Halt
ON	OFF	ON	Retract
OFF	ON	ON	Advance

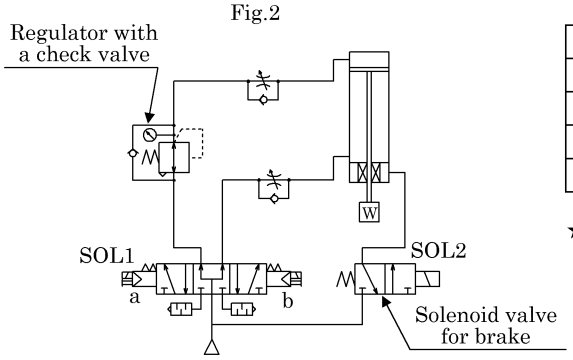
★ Pressure within the regulator $= \frac{(D^2-d^2)}{D^2} P$

D : Cylinder bore [mm]
d : Diameter of rod [mm]
P : Working pressure [MPa]

In case of downward load

When the lay-out of circuit is as shown in Fig.2, install a reducing valve with a check valve to the circuit of cylinder head side for the purpose of reducing the downward thrust of the rod and keeping a balance because the cylinder rod is apt to be suddenly pulled down due to the load at the moment the brake system is released.

Fig.2



SOL1		SOL2	Actuating
a	b		
OFF	OFF	OFF	Halt
ON	OFF	ON	Advance
OFF	ON	ON	Retract

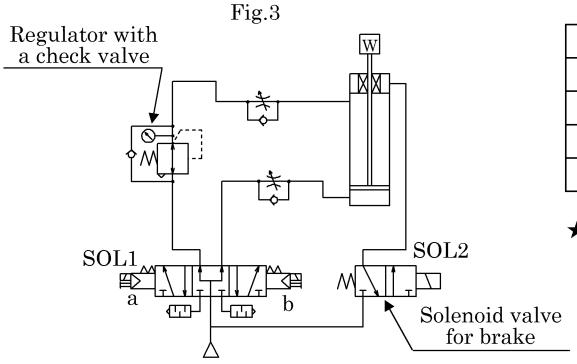
★ Pressure within the regulator $= \frac{\pi(D^2-d^2)P-4W}{\pi D^2}$

D : Cylinder bore [mm]
d : Diameter of rod [mm]
P : Working pressure [MPa]
W : Load [N]

In case of upward load

When the load is upward as shown in Fig.3, install a reducing valve with a check valve to the circuit of piston rod side for the purpose of reducing reversed thrust of the rod and keeping a balance because the cylinder rod is apt to be pushed backward due to the load at the moment the brake system is released.

Fig.3



SOL1		SOL2	Actuating
a	b		
OFF	OFF	OFF	Halt
ON	OFF	ON	Retract
OFF	ON	ON	Advance

★ Pressure within the regulator $= \frac{\pi D^2P-4W}{\pi(D^2-d^2)}$

D : Cylinder bore [mm]
d : Diameter of rod [mm]
P : Working pressure [MPa]
W : Load [N]

2) Keeping a balance of propulsion
Keep a balance of propulsion by regulator with check valve as per fundamental circuit diagram posted in “2.2 Fundamental Circuit”.
Adjust pressure in the duration of raising it instead of reducing it. Guide line value is calculated out of formulae posted in “2.2 Fundamental Circuit” (★ marked on page 5).

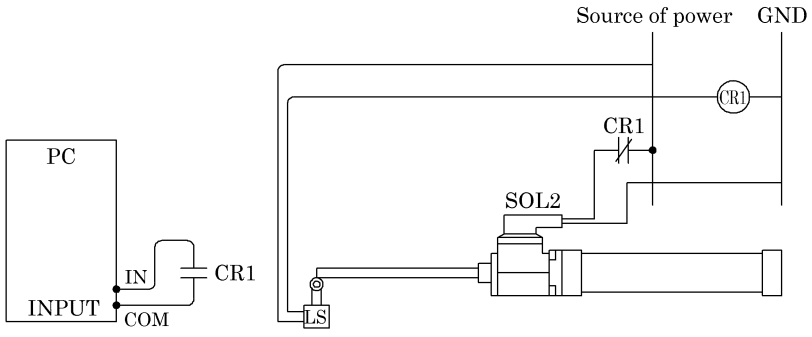
2.3 Electric Control Circuit

Carefully observe the following items as position accuracy is influenced by each control equipment as well as circuit.

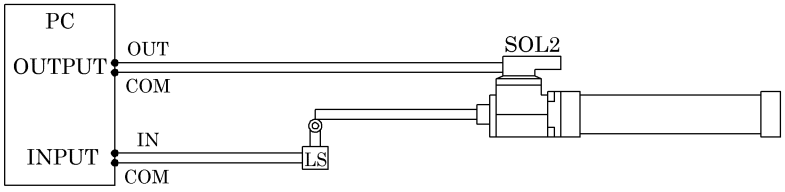
① Select the equipment with a quick response time and high accuracy.
② So design to have brake release signal and cylinder control signal are put out simultaneously or have brake release signal is put out a moment ahead of cylinder control signal to avoid piston rod from popping out.
③ Make the sensor switch of stop signal self-holding circuit.
④ Select sensor switch of stop signal out of either cylinder switch, roller plunger type limit switch, proximity switch or that of photo tube.
⑤ Caution when sequencer is built in a circuit.
Positioning accuracy is ruined to extent of such as ±3mm to ±5mm when brake circuit is built through a sequencer because of dispersion of brake release timing due to dispersion of scanning time (±20ms to 30ms).
Design the brake circuit directly through a relay instead of through sequencer.

※ Scanning time ·····Time requirement a program routine executed one cycle
※ Dispersion ·····Dispersion is ±1.5mm when scanning time is 30ms at the cylinder speed of 100mm/s

○ Example of good circuit which does not go through sequencer

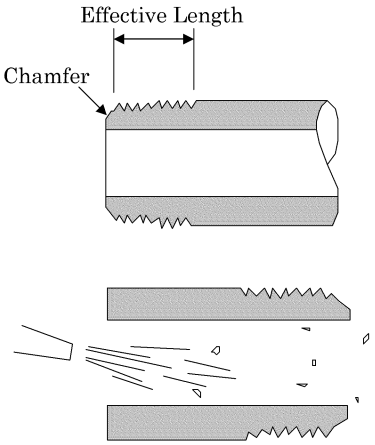


× Example of undesirable circuit which goes through sequencer



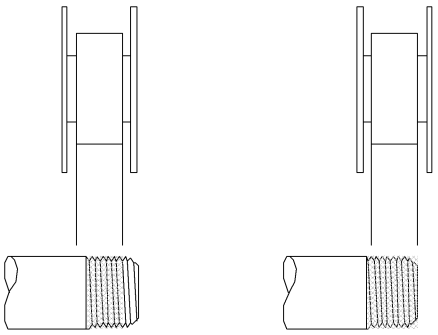
2.4 Piping

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.



