CKD Corporation

SM-5163-A

INSTRUCTION MANUAL

FOR

SELEX CYLINDER
SCA2-O

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.

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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SCA 2
Selex Cylinder
SM 2944-A

1. PRODUCT

1.1 Specifications

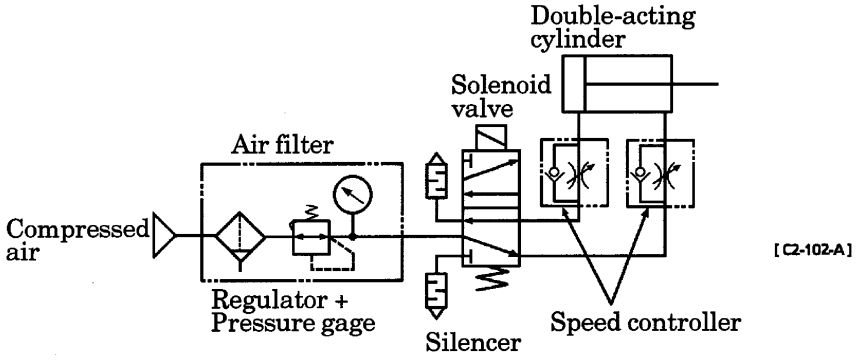
Fluid	Compressed Air
Operating Pressure Range MPa{kgf/cm²}	0.01~1.0 {0.1~10.2}
Withstanding Pressure MPa {kgf/cm²}	1.6 {16.3}
Ambient Temperature Range °C	−5~60 (Not to be frozen)
Lubrication	Not required (Use Grade 1 ISO VG32 Turbine oil, if lubrication is preferred.)
Operating Piston Speed mm/s	10~1000
Installable Switch Model	R0, R1, R2, R2Y, R3, R3Y, R4, R5, R6, A0BC, A0BF, R□ A (Terminal box : IP64), R□B (Terminal box : No Water proof)

Note : Cylinder switch is mountable on the cylinder of this type.

1.2 Fundamental Circuit Diagram & Selection of Related Equipment

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

The following is the fundamental circuit diagram.



2) Selection of Related Equipment with the Fundamental Circuit Diagram above:

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

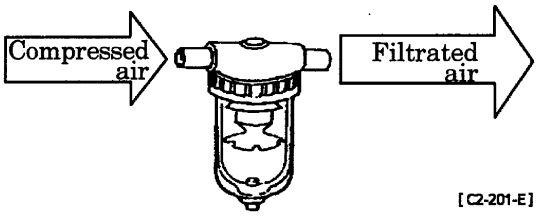
Selection Guide Table for Related Equipment (an example)

Inner dia. of cylinder (mm)	Theoretical standard speed (mm/s)	Required flow rate (ℓ/min) at P=0.5MPa {5kgf/cm²}	solenoid valve		Speed controller	Silencer	Distribution tube (1m)
			Single solenoid	Double solenoid			
φ40	250	110	A4F010-06	4F020-06	SC1-6	SL-M5	φ4×φ2.5 Nylon tube (1m)
	500	230	A4F010-06	4F020-06	SC1-6	SL-M5	φ6×φ4 Nylon tube (1m)
	750	340	4F110-08	4F120-08	SC1-8	SLW-8A	φ6×φ4 Nylon tube (1m)
	1,000	450	4F210-08	4F220-08	SC1-10	SLW-8A	φ10×φ8 Nylon tube (1m)
φ50	250	180	A4F010-06	4F020-06	SC1-6	SL-M5	φ6×φ4 Nylon tube (1m)
	500	350	4F110-08 4L210-08	4F120-08 4L220-08	SC1-8	SLW-6A	φ6×φ4 Nylon tube (1m)
	750	530	4F210-08	4F220-08	SC1-10	SLW-8A	φ10×φ8 Nylon tube (1m)
	1,000	710	4F410-10 4F310-10 4K310-10 4L310-10	4F420-10 4F320-10 4K320-10 4L320-10	SC1-10	SLW-10A	φ10×φ8 Nylon tube (1m)
φ63	250	280	4F110-08 4L210-08	4F120-08 4L220-08	SC1-8	SLW-6A	φ6×φ4 Nylon tube (1m)
	500	560	4F210-08	4F220-08	SC1-10	SLW-8A	φ10×φ8 Nylon tube (1m)
	750	840	4F410-10 4F310-10 4K310-10 4L310-10	4F420-08 4F320-10 4K320-10 4L320-10	SC1-10	SLW-10A	φ10×φ8 Nylon tube (1m)
	1,000	1,100	4F510-10	4F520-20	SC1-10	SLW-10A	φ10×φ4 Nylon tube (1m)
φ80	250	450	4F210-08	4F220-08	SC1-10	SLW-8A	φ10×φ8 Nylon tube (1m)
	500	910	4F410-08 4F310-08 4K310-08 4L310-08	4F420-08 4F320-08 4K320-08 4L320-08	SC1-10	SLW-8A	PT1/4 Steel pipe
	750	1,400	4F510-10	4F520-10	SC1-10	SLW-10A	PT3/8 Steel pipe
	1,000	1,800	4F510-15	4F520-15	SC-20A	SLW-15A	PT3/8 Steel pipe (or PT1/2)
φ100	250	710	4F410-10 4F310-10 4K310-10 4L310-10	4F420-10 4F320-10 4K320-10 4L320-10	SC1-10	SLW-10A	φ10×φ8 Nylon tube (1m)
	500	1,400	4F510-10	4F520-10	SC1-10	SLW-10A	PT3/8 Steel pipe
	750	2,100	4F510-15	4F520-15	SC-20A	SLW-15A	PT3/8 Steel pipe (or PT1/2)
	1,000	2,800	4F610-20	4F620-20	SC-20A	SL-20A	PT3/8 Steel pipe

