CKD Corporation

SM-5748-A

INSTRUCTION MANUAL

TIGHT CYLINDER, ROD TURNIN PREVENTION TYPE

CMK2-M

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.

[EC1-0FC05]

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.

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SM5748-A

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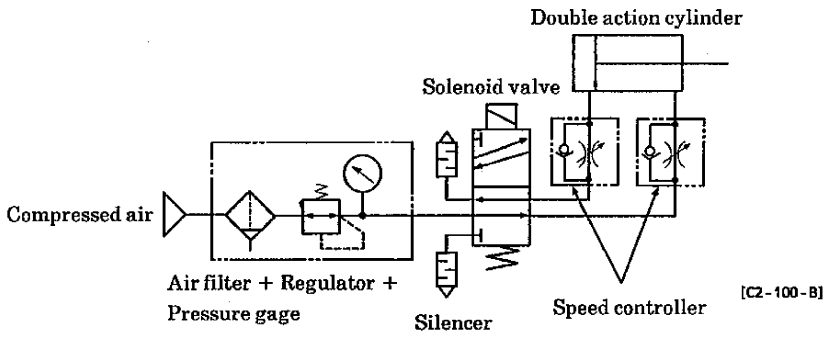
1. PRODUCT

1-1. Specifications

Media	Compressed air
Maximum load pressure kgf/cm² {MPa}	9.9 { 0.99}
Minimum load pressure kgf/cm² {MPa}	1.0 {0.1}
Withstanding pressure kgf/cm² {MPa}	1.6 {0.16}
Range of ambient temperature °C	−10~60 (Not to be frozen)
Lubrication	Not required
Service piston speed mm/sec	50~500
Cushion	Rubber cushion
Available switches to be mounted	R0、R1、R2、R2Y、R3、R3Y、R4、R5、R6
Permissible turning angle (°)	3 (ø20~32)、2 (ø40)

1-2. Fundamental Circuit Diagram for double action cylinder (Non-Iubrication system)

The following is a fundamental circuit diagram, generally.



1-3. Selection of Related Equipment with the Fundamental Circuit Diagram

The related equipment depends on the tube inner diameter and speed of the driving cylinder. Select equipment out of the Selection Guide Table. (The table provided here is an example of related equipment.)

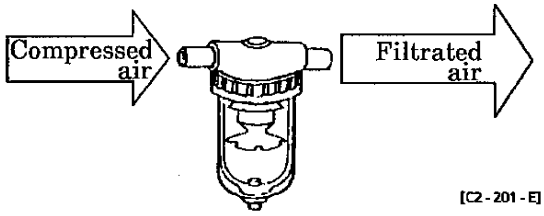
Tube bore (mm)	Theoretical standard speed (mm/sec)	Required flow rate (ℓ/min)	Effective sectional area (mm^2)	Appropriate standard system NO.
ø 20	250	29	0.5	B1
	400	46	1.6	B1
ø 25	250	44	0.8	B1
	400	70	1.9	B1
ø 32	250	73	1.3	B1
	400	120	3.1	B3
ø 40	250	110	2.0	B2
	400	180	4.9	B3

Tube bore (mm)	4 · 5 port solenoid valve, pneumatic pressure regulating		Auxiliary pneumatic equipment		Distribution tube
	Single solenoid valve	Double solenoid valve	Speed controller	Silencer	For solenoid valve and cylinder
ø 20	4KA110, 4KB110	4KA120, 4KB120	SC3G-6-6	SL-M5, SLW-6A	ø6×ø4Nylon tube
	4KA110, 4KB110	4KA120, 4KB120	SC3G-6-6	SL-M5, SLW-6A	ø6×ø4 Nylon tube
ø 25	4KA110, 4KB110	4KA120, 4KB120	SC3G-6-6	SL-M5, SLW-6A	ø6×ø4 Nylon tube
	4KA110, 4KB110	4KA120, 4KB120	SC3G-6-6	SL-M5, SLW-6A	ø6×ø4 Nylon tube
ø 32	4KA110, 4KB110	4KA120, 4KB120	SC3G-6-6	SL-M5, SLW-6A	ø6×ø4 Nylon tube
	4KA210-06, 4F110-06 4KB210-06, 4F110-06	4KA220-06, 4F120-06 4KB220-06, 4F120-06	SC1-6	SLW-6A	ø8×ø5.7 Nylon tube
ø 40	4KB110, A4F010-06	4KB120, A4F010-06	SC1-6	SLW-6A	ø8×ø5.7 Nylon tube
	4KA210-06, 4F110-06 4KB210-06, 4F110-06	4KA220-06, 4F120-06 4KB220-06, 4F120-06	SC1-6	SLW-6A	ø8×ø5.7 Nylon tube

2. CAUTION

2-1. 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).