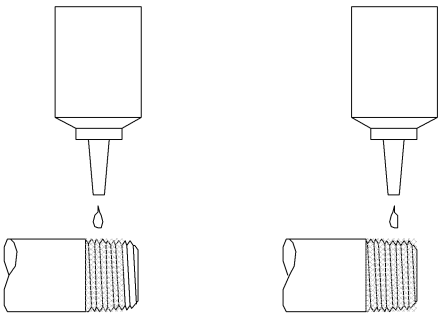
6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

● Seal Tape



(Correct) (Incorrect)

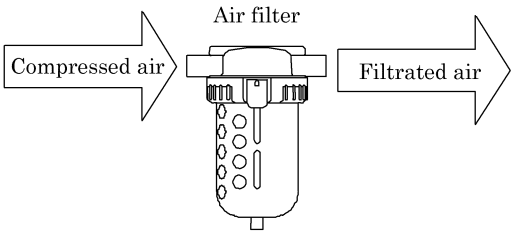
● Sealant (liquid)



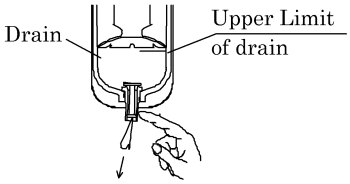
(Correct) (Incorrect)

2.5 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 directional control valve as possible).



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

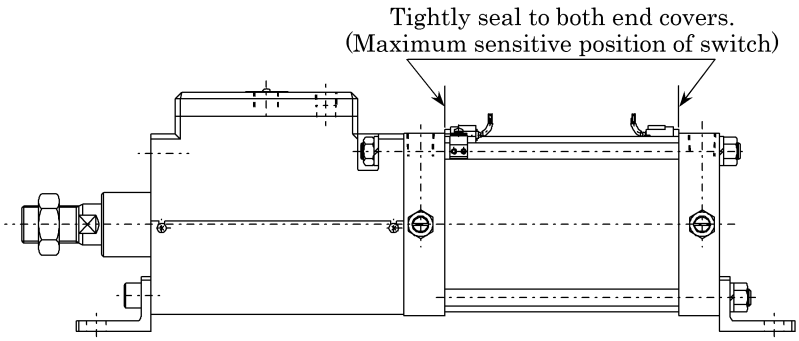


3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.

4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 as a lubricant, if and when lubrication is needed.

2.6 Location of mounting Switches on a Cylinder

1) Location of mounting switches on a cylinder

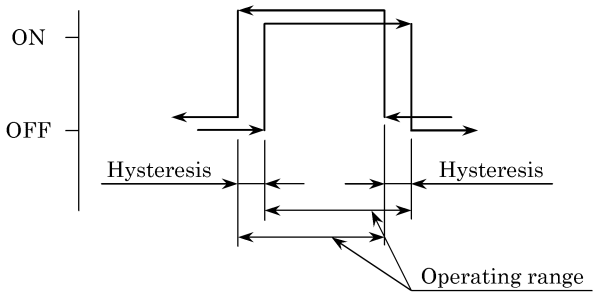


(1) At the stroke end
Refer the illustration above. Mount switches within the rod side dimension RD as well as the head side dimension HD for the purpose of having switches function at the points of the maximum sensitive position.

(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.

Discontinue

4) Maximum sensitive position (HD・RD), operating range and hysteresis.

(Unit : mm)

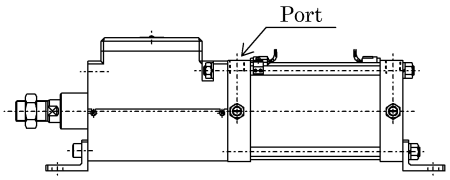
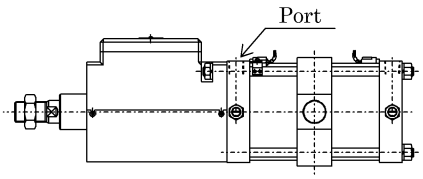
Item / Bore size (mm)	Maximum sensitive position	Solid state switch (R1K, R2K, R2YK,R3K,R3K)				Reed switch (R0, R4, R5, R6)	
	HD, RD	Operating range		Hysteresis		Operating range	Hysteresis
		1 color	2 color	1 color	2 color		
φ125	0	7.5 to 14	14～21	1.5 or less	1.0 or less	11 to 16	3 or less
φ140			18 to 26				
φ160							
φ180							

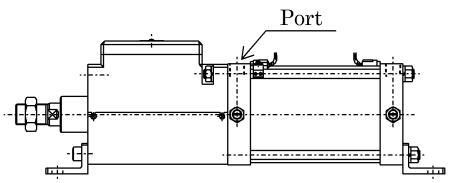
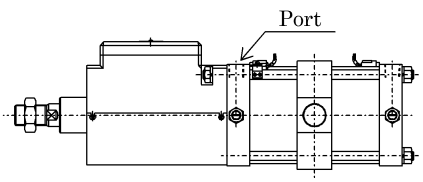
Item / Bore size (mm)	Maximum sensitive position		Strong magnetic field proof solid state switch (T2YDP)			
	HD, RD		Operating range		Hysteresis	
	1 color	2 color	1 color	2 color	1 color	2 color
φ125	—	3.5	—	6.5 to 8	—	1 or less
φ140	—	3	—	6.5 to 8.5	—	
φ160	—	4	—		—	
φ180	—	5	—	6.5 to 9	—	

5) Location of switches mounted at ex-factory

Switches are mounted at the maximum sensitive position on cylinder. The location along circumference of cylinder differs in accordance with stroke. Refer the table below.

