CKD

SM－249172－A

INSTRUCTION MANUAL

LINEAR SLIDE CYLINDER FINE SPEED TYPE

LCS-F, LCT-F Series

- Please read this manual and the manual of a standard type before using the product.
  LCS:SM-220632-A
  LCT:SM-237524-A
- Especially, please read the description concerning safety carefully.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation
Ver.2

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 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:

⚠ 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.

INDEX

LCS-F, LCT-F Series
Linear Slide Cylinder
Fine Speed Type
Manual No. SM-249172-A

1. UNPACKING

1) Make sure that the type No. on the nameplate of the delivered Micro Speed Cylinder matches the type No. you orderd.

2) Check the appearance for any damage.

3) Stop up the piping port with a sealing plug to prevent the entry of foreign substances into the cylinder. Remove the sealing plug before piping.

2. INSTALLATION

2.1 Installation

1) The ambient temperature for this cylinder is 5 to 60℃. Always operate the cylinder within this temperature range.

2) Install cylinder body with a hexagon socket head cap screw directly.

3) Apply no lateral load at all for the purpose of stopper.

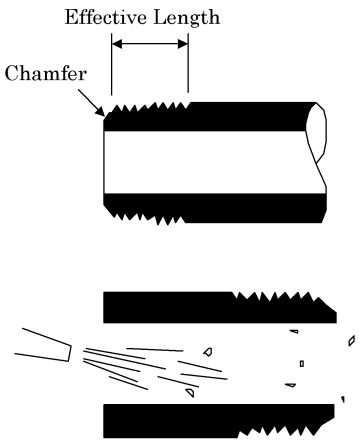
2.2 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.
2) See to it that the pipe connecting cylinder and solenoid valve has effective sectional area which is needed for the cylinder to drive at the specified speed.

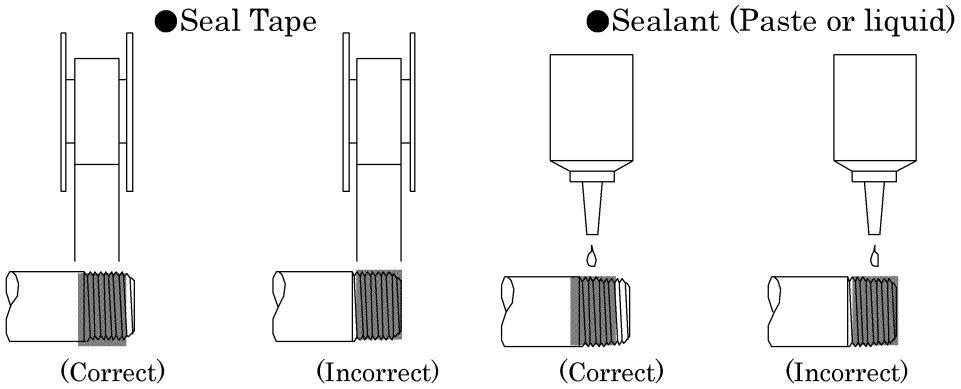
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

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.

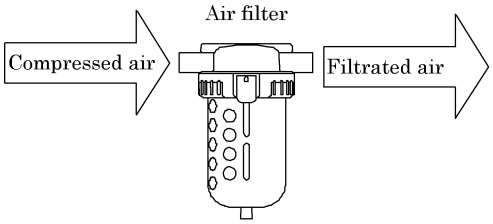


6) Refrain from mapplying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

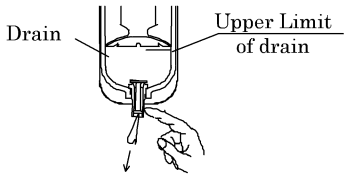


2.3 Fluid

1) It is necessary to use dehumidified air that has been filtered from compressed air. Carefully select an adequate filter that has an adequate filtration rate (preferably 5 μm 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) Use this cylinder without lubrication. If this cylinder is lubricated, this may cause the characteristics to be changed.