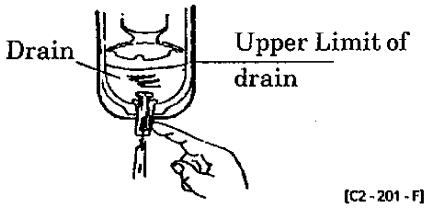


[C2-201-E]

2) Be sure to drain out the accumulation in 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.

4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 if lubrication is preferred.



[C2-201-F]

3. OPERATION

1) The pressure supply range is 1.0 ~ 9.9 kgf/cm2 {0.1 ~ 0.99MPa}. 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 table below.

Cushion characteristic

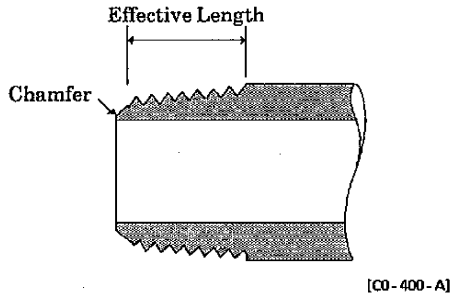
Tube bore (mm)	Allowable energy absorbed (kgf · cm) {N · m}
ø 20	0.91 (0.091)
ø 25	1.4 (0.14)
ø 32	1.83 (0.183)
ø 40	2.84 (0.284)

3) Install a set of speed controller as shown in the fundamental circuit diagram, Section 1, 1-2 to control the piston speed.

4. INSTALLATION

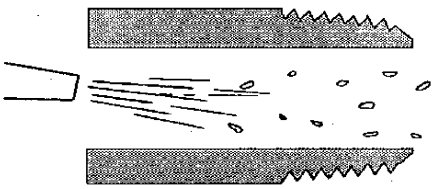
4-1. Piping

1) For piping beyond the filter, use pipes that hardly get corroded such as galvanized pipes, nylon tubes, rubber tubes, etc. (Refer to Selection Guide Table for Related Equipment.)
2) See to it that the pipe connecting cylinder and solenoid valve has effective sectional area needed for the cylinder to drive at specified speed. (Refer to Selection Guide Table for Related Equipment.)
3) Install filter preferably adjacent upper-stream to solenoid valve for eliminating rust, foreign substance and drain in the pipe.
4) Strictly observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.

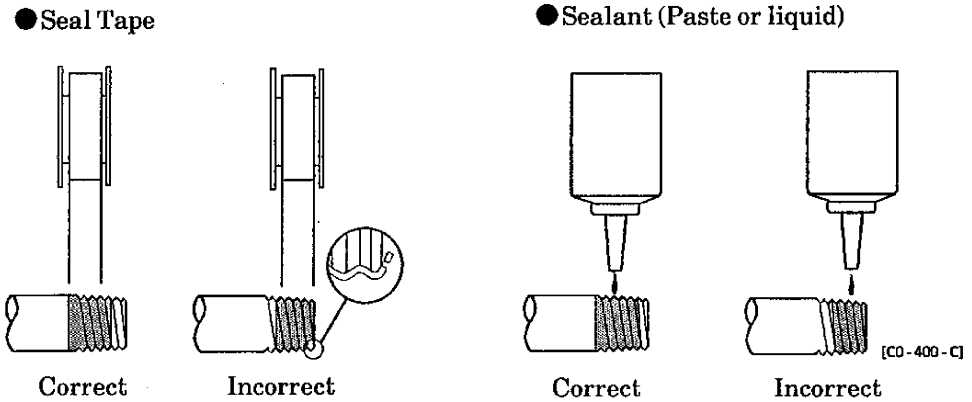


[C0-400-A]

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


[C0-400-B]

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



[C0-400-C]

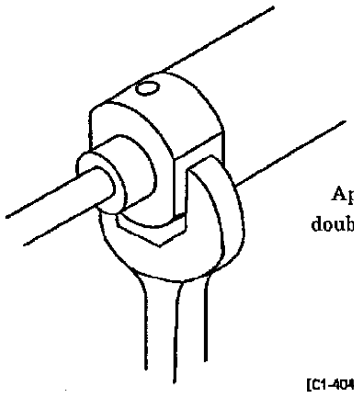
7) Inspect against any external leakage at each threaded joint, upon completion of plumbing, by applying soapy water over it.