2. CAUTION

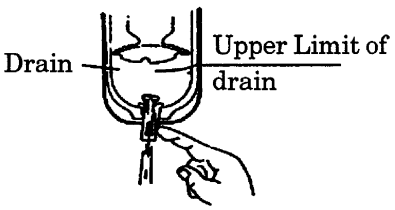
2.1 Fluid

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 (5μm or less), flow rate and its mounting location (as nearest to the directional control valve as possible).



[C2-201-E]

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.



[C2-201-F]

3. OPERATION

1) The cylinder feed pressure is 0.01~1.0 MPa {0.1~10.2kgf/cm^2}; hence regulate the pressure within this pressure range.

Table 1: Table of cushion characteristics

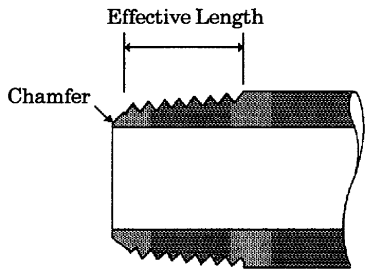
Tube I.D. (mm)	Absorbable energy J {kgf · m}
	Without cushion
ϕ 40	0.15 {0.015}
ϕ 50	0.24 {0.024}
ϕ 63	0.24 {0.024}
ϕ 80	0.54 {0.055}
ϕ100	0.87 {0.089}

2) Install a speed controller as shown in "Fundamental Circuit Diagram" on the page 1 to control the piston speed.

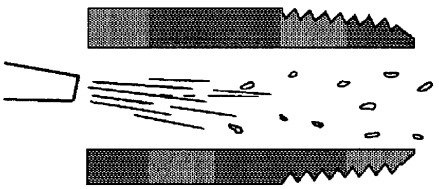
4. INSTALLATION

4.1 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion 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 an effective sectional area which is needed for the cylinder to drive at the specified speed. (Refer to Selection Guide Table for Related Equipment.)
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust and foreign substances in the drain of the pipe.
4) 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.
5) Flush air into the pipe to blow out foreign substances and chips before piping.

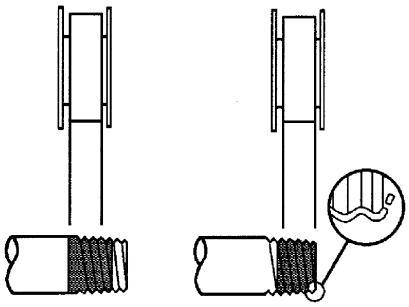


[C0-400-A]

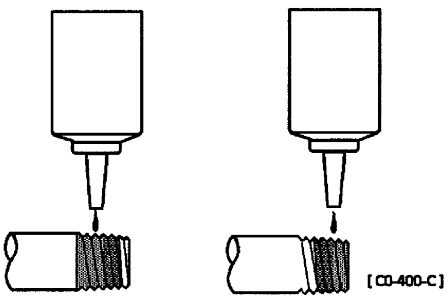

[C0-400-B]

6) 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)