(Unit : mm)

Item	Same surface installation	Center trunnion installation
Rough sketch / Bore size		
φ125	20 over ※(25 over)	120 or more
φ140		125 or more
φ160		130 or more
φ180		135 or more

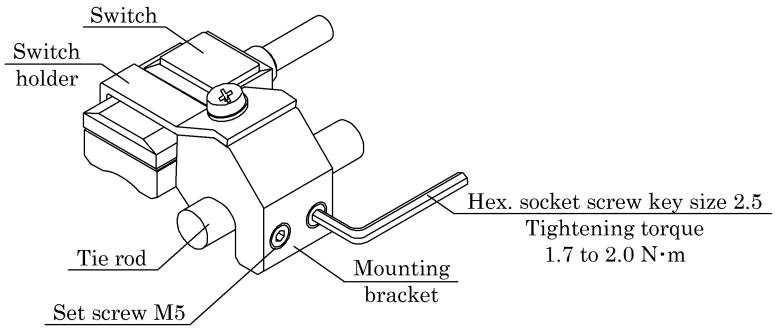
Item	Rod side trunnion installation	Head side trunnion installation
Rough sketch / Bore size		
φ40	70 or more	
φ50	75 or more	
φ63	80 or more	
φ80	85 or more	

※ For R2YK and R3YK, this is the minimum stroke length.

6) Relocation of switch

Loosen the set screws (2 ea.) for approx. 1/2 to 3/4 turn. It enables the switch to slide along the tie rod without letting screws drop off.

After setting the new location of switch, hold switch holder against the tube surface and tighten set screws to the tie rod. Adequate torque of tightening it is 1.7 to 2.0 N・m. It is considered to be sufficient, as a rule of thumb, when Allen wrench starts bending slightly.

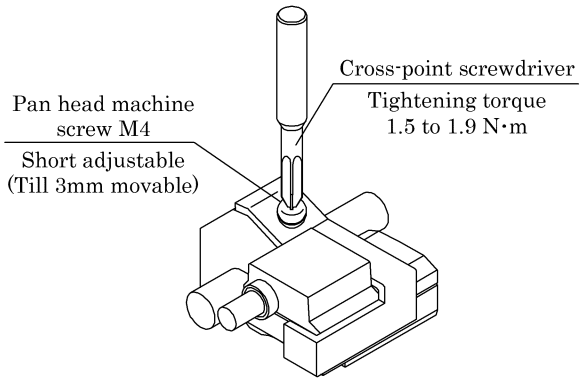


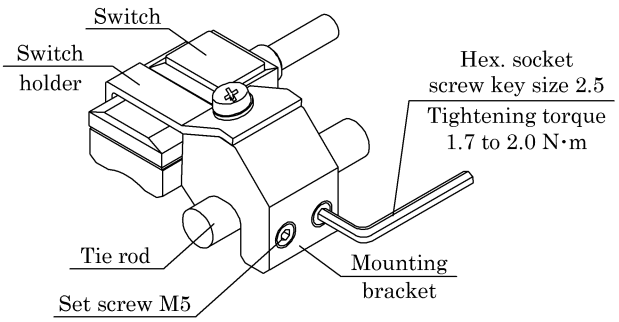
7) Installation of switch

Follow the procedures (1) to (3) as described below.

(1) While holding a switch underneath of switch holder, tighten M4×10 pan headed machine screws to mount it on the bracket.

(2) Screw-in the set screws to mount the bracket on the tie rod. While letting the mounting bracket hook the tie rod, slightly screw further until it touches the rod. Thus, it eliminates the whole set of switch from falling off the rod, yet enables to slide the set along the rod. Make use this merit when engaged in adjusting location of the switch set.





(3) To fix the mounting bracket on the tie rod, tighten screws while pressing bracket slightly against tube. Adequate torque of tightening screw is 1.7 to 2.0 N·m. It is considered to be sufficient, as a rule of thumb, when Allen wrench starts bending slightly.

3. OPERATION

3.1 Operating the Cylinder

1) Range of working pressure
Operate the system within following working pressure.

Model	Working pressure for brake	Working pressure for cylinder
JSC3-N	0.3 to 1.0MPa	0.05 to 1.0MPa
JSC3-H		0.1 to 1.0MPa
JSC3-T		0.05 to 1.0MPa

2) Though the cushion has been adjusted at no load when delivered, adjust the cushion needle when the change of cushion effect is required.
Tightening the needle (clockwise) makes cushion more effective. Tighten the needle lock nut all the way after adjustment.
However, 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.

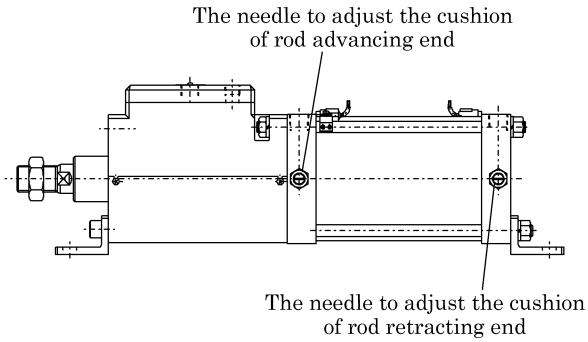
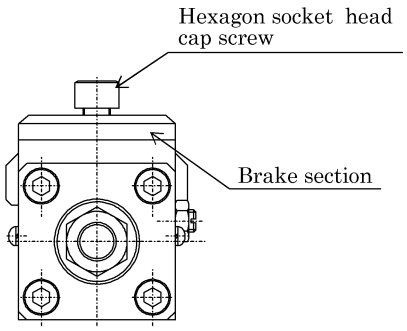


Table1. Cushion characteristic chart

Bore size (mm)	Allowable energy absorption (J)		
	Effective air cushion length (mm)	With cushion	Without cushion
ϕ125	21.6	63.6	0.371
ϕ140		91.5	0.386
ϕ160		116	0.386
ϕ180		152	0.958

3) Adjust the working piston speed with the speed controller mounted.

4) Manual release of brake
Brakes are released when the hexagon socket head cap screw is screwed in 2 turns into the female thread on the top of the brake section (side of the brake release port). (If a commercially-available bolt is screwed in too far, the brakes may not function.)
(Remove the hexagon socket head cap screw before starting normal operation.)



Note : So long as the model JSC3-V is concerned, (as solenoid valve for brake mechanism is built-in) brake is also able to be released by manually operating the solenoid valve but it requires independent pressure air line to actuate the brake mechanism.

