CKD Corporation

SM-
228843-A

INSTRUCTION MANUAL

FOR

SELEX CYLINDER with valve
SCA2-V (Standard type)

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.

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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SCA2-V (Standard type)
Selex Cylinder with valve
Manual No. SM 228843-A

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. PRODUCT

1.1 Specifications

1) Product Specifications

Part number / Item						
		SCA2 - V1 Advancing type when energized SCA2 - V2 Retracting type when energized SCA2 - V Double solenoid				
Action		Double - acting type				
Media		Compressed Air				
Maximum working pressure	MPa {kgf/cm²}	0.7 {7.1}				
Minimum working pressure	MPa {kgf/cm²}	0.15 {1.5}				
Proof pressure	MPa {kgf/cm²}	1.05 {10.7}				
Ambient tempreature	°C	−5~50 (Not to be frozen)				
Bore coil	mm	φ40	φ50	φ63	φ80	φ100
Port size	Rc	3/8	3/8	3/8	1/2	1/2
Stroke tolerance	mm	$^{+1.0}_{0}$(~300), $^{+1.4}_{0}$(~500), $^{+2.0}_{0}$(1000)				
Working piston speed	mm/s	50~500 (Set the speed within the range of energy absorption.)				
Cushioning		Be able to select "have cushioning" or "no cushioning				
Lubrication		Not required (Use Grade 1 ISO VG32 Turbine oil, if lubrication is preferred.)				

Note1. φ100 piston speed can adjust 500 mm/s by using silencer (SLW-10A) as the substitute for Metering Valve (SMW-10A).

Cylinder switch is mountable on the cylinder of this type.

2) Valve Specifications

Part number / Item	SCA2 - V1 - 40 / 50 SCA2 - V2 - 40 / 50 SCA2 - V - 40 / 50		
Rated voltage	AC100V (50/60Hz)	AC200V (50/60Hz)	DC24V
Starting voltage	0.056 / 0.044	0.028 / 0.022	0.075
Holding current	0.028 / 0.022	0.014 / 0.011	
Power consumption	1.8 / 1.4		1.8
Voltage fluctuation range	±10%		
Insulation class	JIS Class B mold coil		

Part number / Item	SCA2 - V1 - 63 SCA2 - V2 - 63 SCA2 - V - 63		
Rated voltage	AC100V (50/60Hz)	AC200V (50/60Hz)	DC24V
Starting voltage	0.046 / 0.042	0.023 / 0.021	0.075
Holding current	0.028 / 0.021	0.014 / 0.011	
Power consumption	1.6 / 1.3		1.8
Voltage fluctuation range	±10%		
Insulation class	JIS Class B mold coil		

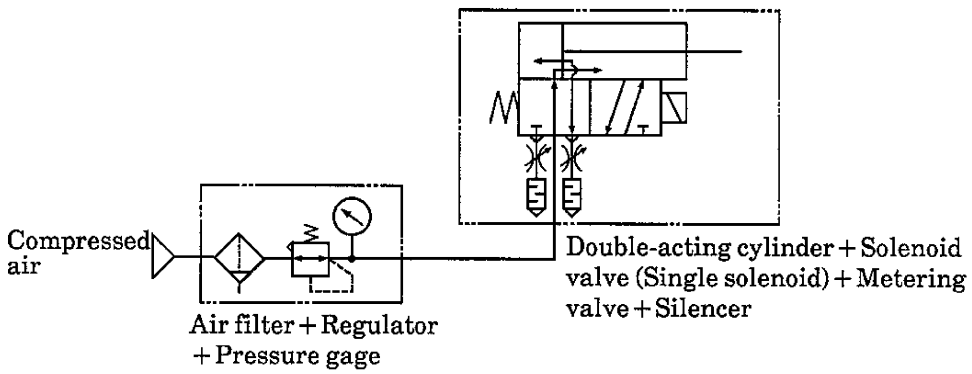
Part number / Item	SCA2 - V1 - 80 / 100 SCA2 - V2 - 80 / 100 SCA2 - V - 80 / 100		
Rated voltage	AC100V (50/60Hz)	AC200V (50/60Hz)	DC24V
Starting voltage	0.046 / 0.042	0.023 / 0.021	0.075
Holding current	0.028 / 0.022	0.014 / 0.011	
Power consumption	1.6 / 1.3		1.8
Voltage fluctuation range	±10%		
Insulation class	JIS Class B mold coil		

1.2 Fundamental Circuit Diagram

1) Fundamental Circuit Diagram (Oilless Type)

The following is the fundamental circuit diagram.