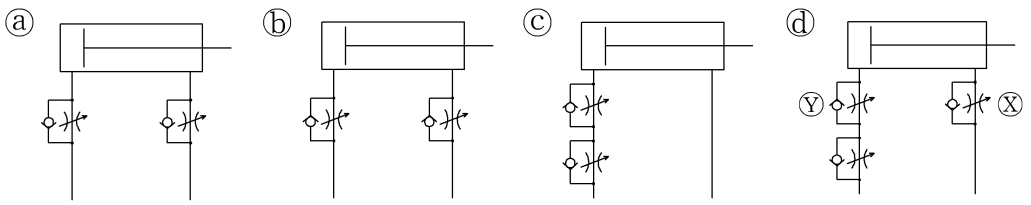
3. OPERATION

1) Use this cylinder without lubrication.
   (1) Features may change if the device is lubricated.

2) Always operate the cylinder within this working speed range.
   (1) Working speed range.
   LCS :5 to 200mm/s, LCT :10 to 200mm/s (loadless, Pressure = 0.5MPa)

3) Assemble the flow control valve near the cylinder.
   (1) Adjustments become unstable if assembled away from the cylinder.
   (2) Use the SC-M3/M5, SC3W, SCD-M3/M5, and SC3WU Series flow control valve.

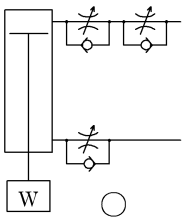
4) Stable speed control is achieved with a meter-out circuit.
   (1) If the load resistance is small when the operating direction of the single is driven at a micro speed, the pop up occurs when starting the operation.
   To prevent the pop up, use the circuits ⓑ, ⓒ, or ⓓ.
   When comparing the circuits ⓑ, ⓒ, and ⓓ, the circuit ⓓ provides the most stable operation.



ⓐ	ⓑ	ⓒ	ⓓ
PUSH : Meter-out PULL : Meter-out	PUSH : Meter-in PULL : Meter-in	PUSH : Meter-in PULL : Meter-out	PUSH : Meter-in and -out PULL : Meter-out

   (2) How to adjust the PUSH operation speed of the circuit ⓓ.
   1. Set the speed using the speed controller Ⓧ.
   2. Throttle the speed with the speed controller Ⓨ until pop up does not occur.
   3. Recheck the speed.

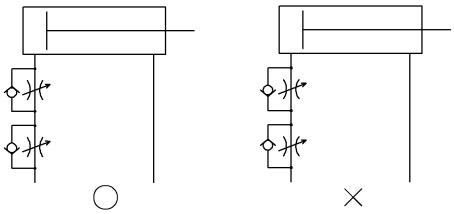
(Note1) If the meter-in circuit is used when mounting the cylinder in the vertical direction, the cylinder may fall down by its own weight. In this case, the meter-out circuit needs to be combined.



○ ×

Cylinder may fall down by its own weight during lowering.

(Note2) When connecting the speed controllers in series, the circuit shown in the Fig. Below is used.



○ ×

Speed control becomes unstable.

(3) Cause of pop up

- The flow rate is throttled using the meter-out circuit to control the speed on the exhaust side to a micro speed level. Therefore, both sides become the same pressure level immediately after the valve has been operated.
- The thrust equivalent to a difference between with piston and without piston in pressure receiving area is activated in the PUSH direction and it may cause the pop up.

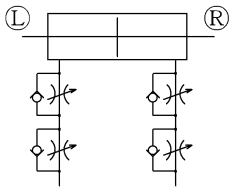
(4) Reference for pop up

The pop up occurs when the following conditions are met.
Piston rod area × Air pressure > Load resistance

(5) For LCT

It corresponds to the constructional both rod cylinder for LCT. ⓔ is the steadiest to the cylinder circuit.

ⓔ



Ⓡ → Ⓛ : Meter-in and -out
Ⓛ → Ⓡ : Meter-in and -out

5) Generally, the higher air pressure, and the smaller load result in the more stable operation.
   (1) Use a load at 50% or less.

6) Do not operate the cylinder in a place where any vibration exists.
   (1) The vibration may adversely affect the cylinder, causing unstable operation.

7) Please wash the hand after handling the fluorine-based grease.
   (1) There is a possibility to generate a harmful gas at the high temperature of 260℃ or more though it is not dangerous to grease.

4. TROUBLE SHOOTING

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