SM-5363-A

INSTRUCTION MANUAL

FOR

SELEX CYLINDER

SCA2-K

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.

Refer to "TECHNICAL MANUAL FOR POSITION CHECK CYLINDER (SM-3429) for the cylinder with switch.

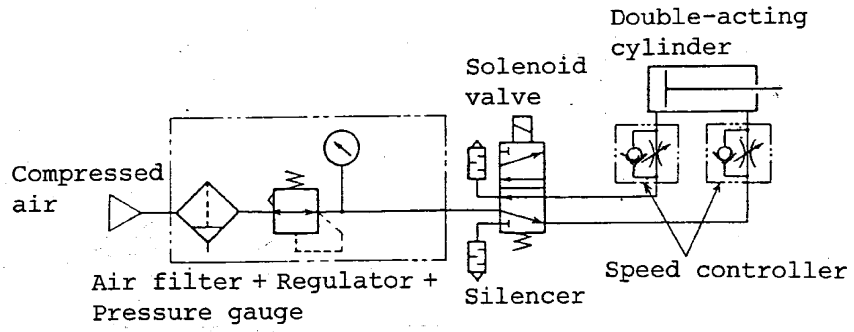
1. SPECIFICATION

Fluid	Compressed air
Operating pressure range kgf/cm^2 (MPa)	0.5 - 9.9 (0.05 - 0.99)
Proof pressure kgf/cm^2 (MPa)	16.0 (1.6)
Ambient temperature range (^{o}C)	-10 - 60 (Not to be frozen)
Lubrication	Not needed (Use class 1 ISO VG32 turbine oil, if oiling)
Operating piston speed (mm/sec)	50 - 1000

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 = 2.5 kgf/cm²	Solenoid valve		Speed controller	Silencer	Distribution tube
			Single solenoid	Double solenoid			
φ40	250	110	A4F010-06	4F020-06	SC1-6	SL-M5	φ4 x φ2.5 Nylon tube (1 m)
	500	230	A4F010-06	4F020-06	SC1-6	SL-M5	φ6 x φ4 Nylon tube (1 m)
	750	340	4F110-08	4F120-08	SC1-8	SLW-8A	φ6 x φ4 Nylon tube (1 m)
	1,000	450	4F210-08	4F220-08	SC1-10	SLW-8A	φ10 x φ8 Nylon tube (1 m)
φ50	250	180	A4F010-06	4F020-06	SC1-6	SL-M5	φ6 x φ4 Nylon tube (1 m)
	500	350	4F110-08 4L210-08	4F120-08 4L220-08	SC1-8	SLW-6A	φ6 x φ4 Nylon tube (1 m)
	750	530	4F210-08	4F220-08	SC1-10	SLW-8A	φ10 x φ8 Nylon tube (1 m)
	1,000	710	4F410-10 4F310-10 4K310-10 4L310-10	4F420-10 4F320-10 4K320-10 4L320-10	SC1-10	SLW-10A	φ10 x φ8 Nylon tube (1 m)
φ63	250	280	4F110-08 4L210-08	4F120-08 4L220-08	SC1-8	SLW-6A	φ6 x φ4 Nylon tube (1 m)
	500	560	4F210-08	4F220-08	SC1-10	SLW-8A	φ10 x φ8 Nylon tube (1 m)
	750	840	4F410-10 4F310-10 4K310-10 4L310-10	4F420-10 4F320-10 4K320-10 4L320-10	SC1-10	SLW-10A	φ10 x φ8 Nylon tube (1 m)
	1,000	1,100	4F510-10	4F520-10	SC1-10	SLW-10A	PT 3/8 Steel tube (1 m)
φ80	250	450	4F210-08	4F220-08	SC1-10	SLW-8A	φ10 x φ8 Nylon tube (1 m)
	500	910	4F410-08 4F310-08 4K310-08 4L310-08	4F420-08 4F320-08 4K320-08 4L320-08	SC1-10	SLW-8A	PT 1/4 Steel tube (1 m)
	750	1,400	4F510-10	4F520-10	SC1-10	SLW-10A	PT 3/8 Steel tube (1 m)
	1,000	1,800	4F510-15	4F520-15	SC-20A	SLW-15A	PT 3/8 Steel tube (or PT 1/2) (1 m)
φ100	250	710	4F410-10 4F310-10 4K310-10 4L310-10	4F420-10 4F320-10 4K320-10 4L320-10	SC1-10	SLW-10A	φ10 x φ8 Nylon tube (1 m)
	500	1,400	4F510-10	4F520-10	SC1-10	SLW-10A	PT 3/8 Steel tube (1 m)
	750	2,100	4F510-15	4F520-15	SC-20A	SLW-15A	PT 3/8 Steel tube (or PT 1/2) (1m)
	1,000	2,800	4F610-20	4F620-20	SC-20A	SL-20A	PT 3/8 Steel tube (1 m)

