CKD

SM-210001-A

INSTRUCTION MANUAL

Brake unit

JSB3 (ϕ16 to ϕ45)

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

CKD Corporation

For Safety Use

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

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

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

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

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

⚠ Precautions

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

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

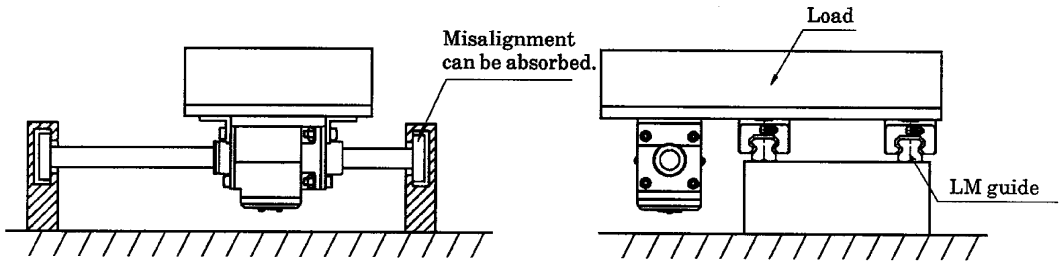
1. UNPACKING

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

2. INSTALLATION

2.1 Installation

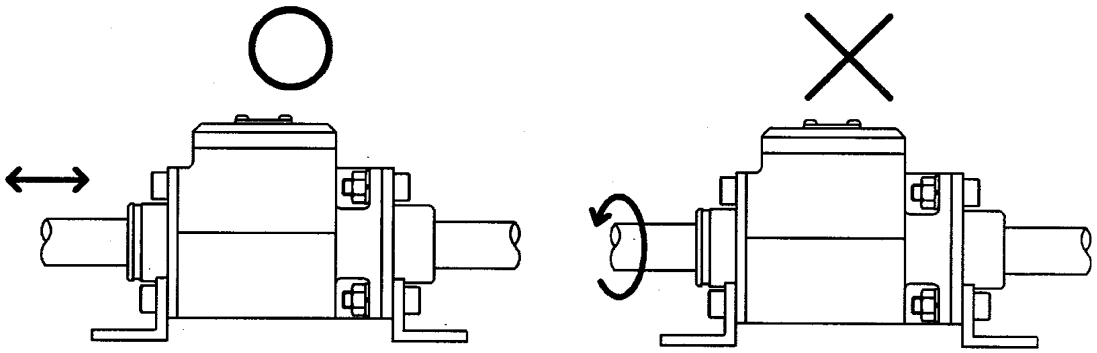
1) Use such bearing of low coefficient of skin friction and of low expansion ratio as ball bearing or roller bearing for the guide of cylinder load for the purpose of retaining positioning accuracy.
2) Use these cylinders within the following range of ambient temperature.
   −10 to 60°C (Not frozen)
3) Use a bellows type rod cover where a rod is exposed to the dusty ambient.
4) For the purpose of retaining improved positioning accuracy within the cushion chamber;
   (1) Avoid to plan to stop piston 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.
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. Hence, connect them with CKD floating connector (spherical bearing).
6) Do not apply a horizontal load to the brake.
7) If the rod is misaligned with the brake, this may cause burning damage. Mount the brake on a structure that is able to absorb such misalignment.



8) Mount the solenoid valve for releasing of the brake as close to the brake port as possible.

2.2 Basic cautions

1) Do not use this product for braking of the rotating rod.



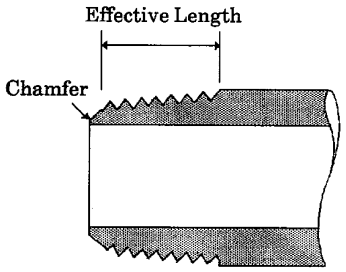
2) Do not apply any rotating force (torque) to the rod. Doing so may cause the holding force to lower, resulting in danger. Additionally, mount this product in a mechanism that the rod does not rotate.
3) Do not remove or mount the hexagon socket head cap screw for releasing of the brake with the rod bar removed. (If the brake is locked with the rod bar removed, the reassembly may become impossible.)
4) After the product has been installed, carry out the trial-run to make sure that the holding mechanism functions correctly.