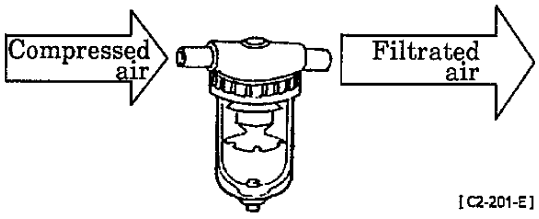
This product is with Valve, Metering Valve, and Silencer, so the piping is only connected with the air through air filter and regulator.



2. CAUTION

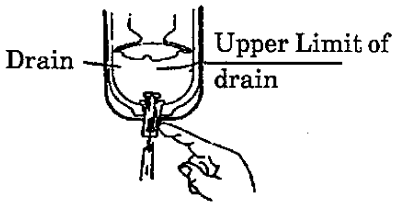
2.1 Fluid

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 (preferably 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

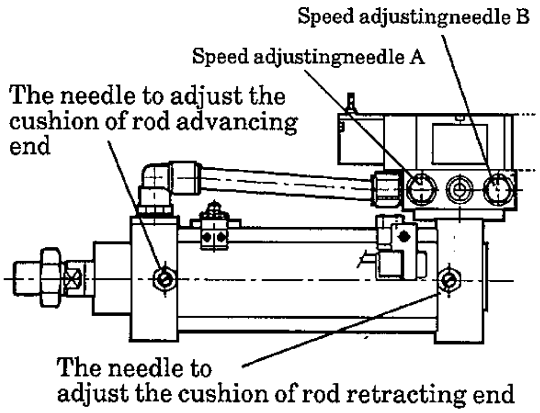
3.1 Working Pressure Range

The cylinder feed pressure is 0.05~1.0 MPa {0.5~10.2kgf/cm^2}; hence regulate the pressure within this pressure range.

3.2 Cushion Adjustment

Though the cushion has been adjusted at no load when delivered, adjust the cushion needle when the change of cushion effect is required.

Tightening the needle (clockwise) makes cushion more effective. Tighten the needle lock nut all the way after adjustment.



However, if kinetic energy such as load is heavy or speed is too fast, exceeding the values given in Table 1, consider of providing a shock absorber.

Table 1: Table of cushion characteristics

Tube I.D. (mm)	Effective cushion length (mm)	Absorbable energy J {kgf·m}	
		With cushion	Without cushion
ϕ 40	14.6	4.29 {0.437}	0.15 {0.015}
ϕ 50	16.6	8.37 {0.854}	0.24 {0.024}
ϕ 63	16.6	15.8 {1.62}	0.24 {0.024}
ϕ 80	20.6	27.9 {2.85}	0.54 {0.055}
ϕ100	23.6	49.8 {5.08}	0.87 {0.089}

3.3 Piston Speed Adjustment

Adjust Piston speed with the needle of Metering valve mounting on the sub base.

Speed adjustment needles A · B are divided for advancing adjustment and for retracting adjustment. Each is different by operating type (V1, V2 and V). Confirm the connection of the operating direction and needles A · B by Table below.

Operating direction / How to operate	Advancing adjustment	Retracting adjustment
V1 : Advancing type when energized Single solenoid type	needle B	needle A
V2 : Retracting type when energized Single solenoid type	needle A	needle B
V : Double solenoid type	needle B	needle A

How to adjust speed is turning needles clockwise make speed down, because exhaust orifices become narrow.
On the contrary, turning needles counterdockwise make speed up.

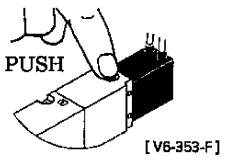
3.4 Function

1) V1 : Advancing type when energized · Single solenoid type
<Non-current>
Compressed air is supplied to head side and the air is exhausted from cap sid at the same time. Then piston rod retracts.
<Current>
Compressed air is supplied to cap side and the air is exhausted from head side at the same time. Then the piston rod advances.
2) V2 : Retracting type when energized · Single solenoid type
<Non-current>
Compressed air is supplied to cap side and the air is exhausted from head side at the same time. Then the piston rod advances.
<Current>
Compressed air is supplied to head side and the air is exhausted from cap sid at the same time. Then piston rod retracts.
3) V : Double solenoid
<SOL a current>
Compressed air is supplied to head side and the air is exhausted from cap sid at the same time. Then piston rod retracts.
<SOL b current>
Compressed air is supplied to cap side and the air is exhausted from head side at the same time. Then the piston rod advances.