4-2. Installation

1) The ambient temperature range for this cylinder is −10 ~ 60°C.
2) Use cylinder with bellows over its rod within the area with much dust.
3) Carefully avoid other object from hitting the tube or over-tightening. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.
4) Assembly of supporting metal fittings

   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 metal bracket.

   The supporting metal fittings are supplied with the cylinder at the time of delivery.



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

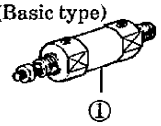
[C1-404-A]

Required torque to the mounting nut is 230 kgf/cm^2 {23N·m}.

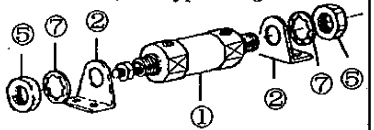
Supporting metal bracket attaching

[C1-404-B]

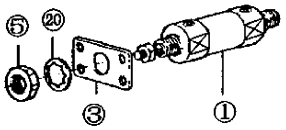
CMK 2-00 (Basic type)



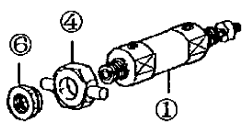
CMK 2-LB (Foot type along axis)



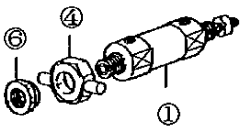
CMK 2-FA (Flange type)



CMK 2-TA (Trunnion type)



CMK 2-TB (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)		

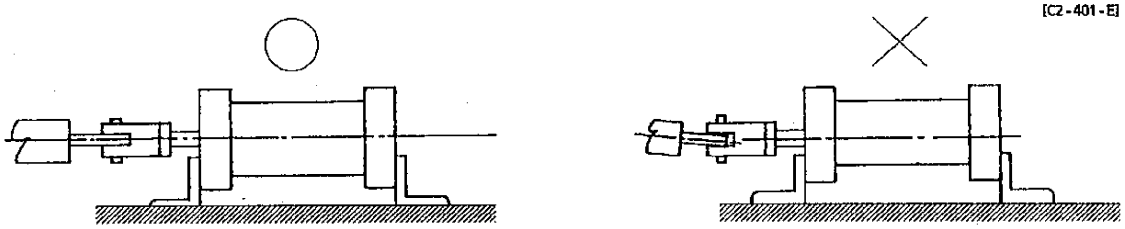
5) When cylinder is fixed type and rod end is guided

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's free joint connector (spherical bearing).

6) When cylinder is fixed type and rod end is connected with pin joint

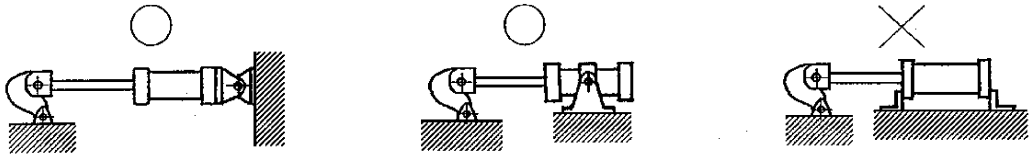
In case the load acting direction is not parallel with the rod axial center, the rod and tube may get entangled causing seizure, etc. Hence, make sure that the rod axial center and the load transfer direction are aligned to each other.

[C2-401-E]



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



[C2-401-F]

Clevis type　　Trunnion type　　Foot type

8) Revolving Torque

The cylinder of this type, with revolving prevention device, is the one strictly to prevent the revolution of piston rod. Avoid using the cylinder with a potential of revolution.

