SM-5563-A

INSTRUCTION MANUAL

FOR

TIGHT·CYLINDER

CMK2-T

Please read this operation manual carefully before using this product, particularly the section describing safety.

Retain this operation 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 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.

Thank you very much for purchasing CKD product. Please read through this MANUAL for upkeeping the equipment in best condition.

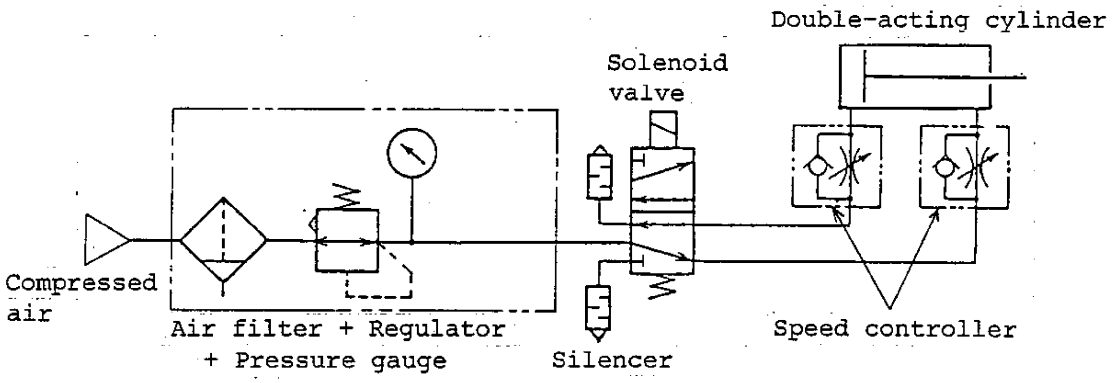
1. SPECIFICATION

Fluid	Compressed air
Operating pressure range kgf/cm^2 (MPa)	1.0 - 9.9 (0.1 - 0.99)
Proof pressure kgf/cm^2 (MPa)	16.0 (1.6)
Ambient temperature range (^{o}C)	5 - 120
Oiling	Not needed
Operating piston speed (mm/sec)	50 - 500
Cushion	Rubber cushion

2. FUNDAMENTAL CIRCUIT DIAGRAM & SELECTION OF RELATED MACHINES

2-1 Fundamental Circuit Diagram of Double-acting Cylinder (Oilless Type)

Below is the fundamental circuit diagram.



2-2 Selection of Related Machines in Fundamental Circuit Diagram Above:

The related machines depend on the tube inner diameter and speed of the driving cylinder. Select from the Selection Guide Table for Related Machines. (The Table below is an example of related machines.)

Selection Guide Table for Related Machine

Inner dia. of cylinder (mm)	Theoretical standard speed (mm/sec)	Required flow rate (ℓ/min) at P = 5 kgf/cm^2	Solenoid valve		Speed controller	Silencer	Distribution tube	F.R kit
			Single solenoid	Double solenoid				
ø20, ø25, ø32	400	120	4KB110	4KB120	SC3G-6-6 SC1-6	SLW-6A	ø6 x ø4 Nylon tube	A7019-1C
ø40	300	130	4KB110	4KB120	SC3G-6-6 SC1-6	SLW-6A	ø6 x ø4 Nylon tube	
ø40	400	180	4K210	4K220	SC1-8	SLW-6A	ø8 x ø6 Nylon tube	A7019-2C

Note: The theoretical standard speed refers to the degree of piston speed (and is approximately equivalent to the no-load speed). For detail, see P. 5 - P. 8 of GENERAL CATALOG FOR CYLINDERS.

3. FLUID

3-1 See to it that the compressed air passes through air filter, and is clean with less water content (moisture). Be sure to extract the drain accumulated in filter periodically.

3-2 Note that the intrusion of carbides in compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of solenoid valve and cylinder. Be sure to carry out thorough check and maintenance of compressor.

3-3 This cylinder does not require lubrication. However, in case lubrication is to be made, use TURBINE OIL GRADE-1 ISO VG32.

4. PIPING

4-1 For piping beyond the filter, use pipes that hardly get corroded such as galvanized pipes, nylon tubes, rubber tubes, etc.