2.3 Rod

1) Use an industrial chrome plated rod (coat thickness of 15 m or more).
2) Use a rod with a surface roughness (Rmax) of 1.2s - 1.6s. If a rod beyond the specifications is used, this may cause the brake metal to be worn out excessively, resulting in lowering of the holding force.
3) Do not apply any lubricant such as grease to the rod.
4) Carefully handle the rod so that it is not damaged or dented.

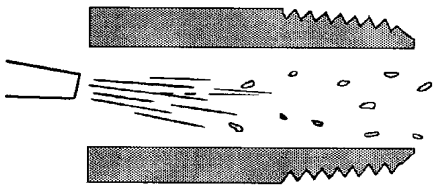
2.4 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.
2) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust and foreign substances in the drain of the pipe.
3) Be sure to adhere to the effective thread length of gas pipe and make a chamfer of approx. 1/2 pitch from the threaded end.



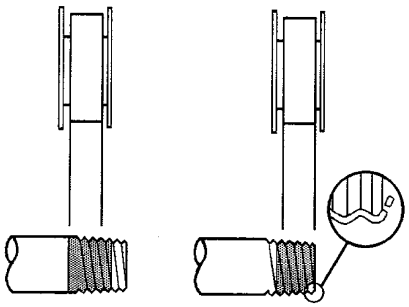
[CO-400-A]

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

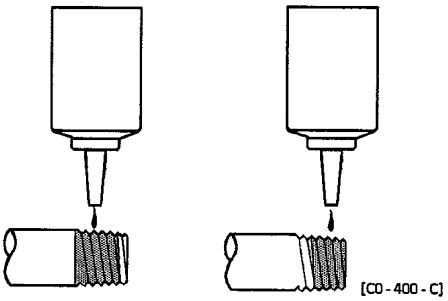

[CO-400-B]

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

● Seal Tape

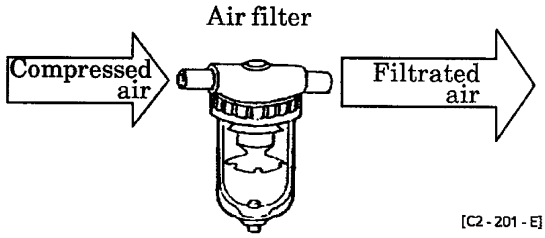

(Right) (False)

● Sealant (Paste or liquid)

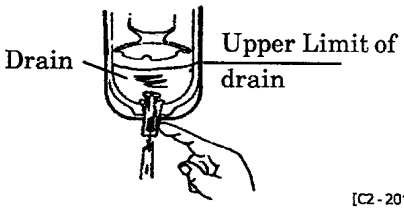

[CO-400-C]
(Right) (False)

2.5 Fluid

1) Use the compressed air, filtrated and dehumidified. Carefully select a filter of an adequate filtration rate (5μm or lower preferred), flow rate and its mounting location (as closest to directional control valve as possible).
2) Be sure to drain out the accumulation in the filter periodically.
3) Note that the intrusion of carbide of compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of solenoid valve and cylinder. Be sure to carry out thorough inspection and maintenance of compressor.



[C2-201-E]



[C2-201-F]

4) This brake requires no lubrications. Always use the brake without lubrication.

2.6 Electric Control Circuit

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

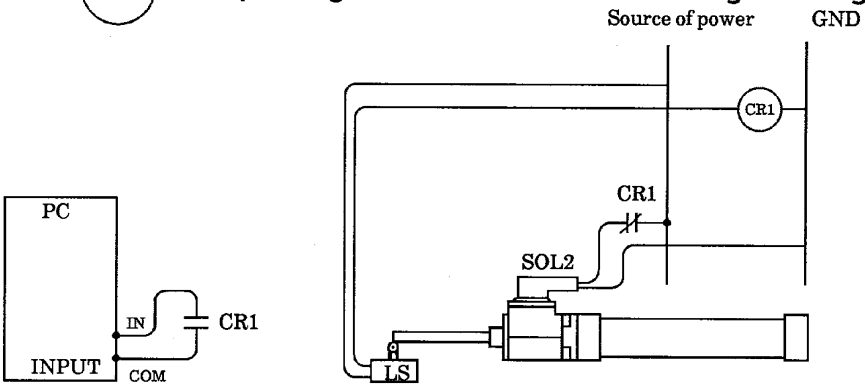
① Select the equipment with a quick response time and high accuracy.
② So design to have brake release signal and cylinder control signal being put out simultaneously or have brake release signal being put out a moment ahead of cylinder control signal to avoid piston rod from popping out.
③ Make the 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.