Besides, double solenoid type dose not change operating direction even when switch off the Current after energized, because of self holding.

3.5 Manual Shifting

The spool is not shifted unless compressed air is supplied, due to it being pilot operated type. manual operation device for valve is non-locking type. Push operating button down to it reaching to the bottom.



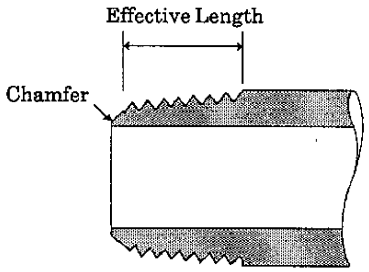
V1 and V2 are 2-position single solenoid valve. It generates as the same effect, as if it is en-energized while the button is being pressed down, and returns when the button is released.

V is 2-position double solenoid valve. It generates as the same effect as if solenoid coil a is energized when the button of a side is pressed down, but the spool stays the shifted position even when the button is released. In order to return the spool, press the button of b side.

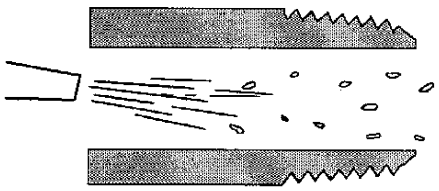
4. INSTALLATION

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.

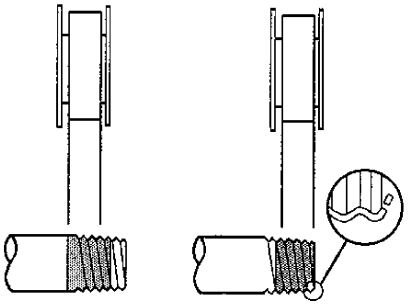


[C0-400-A]

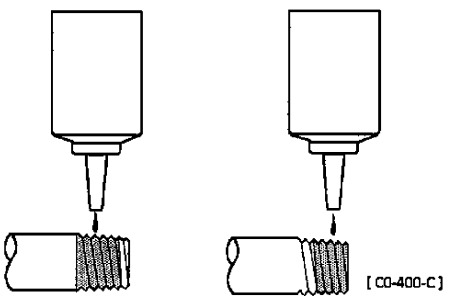

[C0-400-B]

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

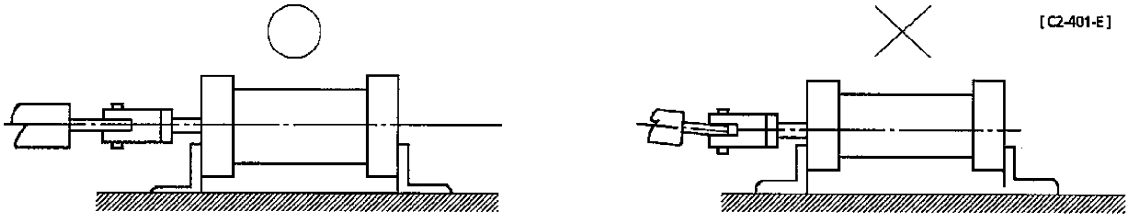
● Sealant (Paste or liquid)


[C0-400-C]

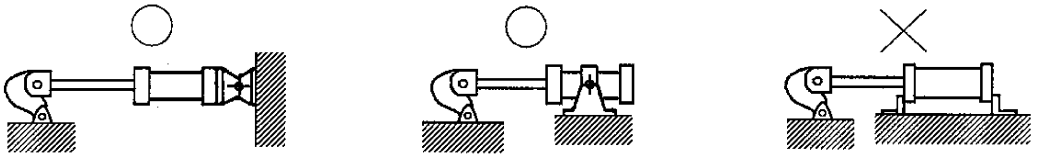
Right False

4.2 Installation

1) The ambient temperature range for this cylinder is −5~50°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) When cylinder is fixed and a load is guided:
   In case the operating directions both of the piston rod and of a load are different (are misaligned), the screw thread on the piston rod may be broken and the bushing may be worn or seized.
   In order to prevent from that, connect the piston rod and a load using CKD's floating connector (a spherical bearing).
5) 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]

6) 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.