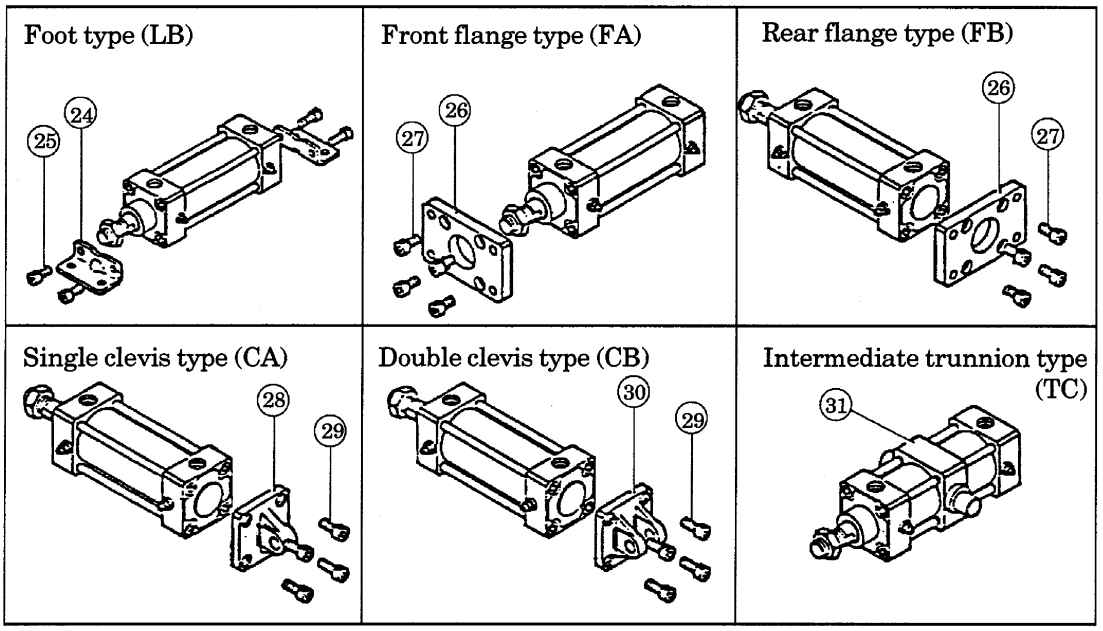

[C0-400-C]

Right False

4.2 Installation

1) The ambient temperature range for this cylinder is − 10~60°C (Not to be frozen).
2) Use cylinder with bellows over its rod within the area with much dust.
3) Carefully avoid other object from hitting the tube. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.
4) Assembly of supporting metal fittings:
   The supporting metal fittings are supplied with the cylinder at the time of deliver. Install them as shown in the figures on this page.
   However, the trunnion types (TC, TA and TB) are shipped with the trunnion mounted.

Assembly of supporting metal fitting (same as disassembling)



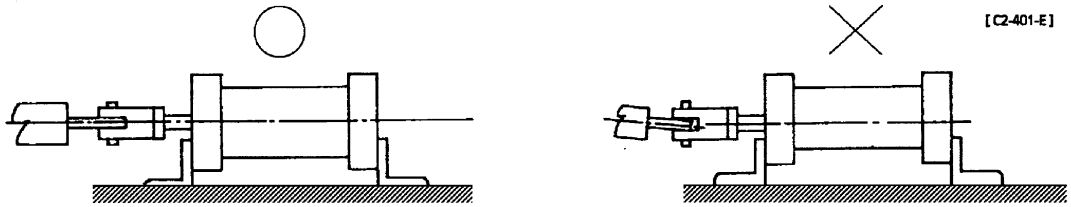
[C2-401-D]

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

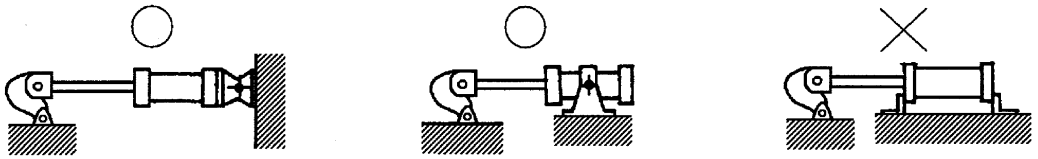
In case the load acting direction is not parallel with the rod axial center, the rod and tube may get entangled causing seizure, etc. Hence, make sure that the rod axial center and the load transfer direction are aligned to each other.



[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.



Clevise type　　Trunnion type　　Foot type

[C2-401-F]

5. MAINTENANCE

5.1 Periodical 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	Exertion of transverse load	Install a guide. Reverse the installation state and/or change the supporting system.