- Caution when sequencer is built in a circuit.

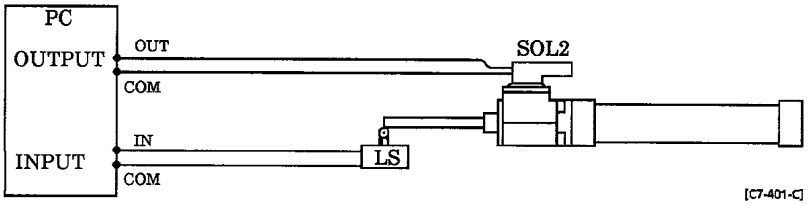
  Positioning accuracy is ruined when brake circuit is built through a sequencer because of dispersion of brake release timing due to dispersion of scanning time (±20ms to 30ms). Design the brake circuit directly through a relay instead of through sequencer.

※ Scanning time	Time requirement a program routine executed one round
※ 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



3. OPERATION

1) Range of working pressure

Operate the system within following range of air pressure.

0.3 to 1.0MPa

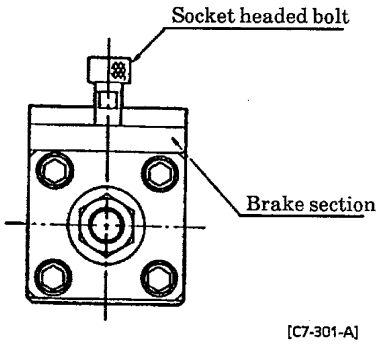
2) Manual release of brake

Brake is released when a socket headed bolt is screwed into the female threaded hole atop of brake section, after removing a dust cover. (Refrain excessive tightening so long as the brake is released.)

Be sure the bolt is taken away before normal operation.

Refer the table below in regard with bolt size to be used.

Rod diameter symbol	Size of hexagon socket headed bolt
16	M10×8
20	M10×8
20A	M12×9
25	M14×10
30	M16×12
35	M24×16
35A	M24×20
40	M24×20
45	M24×24



[C7-301-A]

4. MAINTENANCE

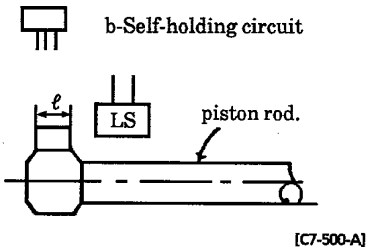
4.1 Periodic Inspection

1) In order to upkeep the Brake unit 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 Confirm the close and open motion of brake mechanism.
   ③ Check that the cylinder operates smoothly.
   ④ Check for internal and/or external leakage.
   ⑤ Check the piston rod for flaw (scratch) and deformation.
   ⑥ Check any corrosion inside of each port.

   Carry out additional tightening or disassembling cylinder for correction as required, should there be any slackening abnormality.
3) Do not attempt to disassemble the brake.

⚠ DANGER	Do not attempt to disassemble the brake. Doing so may result in danger.