3.2 How to use the Switches

3.2.1 Common items

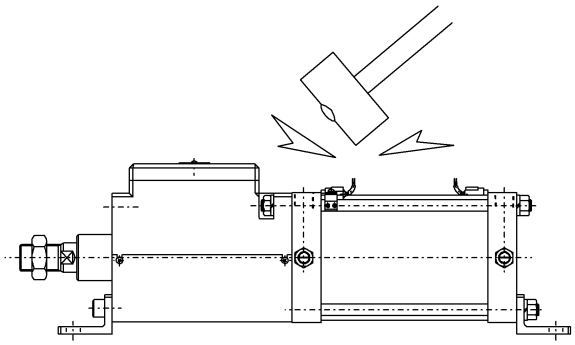
1) Magnetic environment
Do not operate this product in a place where a strong magnetic field or large current (large magnet or spot welder, etc.) exists. If a cylinder with the switch is installed in parallel to this product or the magnetic substance moves near the cylinder, the mutual interference may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

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

3) Operating temperature
Do not operate the product at a high temperature (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.
(Example) Operate cylinder with the speed of less than 500mm/s in case the relay actuation time is 20ms.

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.

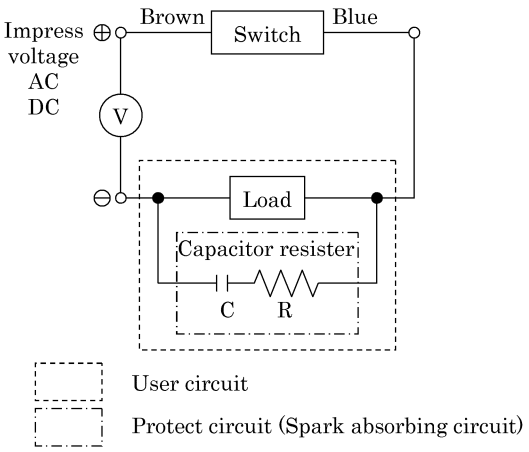
2) Contact protective measures

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

Table 2

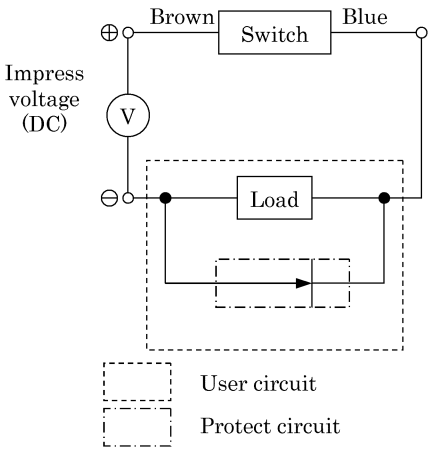
Switch	Electric power	Length of wire
R0, 5, 6	DC	100m
R0, 5	AC	10m
R4	AC	50m

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



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

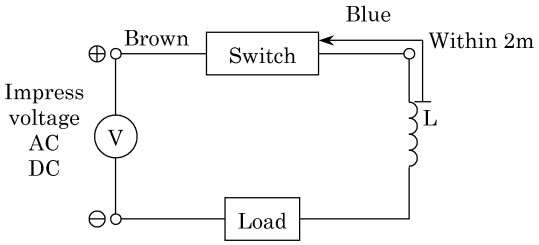
Fig.1 When capacitor resister is used.



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

Fig.2 When diode is used.

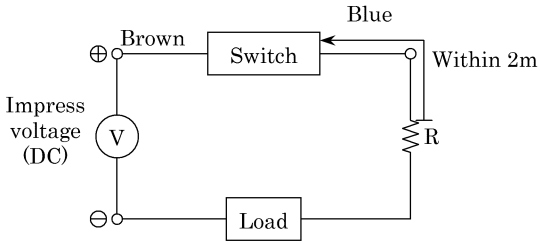
(2) Protective circuit when the wire length exceeds that stated Table 2



・ 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 (R1K, R2K, R3K, T2YDP)

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 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 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 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.

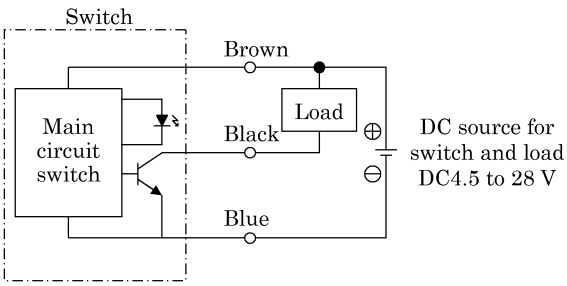


Fig.1 Fundamental circuit Example (1)
(In case the same source of power is used.)

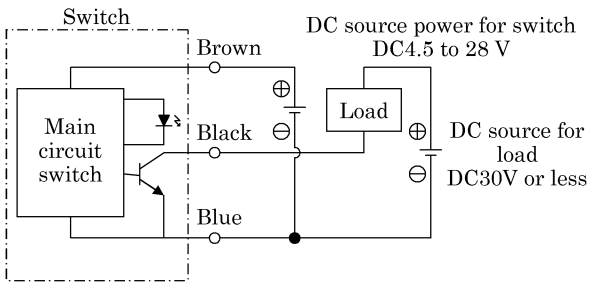


Fig.2 Fundamental circuit Example (2)
(In case individual sources of power are used.)

2) Connection load

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

The R2 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 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.).

3) Strong magnetic field proof switch (T2YDP)

- External magnetic field proof performance (at welding current of AC14000A)

This strong magnetic field proof switch can be used for all T-type strong magnetic field solid state switch (T2YDP) built-in cylinder models or operated in a status that the welding cable is in contact with the cylinder or switch. However, this switch cannot be used for two or more welding cables or within the cable loop.

Note : If this switch is used at a welding current of more than AC14000A, the welding cable must be made 35 mm or more apart from the cylinder tube surface.
(Testing conditions: Outside diameter of the cable is ϕ 36.)