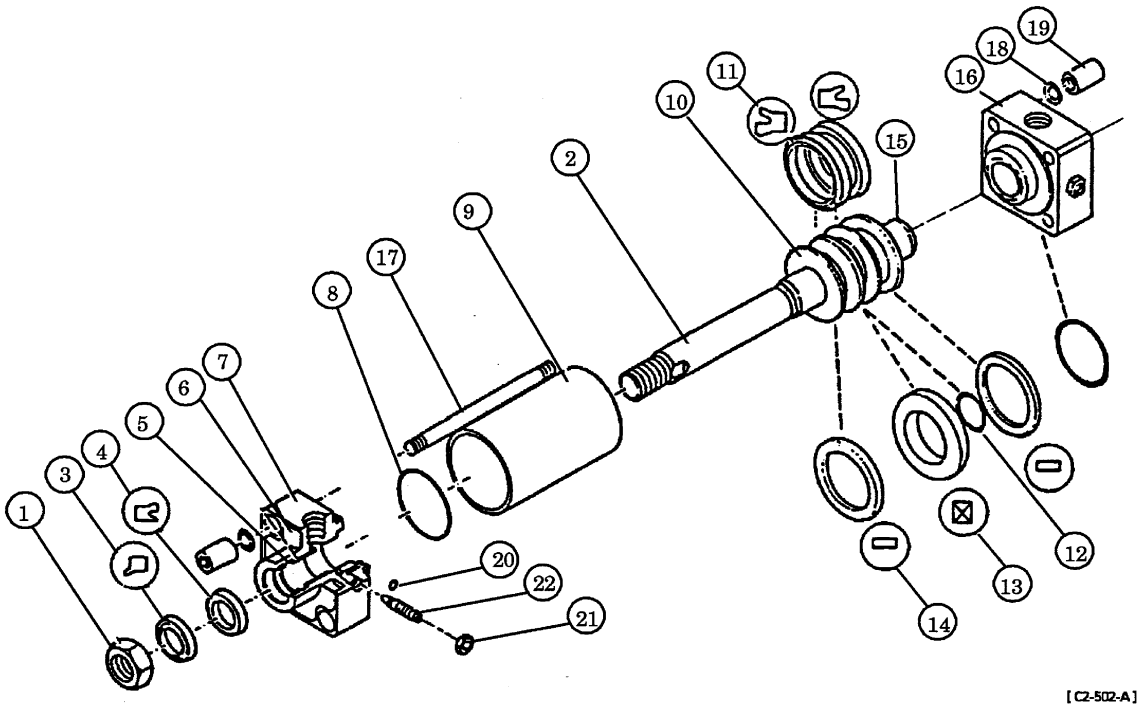
5.3 Disassembling

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

1) Prepare the following tools for disassemling.

Name	Qty	Place of use	Applicable tube ID (mm)
Hex. bar spanner (Nominal 6)	2	25, 27 and 29	40, 50 and 63
Hex. bar spanner (Nominal 8)	2	20	40, 50 and 63
Hex. bar spanner (Nominal 10)	2	25, 27 and 29	80 and 100
Hex. bar spanner (Nominal 12)	2	20	80 and 100
Spanner (Nominal 13)	1	22	For all tube ID
Minus tip screwdriver (Nominal 5.5 × 75)	1	12 and 23	For all tube ID
Minus tip screwdriver (Nominal 9 × 200)	1	9	For all tube ID
Marret hammer	1	For disassembling 7, 17 and 10	For all tube ID
Ice pick	1	3, 4, 8 and 21	For all tube ID

2) Disassemble the cylinder, referring to the following drawing.



Part No.	Part Name	Qty	Part No.	Part Name	Qty
1	Rod nut	1	12	Piston gasket	1
2	Piston rod	1	13	Piston magnet	1
3	Dust wiper	1	14	Wear ring	2
4	Rod packing	1	15	Piston (H)	1
5	Bushing	1	16	Head cover	1
6	Masking plate	2	17	Tie rod	4
7	Rod cover	1	18	Conical spring washer	8
8	Cylinder gasket	2	19	Round nut	8
9	Cylinder tube	1	20	Needle gasket	2
10	Piston (R)	1	21	Needle nut	2
11	Piston packing	2	22	Cushion needle	2

3) Inspect the following items.
   (a) Scratch marks on the boar surface of the tube
   (b) Scratch marks on the surface of piston rod, peel-off of plating and rusting
   (c) Scratch marks and wear inside of the bushing
   (d) Scratch marks, wear and crack of the surface of piston
   (e) Loosened connection of piston and rod
   (f) Crack of both end covers
   (g) 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.)

Tube ID (mm)	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100
Kit No. / Part No. & Name	SCA2-O-40K	SCA2-O-50K	SCA2-O-63K	SCA2-O-80K	SCA2-O-100K
3 Dust wiper	SFR-16N	SFR-20N	SFR-20N	SFR-25N	SFR-30N
4 Rod packing	PNY-16	PNY-20	PNT-20	PNY-25	PNY-30
8 Cylinder gasket	F4-667115	F4-667116	F4-667117	F4-667118	F4-667119
11 Piston packing	PGY-40N	PGY-50N	PGY-63N	PGY-80N	PGY-100N
14 Wear ring	F4-650239	F4-650240	F4-650241	F4-650242	F4-650243
20 Needle gasket	P-3	P-3	P-3	P-3	P-3