4.2 Trouble Shooting

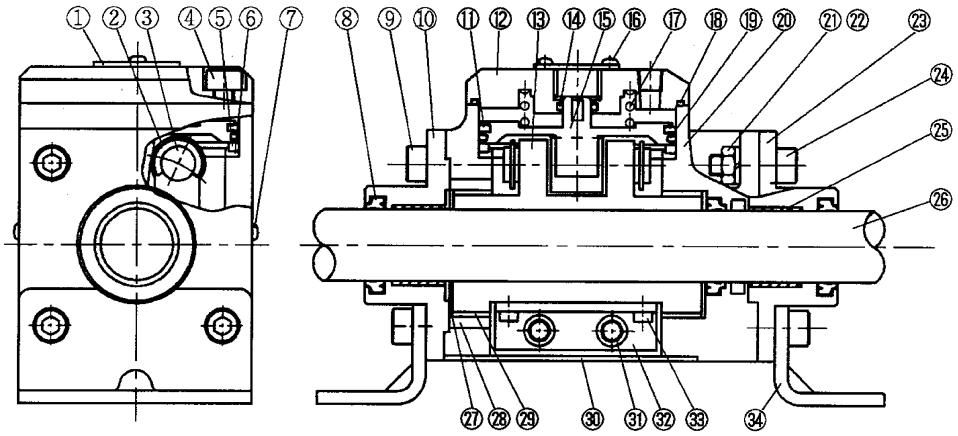
Trouble	Cause	Correction
Brake does not release.	Insufficient pressure to the brake mechanism	Secure ample pressure.
	No signal to brake solenoid valve (In case NO type - Electric signal is there.)	Reaffirm the circuit to receive a signal. (Reaffirm the circuit to shut off a signal.)
	Solenoid valve for brake does not function	Check wiring and repair as required. Repair or replace solenoid valve as is required.
	Damage to packing for brake piston	Replace the brake unit.
Rod does not stop	Electric signal is there. (In case NO type - No signal to brake solenoid)	Reaffirm the circuit to shut off a signal. (Reaffirm the circuit to receive a signal.)
	Solenoid valve for brake does not function	Check the circuit and repair or replace solenoid valve as is required.
	Damage to packing for brake piston	Replace the brake unit.
	Left manual release of brake	Remove the manually open status.
	Skips off the dog for brake a- Excessive cylinder speed b- Circuit is not self-holding circuit  [C7-500-A] a-Excessive speed	a- Slow down the speed or increase the dog length (ℓ). b- Revise the circuit to that of self holding.
Inaccurate positioning	Effective sectional area of solenoid valve for brake is not large enough.	Replace the solenoid valve with the one of larger effective sectional area.
	Either too thine or too long tubing of connecting solenoid valve for brake and brake port	Either replace tubing with the one of larger 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.)
	Slackening of mounting a dog for brake signal.	Correct and remove the play.

Trouble	Cause	Correction
Inaccurate positioning	Remarkable wear and tear on the shape of the dog a- Slant angle should 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.	Replace with new dog if wear and tear is excessive. 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.
	Work speed is changed. a- Check the rod and/or guide for misalignment.	a- Use the free joint to prevent the misalignment.
Piston rod does not move.	No signal to direction control valve	Correct the control circuit.
	Misalignment of center lines at mounting cylinder	Correct the installation state and/or change the supporting system.
Unsteady motion of rod	Misalignment of center lines at mounting	Correct the installation state and/or change the supporting system.
	Exertion of transverse (lateral) load	Install guide, correct the installation state and/or change the supporting system.
	Speed is less than the low speed limit	Relieve the load change. Consider of using low pressure hydraulic oil cylinder.
	Excessive load	Raise the pressure. Use the cylinder of larger bore.
	Speed control valve is built in the way of "Meter 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 supporting system.