5. MAINTENANCE

5-1. Periodic Inspection

1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.
2) Inspection items
   ⓐ Check the bolts and nuts fitting the piston rod end fittings and supporting fittings for slackening.
   ⓑ Check to see that the cylinder operates smoothly.
   ⓒ Check any change of the piston speed and cycle time.
   ⓓ Check for internal and/or external leakage.
   ⓔ Check the piston rod for flaw (scratch) and deformation.
   ⓕ Check the stroke for abnormality.

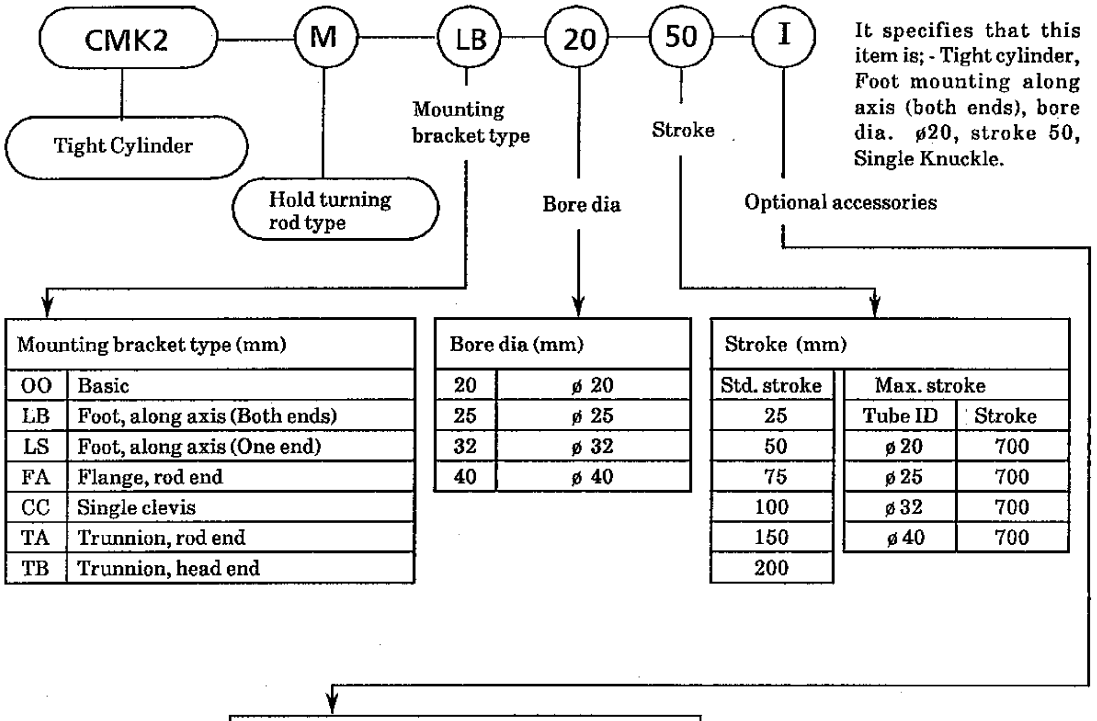
   See "Trouble shooting", 5-2, should there be any trouble found, also carry out additional tightening if bolts, nuts, etc.are slackened.

5-2. Trouble Shooting

Trouble	Cause	Countermeasure
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 supporting system.
	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 supporting system.
	Exertion of transverse (lateral) load	Install a guide. Revise the installation state and/or change the supporting system.
	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 installation direction 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 supporting system.

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.

6. MODEL CODING



Mounting bracket type (mm)	
OO	Basic
LB	Foot, along axis (Both ends)
LS	Foot, along axis (One end)
FA	Flange, rod end
CC	Single clevis
TA	Trunnion, rod end
TB	Trunnion, head end

Bore dia (mm)	
20	ø 20
25	ø 25
32	ø 32
40	ø 40

Stroke (mm)		
Std. stroke	Max. stroke	
	Tube ID	Stroke
25	ø 20	700
50	ø 25	700
75	ø 32	700
100	ø 40	700
150		
200		

Accessories & options	
I	Single Knuckle
Y	Double Knuckle
B2	Double Bracket
J	Bellows, Nylon tarpaulin
K	Bellows, Neoprene sheet
C	Speed controller built in type
F	One touch snap joint
M	Piston rod, material revised
N	Piston rod, variation of extruded length and threaded portion
V	Boss cut