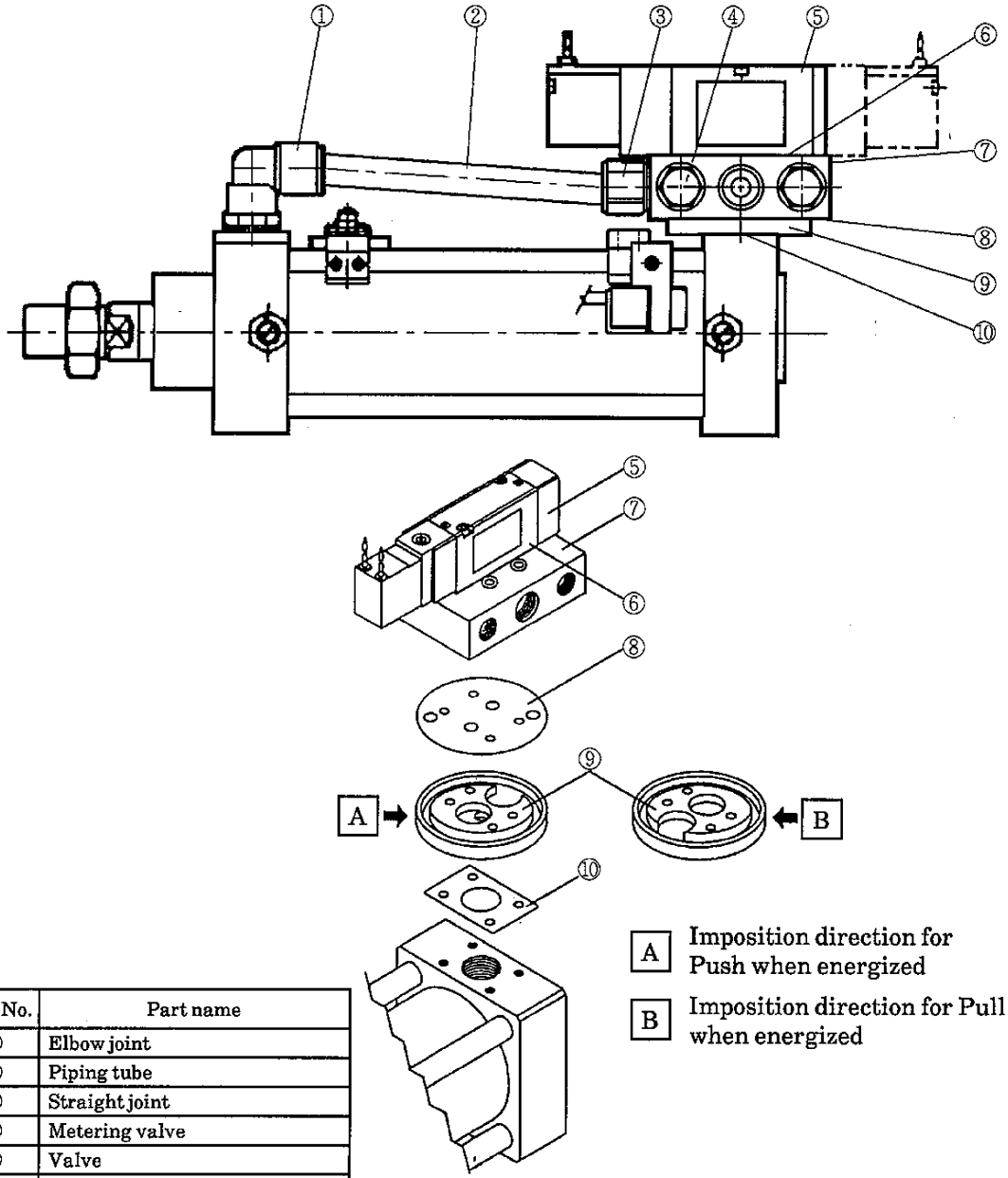
[C2-401-F]

7) Erectric Wiring
   See the instruction manual for valve.

8) Modification between V1 : Advancing type when energized and V2 : Retracting type when energized.

Turning the direction of base plate⑨ 180° can modify from V1 (Advancing type when energized) to V2 (Retracting type when energized) or from V2 to V1 as discribed below.

◇ Note : Modification can not do by turning valve 180°.