4. MAINTENANCE

4.1 Periodic 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 mounting bolts and nuts of brake mechanism.
   ② Check of release operation of brake. (Check whether brake release operates by minimum working pressure 0.35MPa.)
   ③ Check the mounting bolts and nuts of cylinder.
   ④ Check the mounting bolts and nuts to the piston rod end brackets and mounting brackets for slackening.
   ⑤ Check that the cylinder operates smoothly.
   ⑥ Check any change of the working piston speed and cycle time.
   ⑦ Check for internal and /or external leakage.
   ⑧ Check the piston rod for flaw(scratch) and deformation.
   ⑨ Check the stroke for abnormality.
   ⑩ Check whether overrun length of piston rod is large.
   ⑪ Check any corrosion inside of each port.

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

   Do not disassemble the brake section for an important section. When inspecting the inside of brake, it takes over and inspects by our company. Consult with CKD.

4.2 Disassembling ・Assembling

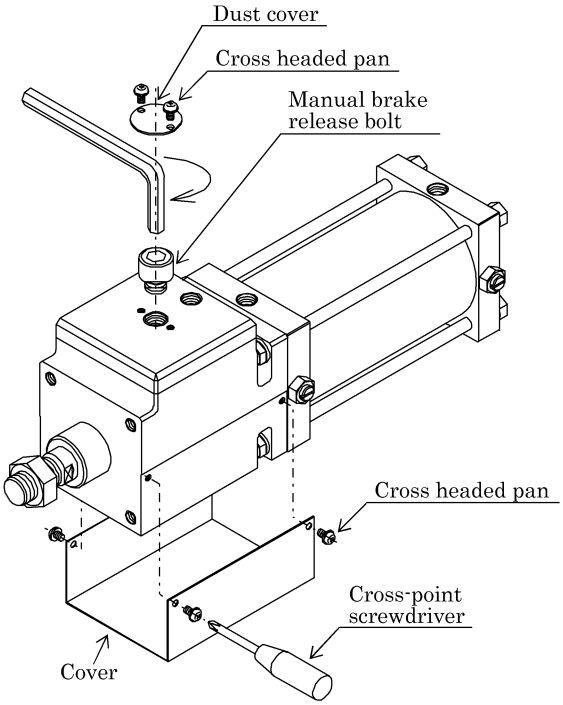
Should any air leakage occur, take the following corrective actions.

1) Dismounting of the brake unit

(1) Remove the dust cover on the drake unit by taking out 4 each of dust cover mounting screws with cross-point screwdriver

(2) Remove cover to the down direction.

(3) Remove the dust cover on the brake unit by taking out 2 each of dust cover mounting screws (Cross headed pan). Manually release brake by screwing hexagon socket head cap screw into flame threaded hole (side of the break release port). (Refrain from over tightening it than necessary.)



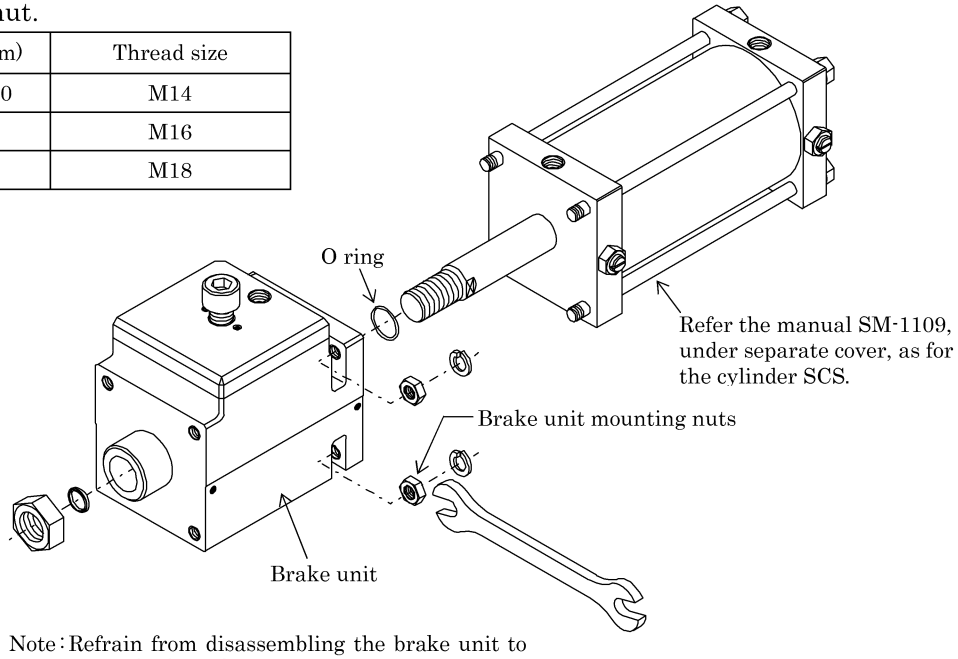
Refer the table below as for the size of hexagon socket head cap screw.

Bore size (mm)	Thread size
φ125	M24×16 or more
φ140	M24×20 or more
φ160	M24×20 or more
φ180	M24×24 or more

(4) Take the brake unit away by removing mounting hexagon nuts.

Refer the table below as for the size of hexagon nut.

Bore size (mm)	Thread size
φ125, φ140	M14
φ160	M16
φ180	M18



Note：Refrain from disassembling the brake unit to retain high performance.

2) Mounting the brake unit
Take reverse procedure (4) to (1) as per described in paragraph 4.2 1) to mount the unit back to cylinder.

Pay attention on the following items during the course of assembling.

① Do not apply grease to piston rods. (Applying grease may result in a drop in holding force of brake.)

② Wipe the grease off the piston rod should there be any grease over it.

③ Apply grease over metal seal (O ring) and carefully assemble them back without giving any scratch mark on it.

④ While tightening the mounting bolts over brake unit, tighten the pair of bolts diagonally to avoid twisting unit.