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. (Refer to Selection Guide Table for Related Machine)

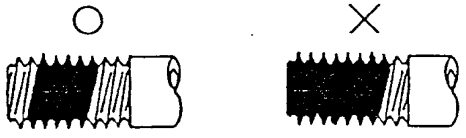
4-2 See to it that the pipe connecting cylinder and solenoid valve has effective sectional area needed for the cylinder to rotate at specified speed. (Refer to Selection Guide Table for Related Machine)

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

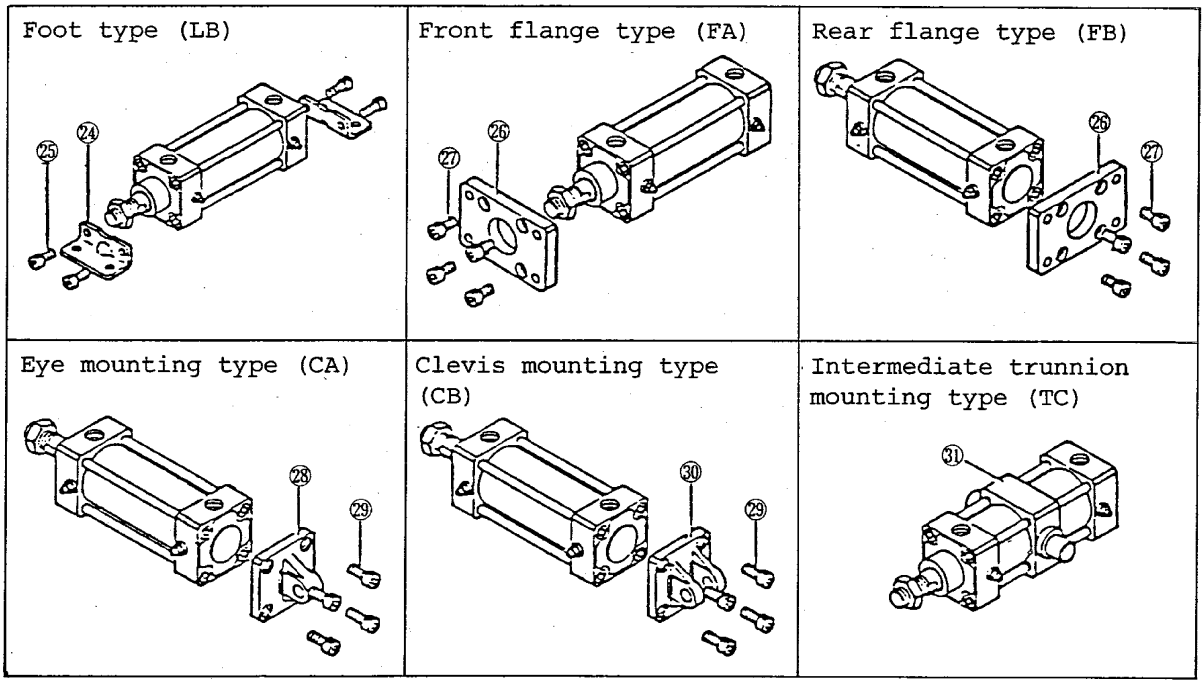
5-1 The ambient temperature range for this cylinder is -10 - 60°C.
At places with temperature exceeding 70°C, use heat resisting type cylinder (SOA2-T).

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

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

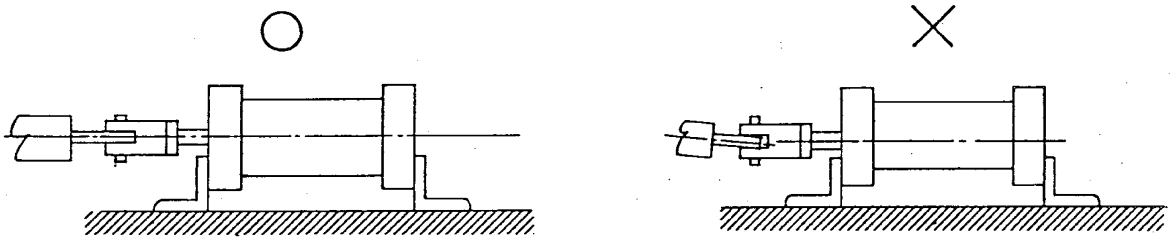
5-4 Assembly of supporting metal fittings:
The supporting metal fittings are attached with the equipment at the time of delivery. Install them as shown in the figure on this page.
However, the trunnion types (TC, TA and TB) are shipped with the trunnion mounted.