Part No.	Part name
①	Elbow joint
②	Piping tube
③	Straight joint
④	Metering valve
⑤	Valve
⑥	Gasket for valve
⑦	Sub base
⑧	Gasket for sub base
⑨	Base plate
⑩	Gasket for head cover
⑪	Switch maunting base

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.
   ⓖ Check any corrosion inside of each port.

   See "Trouble shooting", 5.2 on 11 pages, should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

3) Items of inspection by disassembly
   ⓐ Flaw and corrosion on internal surface of tube.
   ⓑ Flaw on surface of piston rod and pealing of plating or rust.
   ⓒ Flaw and wear of bushing internal surface.
   ⓓ Flaw, wear, rust or scratch on surface of piston.
   ⓔ Slacking threaded joint of piston rod.
   ⓕ Corrosion or flaw of both end covers.
   ⓖ Wear and tear of sliding packings (dust wiper, rod packing, cushion packing, wear ring).

   Repair or replace parts as required upon inspection.

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.
	Two sides of a gasket for sub base are opposite	Turn upside down.
	Base direction is opposite	Turn base direction 180°
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 : As for the troubleshooting valve, see the instruction manual for valve.

5.3 Disassembling

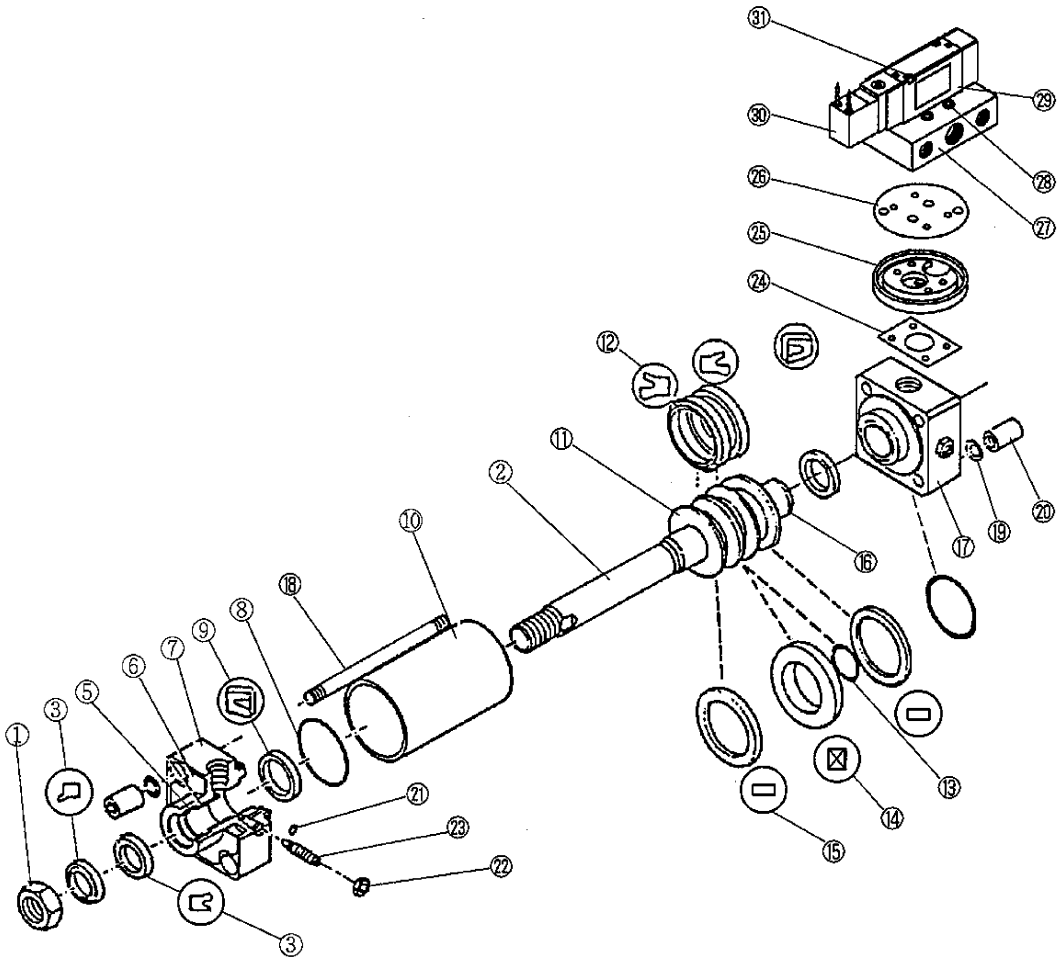
Should any air leakage occur, take the following corrective actions.