4-2 See to it that the pipe connecting cylinder and solenoid valve has effective sectional area needed for the cylinder to rotate at specified speed.

4-3 Install filter preferably adjacent to solenoid valve for eliminating rust, foreign substance and drain in the pipe.

4-4 Strictly observe the effective screw length of gas pipe, and carry out beveling of approximately 1/2 pitch from the screw end.

4-5 Below air into the pipe to eliminate foreign substances and chips before piping.

4-6 Take care of the positions for tying the sealing tape and applying the sealing agent at the time of piping so that the sealing tape or the sealing agent may not intrude into the circuit.

4-7 Make leakage test of the connected parts after piping by using soap water, etc.

5. INSTALLATION

5-1 The ambient temperature range for this cylinder is 5 - 120°C.

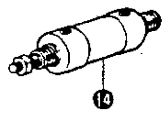
5-2 Use cylinder with bellows at places with much dust.

5-3 Be careful so as not to tighten the cylinder tube strongly or/and hit it with other object, otherwise the tube may get distorted and cause malfunction of the cylinder.

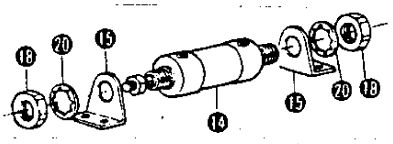
5-4 Assembly of supporting metal fittings:
The supporting metal fittings are attached with the equipment at the time of delivery. Install them as shown in the figure below. Do not apply rotational force to the double-caulked portion of the cylinder tube since it may cause slackening.

Assembly of supporting metal fittings:

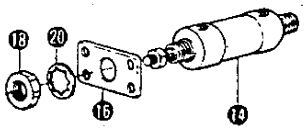
CMK2-00
(Basic type)



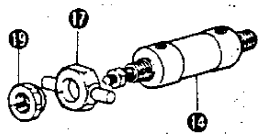
CMK2-LB
(Foot mounting type)



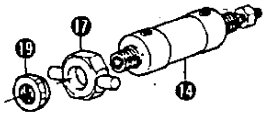
CMK2-FA
(Flange type)



CMK2-TA
(Trunnion type)



CMK2-TB
(Trunnion type)

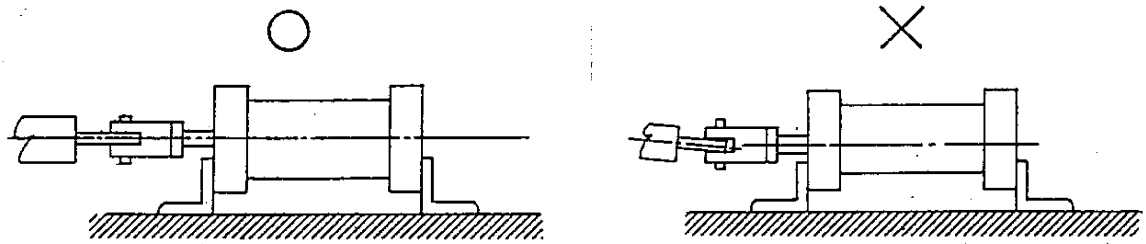


No.	Name	No.	Name
⑭	Cylinder main body	⑲	Nut (for TA type & TB type)
⑮	Foot bracket	⑳	Toothed lock washer (for LB type & FA type)
⑯	Flange		
⑰	Trunnion (Axial type)		
⑱	Nut (for LB type & FA type)		

Note: When installing the supporting metal fittings, keep the cover on the installing side fixed by means of a spanner, etc., and tighten.

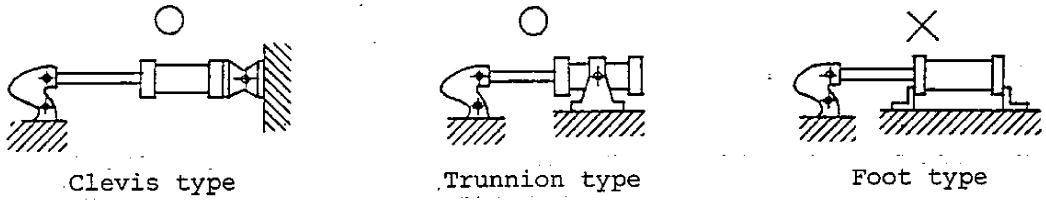
5-5 When cylinder is fixed and rod end is guided:
When the piston rod of cylinder and the load are not concentric, the bushes and packings of the cylinder get extremely worn out. Hence, connect with CKD floating connector (spherical bearing).