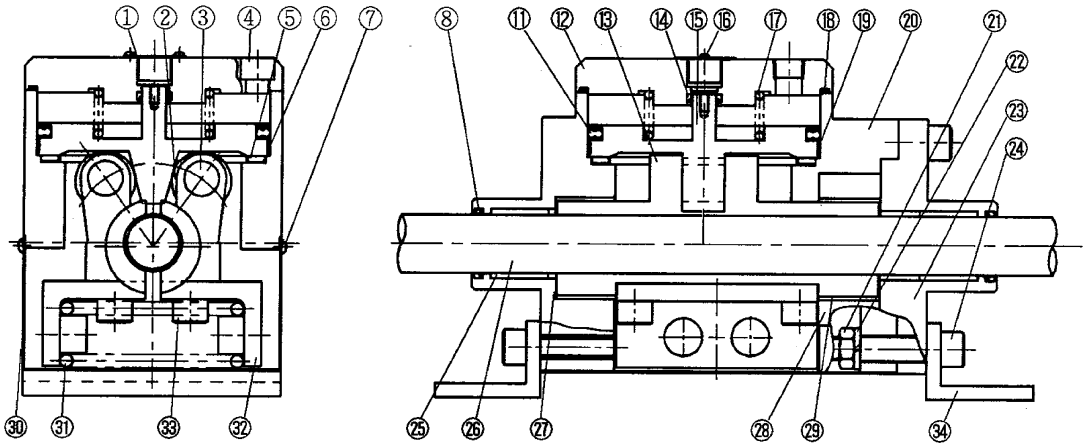
4.3 Maintenance

1) Internal structure and expendable parts list

- JSB3-16 to 30

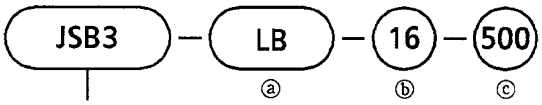


- JSB3-35 to 45



No.	Parts name	Material	Qty.
1	Dust cover	Aluminum alloy	1
2	Bearing	—	2
3	Parallel pins	Steel	2
4	Hexagon soket head cap screw	Alloy steel	4
5	Cushion rubber	Polyurethane rubber	1
6	Cushion rubber seat	Steel	1
7	Cross headed pan	Steel	4
8	Dust wiper	Nitril rubber	2
9	Hexagon soket head cap screw	Alloy steel	4
10	Rod bushing A	Steel	1
11	Piston packing B	Nitril rubber	1
12	Body cap	Cast iron	1
13	Brake shoe metal	ϕ16~30 Copper alloy casting ϕ35~45 Cast iron	1
14	Cap packing	Nitril rubber	1
15	Piston for brake	Cast iron	1
16	Cross headed pan	Steel	2
17	Spring	Piano wire	1
18	Cap gasket	Nitril rubber	1
19	Wear ring	Polyacetal resin	1
20	Brake main body	Aluminum alloy casting	1
21	Hex. nut	Steel	4
22	Spring washer	Steel	4
23	Rod bushing B	Steel	1
24	Hexagon soket head cap screw	Alloy steel	4
25	Bushing B	Oil inpregnated bearing	2
26	Piston rod	alloy	1
27	Thrust washer	Steel	2
28	DU bushing	—	1
29	Bushing A	—	2
30	Cover	Oil inpregnated bearing	1
31	Brake spring	alloy	2
32	Spring seat	Steel	2
33	Hexagon soket head cap screw	Steel	4
34	Foot bracket	Steel	2

5. HOW TO ORDER



Model name

ⓐ Mounting style		ⓑ Rod diameter			ⓒ Rod length mm
		Code	Rod diameter	Applicable cylinder	
LB	Foot mount type, along axis	16	ϕ 16	JSC3-40	)No symbol (no marking)
		20	ϕ 20	JSC3-50	200
FA	Flange type	20A	ϕ 20	JSC3-63	300
		25	ϕ 25	JSC3-80	400
		30	ϕ 30	JSC3-100	500
		35	ϕ 35	JSC3-125	600
		35A	ϕ 35	JSC3-140	700
		40	ϕ 40	JSC3-160	800
		45	ϕ 45	JSC3-180	900
					1000

Note : The cylinder with a rod length of up to 3000 mm can be manufactured in units of 100 mm.

6. PRODUCT

Item \ Rod diameter symbol		16	20	20A	25	30	35	35A	40	45
Media		Compressed air								
Max. working pressure	MPa	1.0								
Min. working pressure	MPa	0.3								
Proof pressure	MPa	1.6								
Ambient temperature	℃	−10 to 60								
Rod diameter and dimensional lerance	mm	f7 ϕ16	f7 ϕ20		f7 ϕ25	f7 ϕ30	f7 ϕ35		f7 ϕ40	f7 ϕ45
Surface roughness of rod	Rmax	1.2S to 1.6S								
Port size	Rc	1/8		1/4		3/8	1/2			
Working rod speed	mm/s	10 to 1000								
Positioning accuracy	mm	±1.0 (at the speed of 300mm/s, no load))								
Holdingforce	N	980	1569	2451	3922	6176	9608	12059	15686	19608
Lubrication		Not allowed.								