Assembly of supporting metal fitting (same as disassembling)

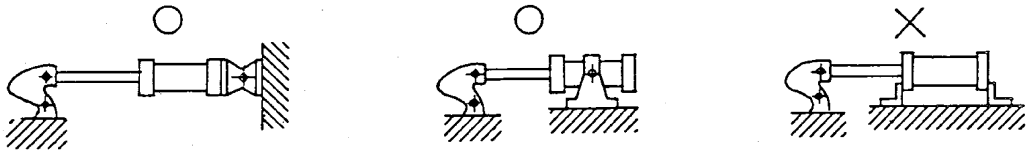


5-5 When cylinder is fixed and rod end is guided:
When the piston rod of cylinder and the load are not concentric, the bushes and packings of the cylinder get extremely worn out. Hence, connect with CKD floating connector (spherical bearing).

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.



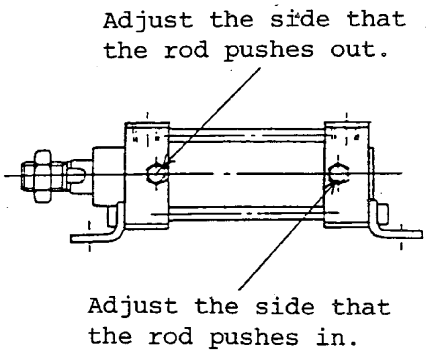
5-7 When the load acting direction changes with the cylinder operation, use an oscillating cylinder (clevis type or trunnion type) capable of making revolution to a certain angle. Furthermore, install the rod end connecting metal (knuckle) so that it moves in the same direction as the cylinder main body.



Clevis type　　Trunnion type　　Foot type

6. OPERATION

6-1 The cylinder feed pressure is 0.5 - 9.9 kgf/cm^2; hence use the cylinder within this pressure range.



6-2 Though the cushion has been adjusted at no load when delivered, adjust the cushion needle when the cushion effect is required to be changed.
Tightening the needle (clockwise) will make cushion more effective. Tighten the needle nut all the way after adjustment.
However, if kinetic energy such as load is heavy or speed is too fast, exceeds the values given in table 1, consider to provide a shock absorber.

Table 1 Table of cushion characteristics

Tube I.D. (mm)	Allowable absorption energy (kg.cm)		
	Effective cushion length (mm)	With cushion	Non cushion
40	14.6	43.7	1.5
50	16.6	85.4	2.4
63	16.6	161.6	2.4
80	20.6	284.9	5.5
100	23.6	507.7	8.9

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

(a) Check the bolts and nuts fitting the piston rod end fittings and supporting fittings for slackening.
(b) Check to see that the cylinder has smooth operation.
(c) Check the piston speed and cycle time for any change.
(d) Check for internal or/and external leakage.
(e) Check the piston rod for flaw (scratch) and deformation.
(f) 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 system.
	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 insulation 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.