5-6 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 comply with each other.



5-7 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. Furthermore, install the rod end connecting metal

(knuckle) so that it moves in the same direction as the cylinder main body.



Clevis type　　Trunnion type　　Foot type

6. OPERATION

6-1 The cylinder feed pressure is 1.0 - 9.9 kgf/cm^2; hence use the cylinder within this pressure range.

6-2 Since the cylinder absorbs only a little of the motion energy due to rubber cushion, install an external stopper when the motion energy is large.

6-3 Install a speed controller as shown in "Fundamental Circuit Diagram" on P. 1 to control the piston speed.

7. PERIODICAL INSPECTION

7-1 In order to upkeep the cylinder in optimum condition, carry out periodical inspection once or twice a year.

7-2 Inspection Items

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

ⓑ Check to see that the cylinder has smooth operation.

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

ⓓ Check for internal or/and external leakage.

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

ⓕ Check the stroke for abnormality.

Check the above items, and should some trouble be found, see "TROUBLESHOOTING" in item 8; also carry out additional tightening if bolts, nuts, etc. are slackened.

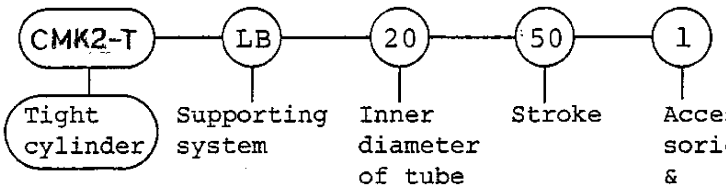
8. TROUBLESHOOTING

Trouble	Cause	Countermeasure
Does not operate.	No pressure or in adequate pressure.	Provide pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Improper or no centering of installation.	Correct the installation state or/and change the supporting system.
	Broken piston packing.	Replace the cylinder.
Does not function smoothly.	Speed is below the low speed limit.	Relax the load variation or/ and think of adopting low hydraulic cylinder.
	Improper or no centering of installation.	Correct the installation state or/and change the supporting system.
	Exertion of transverse (lateral) load.	Install the guide, correct the installation state or/and change the supporting system.
	Excessive load.	Increase the pressure or/and the inner diameter of the tube.
	"Meter in" circuit of speed control valve.	Change the installation direction of the speed control valve.
Breakage or/and deformation	Impact force due to high speed operation.	Turn the speed down, reduce the load, or/and install a mechanism more secured than cushion mechanism (e.g. external cushion mechanism).
	Exertion of transverse load.	Install the guide, correct the installation state or/ and change the supporting system.

Note: Being a caulked type, this cylinder can not be overhauled; hence, replace the cylinder if duly trouble occurs to the cylinder itself.

9. INDICATION OF MODEL NO.

At the time of placing order, specify the model No. in the following manner.



The Model No. indication example on the left refers to tight cylinder, axial (direction) foot type, inner dia.: 20ø, stroke: 50, with rod eye.

Supporting system	
OO	Basic type
LB	Foot mounting type (both sides)
LS	Foot mounting type (one side)
FA	Front flange mounting type
CC	Eye mounting type
TA	Front trunnion mounting type
TB	Rear trunnion mounting type

Inner diameter of tube (mm)	
20	ø20
25	ø25
32	ø32
40	ø40

Stroke (mm)		
Standard stroke	Max. stroke	
25	Tube inner dia.	Stroke
50	ø20	700
75	ø25	700
100	ø32	700
150	ø40	700
200		

Accessories & options	
I	Rod eye
Y	Rod clevis
B2	Clevis bracket
J	Bellow material: nylon tarpaulin
K	Bellow material: neoprene sheet
C	Built-in speed controller type
F	With one-touch joint
M	Alteration in piston rod material
N	Alteration in piston rod lug length and thread area.
V	Boss cut