1) Prepare the following tools for disassemling.

Disassembling tools

Name	Qty	Place of use	Applicable tube ID (mm)
Hex. bar spanner (Nominal 2.5)	1	㉛	63
Hex. bar spanner (Nominal 3)	1	㉘, ㉛	For all tube ID
Hex. bar spanner (Nominal 5)	1	㉘	80, 100
Hex. bar spanner (Nominal 8)	2	㉙	40, 50, 63
Hex. bar spanner (Nominal 12)	2	⑳	80, 100
Spanner (Nominal 13)	1	㉒	For all tube ID
Minus tip screwdriver (Nominal5.5×75)	1	⑫, ㉓	For all tube ID
Minus tip screwdriver (Nominal9 ×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, ㉑	For all tube ID

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



Part No.	Part Name	Qty
1	Rod nut	1
2	Piston rod	1
3	Dust wiper	1
4	Rod packing	1
5	Bushing	1
6	Masking plate	2
7	Rod cover	1
8	Cylinder gasket	2
9	Cushion packing	2
10	Cylinder tubu	1
11	Piston (R)	1

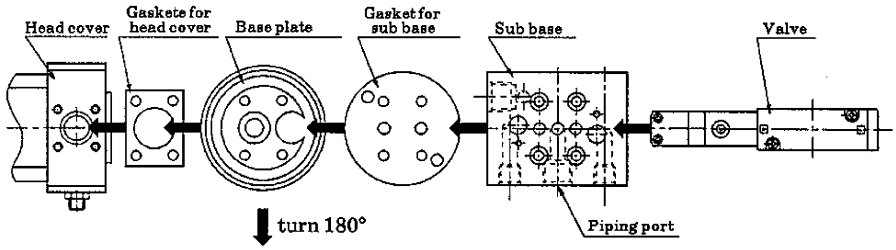
Part No.	Part Name	Qty
12	Piston packing	2
13	Piston gasket	1
14	Piston magnet	1
15	Wear ring	2
16	Piston (H)	1
17	Head cover	1
18	Tie rod	4
19	Conical spring washer	8
20	Round nut	8
21	Needle gasket	2
22	Needle nut	2

Part No.	Part Name	Qty
23	Cushion needle	2
24	Gasket for head cover	1
25	Base plate	1
26	Gasket for sub base	1
27	Sub base	1
28	Hexagon socket head cap screw	4
29	Gasket for valve	1
30	Valve	1
31	Mounting screw for valve	3

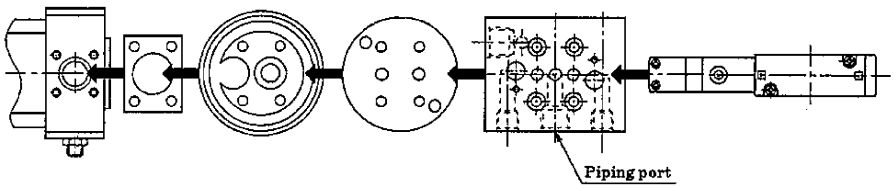
3) Assembling

Assemble in the reversed sequence of disassembling. Take care about the direction of the components between Cylinder and Valve, Base plate ㉕, Gasket for sub base ㉖, and Sub base ㉗. Assemble in the exactly same way as discribed below. If their direction is wrong way, Cylinder operates opposite direction or does not operate.

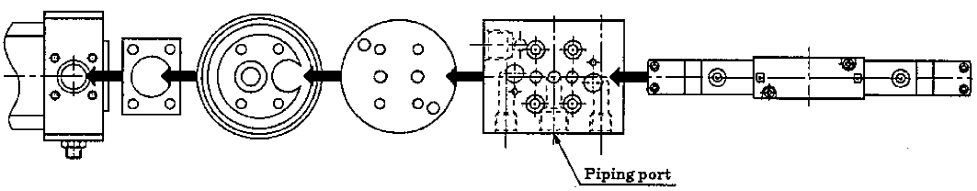
SCA2-V1 (Advancing type when energized · Single solenoid type)



SCA2-V2 (Retracting type when energized · Single solenoid type)



SCA2-V (Double solenoid)



4) Followings are expendable parts. (Specify the kit No. when ordering.)