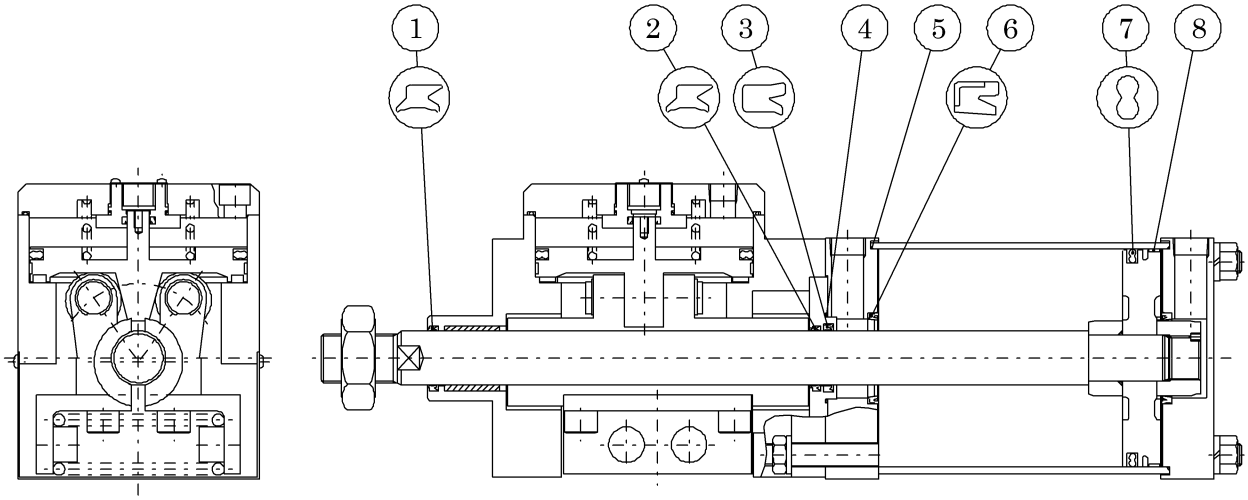
⑤ Keep the socket headed bolt for manual release of brake removed except when required.

3) Inspect the following items.

① Scratch marks on the boar surface of the tube
② Scratch marks on the surface of piston rod, peel-off of plating and rusting
③ Scratch marks and wear inside of the bush
④ Scratch marks, wear and crack of the surface of piston
⑤ Loosened connection of piston and rod
⑥ Crack of both end covers
⑦ Scratch marks and wear of packing in sliding part. (Dust wiper, rod packing, cushion packing and piston packing)

Check all of above items. If any abnormality is found, repair it or replace the parts, when defective.

4) Followings are expendable parts.
Specify the kit No. when ordering.



※ This type of brake unit hardly suffers from mechanical trouble. Should there be any difficulties occurs, replace in its entirety as a unit.

Expendable Parts List

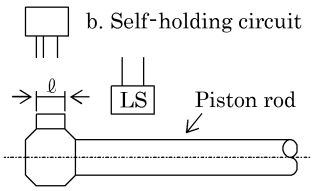
Part No. / Part name / Bore size (mm) / Kit No.		①, ②	③	④	⑤
		Dust wiper	Rod packing	Metal seal	Cylinder gasket
φ125	JSC3-N-125K	SDR-35K	PNY-35	RG-53	P12115-12150200
φ140	JSC3-N-140K	SDR-35K	PNY-35	RG-53	P12115-13450200
φ160	JSC3-N-160K	SDR-40K	PNY-40	RG-63	H4-543105
φ180	JSC3-N-180K	SDR-45K	PNY-45	RG-63	H4-543106

Part No. / Part name / Bore size (mm) / Kit No.		⑥	⑦	⑧	
		Cushion packing	Piston packing	Wear ring	Needle gasket
φ125	JSC3-N-125K	PCS-45	PSD-125	F4-666997	P-9
φ140	JSC3-N-140K	PCS-45	PSD-140	F4-666998	P-9
φ160	JSC3-N-160K	PCS-55	PSD-160	F4-666999	P-9
φ180	JSC3-N-180K	PCS-55	PSD-180	F4-667000	P-9

Note : Specify kit No. on your purchase order, but brake unit is excluded. Specify JSC3-B- bore size for ordering brake unit.

5. TROUBLE SHOOTING

1) Cylinder

Trouble	Cause	Correction
Brake does not release.	Insufficient pressure to the brake mechanism.	Secure ample pressure.
	No signal to brake solenoid valve. (In case NO type-Electric signal is there.)	Reaffirm the circuit to receive a signal. (Reaffirm the circuit to shut off a signal.)
	Solenoid valve for brake does not function.	Check the circuit and repair the matter as is required. Repair or replace solenoid valve as is required.
	Damage to packing for brake piston.	Replace the brake unit.
Rod does not stop	No signal to brake solenoid valve. (In case NO type-Electric signal is there.)	Reaffirm the circuit to receive a signal. (Reaffirm the circuit to shut off a signal.)
	Solenoid valve for brake does not function.	Check the circuit and repair the matter as is required. Repair or replace solenoid valve as is required.
	Damage to packing for brake piston.	Replace the brake unit.
	Left manual release of brake.	Release the manually open status.
	Skips off the dog for brake signal a. Excessive cylinder speed b. Circuit is not self-holding circuit  a. Excessive cylinder speed	a. Either slow down the speed or increase the dog length. b. Revise the circuit to that of self-holding.
	Cylinder switch does not function.	Correct or remove the cause of malfunction.
Inaccurate positioning.	Effective cross-sectional area of solenoid valve for brake is not large enough.	Replace the solenoid valve with the one of large effective cross-sectional area.
	Either too fine or too long tubing of connecting solenoid valve for brake and brake port.	Either replace tubing with the one of large diameter or shorten it if possible. As an alternative, connect the solenoid valve directly.
	Too low response of solenoid valve for brake.	Replace the solenoid valve with the one of high response.
	Too low response of signal sensor switch to solenoid valve for brake.	Replace the sensor switch with the one of high response.
	Relays within signal circuit of brake control are actuated sequentially.	Revise the signal circuit. (Carefully review the response time, particularly when using sequencer.
	There is a slackening of mounting a dog for brake signal.	Correct and remove the play.
	Remarkable wear and tear on the shape of the dog. a. Slant angle is to be maintained less than 30° when using roller plunger type limit switch. b. More length of dog than over run length is required when making an interlocking by means of dog.	a. The larger angle cause load variation and results inaccurate positioning. 〔The slant angle can be up to 60° when using roller lever.〕 b. When relay is used for self-holding circuit, dog length is required to provide an appropriate time length of relay actuating.

Trouble	Cause	Correction
Inaccurate positioning.	Fluctuation of cylinder speed. a. Misalignment of the center lines between piston rod and load guide. b. The momentum inertia of load is excessive in comparison with thrust to cylinder. 〔Particularly when the positioning pitch is too small〕 c. See if the stopping position is within the cushion chamber or just after piston comes out of cushion chamber.	 a. Eliminate misalignment by using free joint or equivalent parts. b. Either use larger bore cylinder or revise to hydraulic oil cylinder of low pressure range. c. Install a check valve to cushion in the event that stopping piston just when getting out of cushion chamber.
	Piston rod is apt to pop out. a. Incorrect setting of pressure balancing regulator. b. Delayed timing of stop release.	 a. Reset the pressure regulator. b. Shorten the timing of stop release. (See if supply line is chalked, also.)
	Fluctuation of load a. Feeding load change along curvature variation of copying profile. (Steady change) b. Remarkable change of load due to perpendicular load (Step change)	 a. Revise the specification to adopt hydraulic cylinder of low pressure range. b. Revise the circuit by building plural number of regulators for pressure balancing in the event that the range of load variation is relatively small or load changes stepping trend.
Piston rod does not move.	No signal to direction control solenoid valve.	Correct the control circuit.
	Misalignment of center lines at mounting cylinder.	Correct the installation state and/or change the mounting style.
	Damage to piston packing.	Replace piston packing.
Unsteady motion of rod	Misalignment of center lines at mounting.	Correct the installation state and/or change the mounting style.
	Exertion of transverse (lateral) load.	Install guide, correct the installation state and/or change the mounting style.
	Speed is less than the low speed limit.	Relieve the load change. Use the cylinder of larger bore.
	Excessive load.	Raise the pressure. Use the cylinder of larger bore.
	Speed control valve is built in the way of “Mater in” circuit.	Revise the installation direction of speed control valve.
Damage or distortion	Shock due to high speed operation	Raise the cushion effect. Lower the speed. Reduce the load. Improve cushion mechanism. (Such as adopting external cushion mechanism.)
	Exertion of transverse load.	Install guide, correct the installation state and/or change the mounting style.

2) Switch

Troubles	Causes	Remedies
Indicator light is not lit.	Deposited contact point	Replace the switch.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	Damaged indicator light	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
Switch does not function right.	Broken circuit	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
	Improper voltage	Correct voltage to specified.
	Incorrect location of switch	Correct its location.
	Aberrant position of switch	Set it back to original position and tighten the mounting device. Tightening torque is 1.5 to 1.9 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.
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.

Note 1. Refer “2.6 Location of mounting Switches on a Cylinder” as for replacing a switch and correcting its location.

Discontinue

6. HOW TO ORDER

6.1 How to order product

●Without switch

JSC3-N – LB – 125 B – 50 ——— S – I

●With switch

JSC3-LN – LB – 125 B – 50 – R0 – R – S – I

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

(a) Model		(b) Mounting style (Note1)		(c) Bore size (mm)	
JSC3-N	Double acting, without switch	LB	Axial foot type	125	ϕ125
JSC3-LN	Double acting, with switch	FA	Rod side flange type	140	ϕ140
JSC3-H	Double acting, low hydraulic type, without switch	FB	Head side flange type	160	ϕ160
JSC3-LH	Double acting, low hydraulic type, with switch	CA	Eye bracket type	180	ϕ180
JSC3-T	Double acting, heat resistance type, without switch	CB	Clevis bracket type		
		TC	Center trunnion type		
		TA	Rod side trunnion type		
		TB	Head side trunnion type		

(d) Cushion		(e) Stroke (mm)		(f) Switch model No. (Note2)					
B	Both sides cushions	50	300	Grommet type	Terminal box type		Switch type	Indicator light	Lead wire
R	Rod side cushion	75	350		Standard type	Splash-proof			
H	Head side cushion	100	400	R1K※	R1KB	R1KA	Solid state	1 color indicator	2 wire
N	No cushion	150	450	R2K※	R2KB	R2KA			
		200	500	R2YK※	R2YKB	—		2 color indicator	
		250		T2YDP※	—	—		Strong magnetic field	
				R3K※	R3KB	R3KA		1 color indicator	3 wire
				R3YK※	R3YKB	—		2 color indicator	
※ Lead wire length				R0※	R0B	R0A	Reed	1 color indicator	2 wire
No code	1m (standard)			R4※	R4B	R4A			
3	3m (option)			R5※	R5B	R5A			
5	5m (option)			R6※	R6B	R6B			

※ mark indicates the length of lead wire.

(g) Switch quantity		(h) Option (Note4)				(i) Accessory	
R	One on rod side			Max. ambient	Instant. Max.	I	Rod eye
H	One on head side	J	Bellows	60℃	100℃	Y	Rod clevis
D	Two	K	Bellows	100℃	200℃	B1	Eye bracket
T	Three	L	Bellows	250℃	400℃	B2	Clevis bracket
4	With for switches (Note3)	M	Piston rod material change (stainless steel)				
		No code	Cushion needle position R (standard)				
		S	Cushion needle position S				
		T	Cushion needle position T				
		C2	Cushion with check valve				

Note1 : Mounting bracket is assembled to product when shipping. (When shipping, special head side flange type is attached.)
Note2 : T2YD, T2YDT, H0, H0Y are strong magnetic field proof switches. Consult with CKD about details.
Note3 : If more than 4 switches, indicate switch quantity.
Note4 : Refer to each dimensions to confirm position indication of "S","T","G".

Discontinue

6.2 How to order brake unit

JSC3 – 140 – BRAKE-UNIT

Bore size
(Previous ⓒ)

6.3 How to order switch

1) How to order R type switch

● Switch main body + mounting bracket

JSC3 – R0 – 140

Switch model No.
(Previous ⓕ)

Bore size
(Previous ⓒ)

● Switch only

SW – R0

Switch model No.
(Previous ⓕ)

● Mounting bracket

JSC3 – R – 140

Bore size
(Previous ⓒ)

Mounting bracket	
※R	R type switch

※For swarf countermeasures,
RF is provided.
(For R2YK or R3Ykswitch)

● Terminal box only

・For R□B

SW – RB

・For R□A

SW – RA

2) How to order T2YD type switch

● Switch main body + mounting bracket

JSC3 – T2YDP※ – 140

Switch model No.
(Previous ⓕ)

Bore size
(Previous ⓒ)

● Switch only

SW – T2YDP※

Switch model No.
(Previous ⓕ)

● Mounting bracket

JSC3 – T – 140

Bore size
(Previous ⓒ)