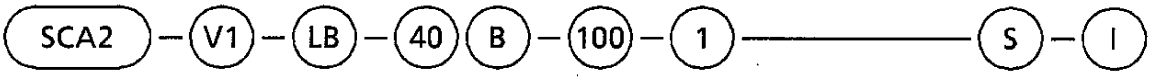
(a) SCA2

Part No.	Name \ Tube ID(mm) / Kit No.	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100
		SCA2-40K	SCA2-50K	SCA2-63K	SCA2-80K	SCA2-100K
3	Dust wiper	SFR-16K	SFR-20K	SFR-20K	SFR-25K	SFR-30K
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
9	Cushion packing	F4-650636	F4-650637	F4-650637	F4-650638	F4-650639
12	Piston packing	PGY-40	PGY-50	PGY-63	PGY-80	PGY-100
15	Wear ring	F4-650239	F4-650240	F4-650241	F4-650242	F4-650243
21	Needle gasket	P-3	P-3	P-3	P-3	P-3

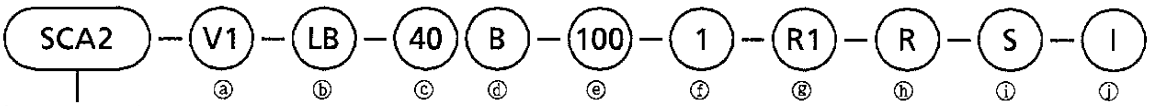
6. HOW TO ORDER

6.1 Product

- Without switch



- With switch



Selex cylinder
double acting, standard with switch

ⓐ How to operate		ⓑ Mounting style		ⓒ Tube ID(mm)		ⓓ Cushion	
V1	Advancing type when energized / Single solenoid type	OO	Basic type	40	ϕ 40	B	With cushion at both ends
		LB	Foot mounting type	50	ϕ 50	R	With cushion at head side
		FA	Front flange mounting type	63	ϕ 63	H	With cushion at cap side
V2	Retracting type when energized / Single solenoid type	FB	Rear flange mounting type	80	ϕ 80	N	Without cushion
		CA	Single clevis mounting type	100	ϕ100		
		CB	Double clevis mounting type				
V	Double solenoid	TC	Intermediate trunnion type				
		TA	Front trunnion mounting type				

Note : Mounting bracket is attached to the product at shipment.
(The trunnion mounting types are assembled at shipment.)

ⓔ Stroke (mm)			ⓕ Valve voltage		ⓖ Switch Model code			ⓗ Number of switches	
Std. stroke	Max. stroke		1	AC100V	Grommet			R	With 1 switch on head side
	Tube ID	Stroke	2	AC200V	R1※	Contactless	2-wire	H	With 1 switch on cap side
25			3	DC24V	R2※			D	With 2 switches
50	ϕ 40	600			R2※Y			T	With 3 switches
75	ϕ 50	600			R3※		3-wire		
100	ϕ 63	600			R3※Y				
150	ϕ 80	700			R0※	Contact	2-wire		
200	ϕ100	800			R4※				
250					R5※				
300					R6※				
350									
400									
450									
500									

The asterisk (※) represents the load wire length.

※ Length of lead cord	
No code	1m (Standard)
3	3m (Optional)
5	5m (Optional)

ⓘ Option		ⓙ Accessories	
J	Bellow: Nylon tarpaulin	I	Single knuckle
M	Alteration in piston rod material	Y	Double knuckle
No code	Cushion needle position R (Standard)	B1	Single bracket
S	Cushion needle position S	B2	Double bracket
T	Cushion needle position T	B4	Trunnion type No.2 bracket

6.2 Valve Model Code

Tube ID / Operating classifications	φ40 / φ50	φ63	φ80 / φ100
V1	4KB219	4KB319	4KB419
V2	4KB219	4KB319	4KB419
V	4KB229	4KB329	4KB429

6.3 Instruction point for valve

As for the instruction point for valve, see the instruction manual of No. below.

Product model code	Valve model code	No. of Instraction manual
SCA2-V1 · V2-40 / 50	4KB219	SM-206790-A
SCA2-V-40 / 50	4KB229	
SCA2-V1 · V2-63	4KB319	SM-215163-A
SCA2-V-63	4KB329	
SCA2-V1 · V2-80 / 100	4KB419	SM-215164-A
SCA2-V-80 / 100	4KB429	