Discontinue

7. SPECIFICATION

7.1 Product Specifications

Model / Item		JSC3-N JSC3-LN				JSC3-H JSC3-LH				JSC3-T			
Bore size mm		ϕ125	ϕ140	ϕ160	ϕ180	ϕ125	ϕ140	ϕ160	ϕ180	ϕ125	ϕ140	ϕ160	ϕ180
Actuation		Double acting				Double acting, low hydraulic type				Double acting, heat resistance type			
Working fluid		Compressed air				Hydraulic fluid ※1				Compressed air			
Max. working pressure MPa		1.0											
Min. working pressure MPa	Brake section	0.3											
	Cylinder section	0.05				0.1				0.05			
Proof pressure MPa		1.6											
Ambient temperature ℃		-5 to 60 (No freezing)				5 to 50				5 to 120			
Port size	Brake section	Rc1/2											
	Cylinder section	Rc1/2	Rc3/4			Rc1/2	Rc3/4			Rc1/2	Rc3/4		
Working piston speed		50 to 1000 (Use within the range of allowable energy absorption)				—				50 to 1000 (Use within the range of allowable energy absorption)			
Cushion		Cushion can be selected											
Effective air cushion length mm		21.6											
Lubrication		Must be oil free				Not required (When lubrication, use turbine oil Class1 ISOVG32)				Must be oil free ※2			
Stoppage accuracy		±1.0 (300mm/s at not load)				±0.2 (50mm/s at not load)				±1.0 (300mm/s at not load)			
Holding force		9.6	12.0	15.8	20.0	9.6	12.0	15.8	20.0	9.6	12.0	15.8	20.0
Allowable energy absorption J	Cushioned	63.6	91.5	116	152	63.6	91.5	116	152	63.6	91.5	116	152
	No cushion	0.371	0.386	0.386	0.958	0.371	0.386	0.386	0.958	0.371	0.386	0.386	0.958

Note1 : Brake is operated by compressed air.
Note2 : Apply heat proof greace periodically.
Note : No cushion type can not absorb a large energy generated by an external load.
We recommend to use an external shock absorber together.

Discontinue

7
SPECIFICATION

7.2 Switch Specifications

Model	Reed 2 wire				
Item	R0			R4	
Applications	Relay, programmable controller			High capacity relay, solenoid valve	
Load voltage	DC12/24V	AC110V	AC220V	AC110V	AC220V
Load current (Note2)	5 to 50mA	7 to 20mA	7 to 10mA	20 to 200mA	10 to 200mA
Internal voltage drop	2.4V or less			2V or less	
Indicator light	LED (ON lighting)			Neon light OFF (OFF lighting)	
Leakage current	0mA			1mA or less	
Lead wire length (Note1)	1m (oil resistant vinyl cabtire code 2 conductor 0.3mm^2)				
Shock resistance	294m/s^2				
Insulation resistance	20MΩ over at 500V megger				
Withstand voltage	No failure at AC1500V impressed for one minute				
Ambient temperature	−10 to 60℃				
Degree of protection (Note3)	Grommet type IEC standard IP67, JIS C 0920 (water tight type), oil resistance				

Model	Reed 2 wire			
Item	R5			R6
Applications	Programmable controller, relay, IC circuit (without indicator light),serial connection			Programmable controller (DC self hold function)
Load voltage	DC5/12/24V	AC110V	AC220V	DC24V
Load current (Note2)	50mA or less	20mA or less	10mA or less	5 to 50mA
Internal voltage drop	0V			5Vor less
Indicator light	None			LED (ON lighting)
Leakage current	0mA			0.1mA or less
Lead wire length (Note1)	1m (oil resistant vinyl cabtire code 2 conductor 0.3mm^2)			
Shock resistance	294m/s^2			
Insulation resistance	20MΩ over at 500V megger			
Withstand voltage	No failure at AC1500V impressed for one minute			
Ambient temperature	−10 to 60℃			
Degree of protection (Note3)	Grommet type IEC standard IP67, JIS C 0920 (water tight type), oil resistance			

Discontinue

Model	Solid state 2 wire		
Item	R1K	R2K	R2YK (2 color indicator)
Applications	Programmable controller, relay, small solenoid valve	Programmable controller	
Load voltage	AC85 to 265V	DC10 to 30V	
Load current (Note2)	5 to 100mA	5 to 30mA	
Internal voltage drop	7V or less	4V or less	
Indicator light	LED (ON lighting)		Red/Green LED (ON lighting)
Leakage current	1mA or less at AC100V 2mA or less at AC220V	1mA or less	1.2mA or less
Lead wire length (Note1)	1m (oil resistant vinyl cabtire code 2 conductor 0.3mm^2)		
Shock resistance	980m/s^2		
Insulation resistance	20MΩ over at DC500V megger		
Withstand voltage	No failure at AC1500V impressed for one minute	No failure at AC1000V impressed for one minute	
Ambient temperature	−10 to 60℃		
Degree of protection (Note3)	Grommet type IEC standard IP67, JIS C 0920 (water tight type), oil resistance		

Model	Solid state 3 wire		Solid state 2 wire
Item	R3K	R3YK (2 color indicator)	T2YDP※ (Note6)
Applications	Programmable controller, relay, IC circuit, solenoid valve		Programmable controller
Power supply voltage	DC4.5 to 28V		——
Load voltage	DC30V	DC30V or less	DC24V±10%
Load current (Note2)	200mA or less	150mA or less	5 to 20mA
Current consumption	At DC24V (at ON state)		——
	10mA or less	16mA or less	
Internal voltage drop	0.5V or less at 150mA	0.5V or less	6V or less
Indicator light	LED (ON lighting)	RED/Green LED (ON lighting)	RED/Green LED (ON lighting)
Leakage current	10μA or less		1.0mA or less
Output delay time (ON delay, OFF delay) (Note4)	——		30 to 60mS
Lead wire length (Note1)	1m (oil resistant vinyl cabtire code 3 conductor 0.2mm^2)		1m (oil resistant vinyl cabtire code 2 conductor 0.5mm^2) (Note5)
Shock resistance	980m/s^2		
Insulation resistance	20MΩ over at DC500V megger		100MΩ over at DC500V megger
Withstand voltage	No failure at AC1000V impressed for one minute		
Ambient temperature	−10 to 60℃		
Degree of protection (Note3)	Grommet type 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.
Note 4 : This shows a period of time between detection of the magnet by the magnetic sensor and sending of switch output.
Note 5 : Non-flammable cabtyre cable available as option.
Note 6 : T2YDP※ is not available in direct-current magnetic field.

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