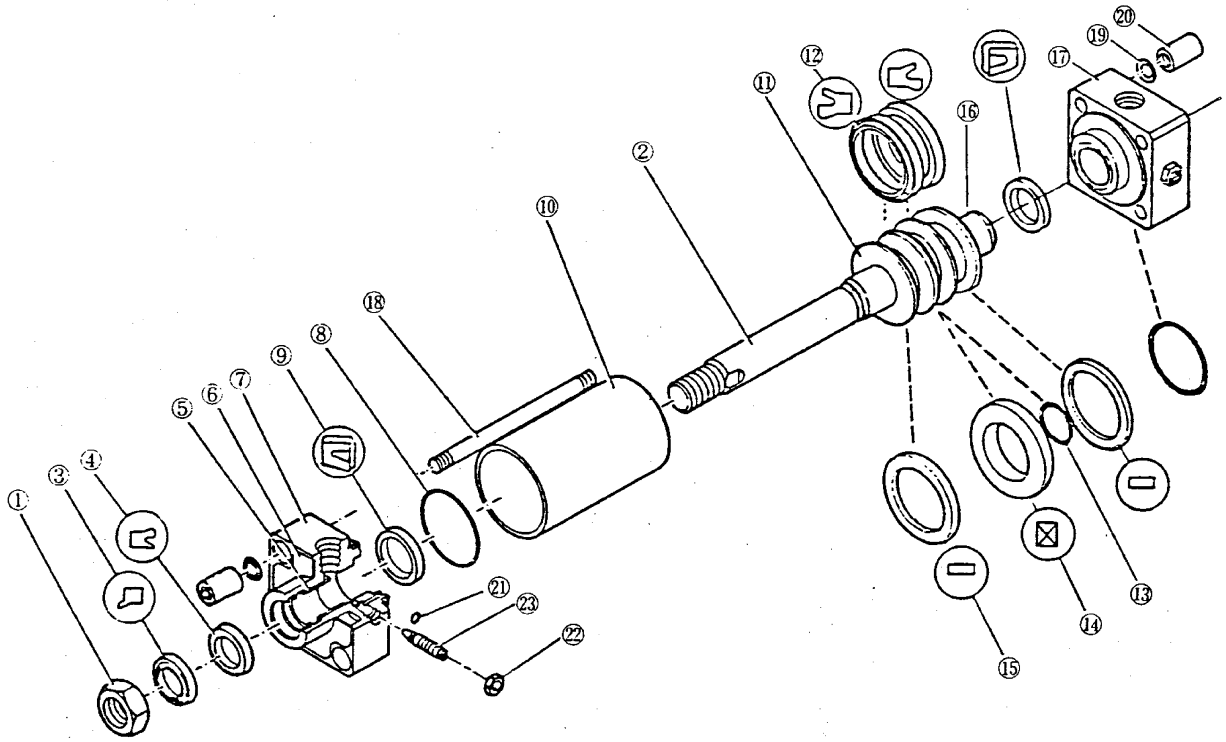
9. MAINTENANCE

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

9-1 Prepare the following tools for disassembly

Name	Q'ty	Place of use	Applicable tube I.D. (mm)
Hex. bar spanner (nominal 6)	2	㉕ ㉗ ㉙	40, 50, 63
Hex. bar spanner (nominal 8)	2	⑳	40, 50, 63
Hex. bar spanner (nominal 10)	2	㉕ ㉗ ㉙	80, 100
Hex. bar spanner (nominal 12)	2	⑳	80, 100
Spanner (nominal 13)	1	㉒	For all tube I.D.
Slotted screwdriver (nominal 5.5 x 70)	1	⑫ ㉓	For all tube I.D.
Slotted screwdriver (nominal 9 x 200)	1	⑨	For all tube I.D.
Wooden hammer	1	For disassembly ⑦ ⑰ and ⑩	For all tube I.D.
Eyeleteer	1	③ ④ ⑧ ㉑	For all tube I.D.

9-2 Disassemble the cylinder by reference to the drawing below.



Part No.	Part name	Q'ty
1	Rod nut	1
2	Piston rod	1
3	Dust wiper	1
4	Rod packing	1
5	Bush	1
6	Masking plate	2
7	Rod cover	1
8	Cylinder gasket	2
9	Cushion packing	2
10	Cylinder tube	1

Part No.	Part name	Q'ty
11	Piston (R)	1
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

Part No.	Part name	Q'ty
21	Needle gasket	2
22	Needle nut	2
23	Cushion needle	2
24	Foot bracket	2
25	Hex. socket head cap screw	4
26	Flange	1
27	Hex. socket head cap screw	4
28	Eye mounting	1
29	Hex. socket head cap screw	4
30	Clevis mounting	1
31	Intermediate trunnion	1

9-3 Inspect the following items.

(a) Flaw inside the tube.

(b) Flaw on the surface of piston rod, peel-off of plating, and rusting.

(c) Flaw and wear inside the bushing.

(d) Flaw, wear and crack of the surface of piston.

(e) Looseness of connection of piston and rod.

(f) Crack of both end covers.

(g) Flaw and wear of packing in slide part. (Dust wiper, rod packing, cushion packing and piston packing).

Check all the above. If any abnormality is found, repair or replace the parts, when defective.

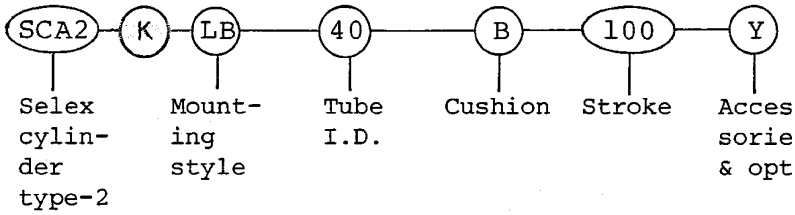
9-4 Followings are expendable parts.

Specify the kit No. when ordering.

Tube I.D. (mm)	φ40	φ50	φ63	φ80	φ100
Part No. & name \ Kit No.	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	PNY-20	PNY-25	PNY-30
⑧ Cylinder gasket	F4-650631	F4-650632	F4-650633	F4-650634	F4-650635
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

10. 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 selex cylinder type-2, axial foot type, inner dia.: 20ϕ, styroke: 100, with rod clevis.

Mounting style	
OO	Basic type
LB	Foot mounting type
FA	Front flange mounting type
FB	Rear flange mounting type
FC	Special rear flange mounting type
CA	Eye mounting type
CB	Clevis mounting type
TC	Intermediate trunnion type
TA	Front trunnion mounting type
TB	Rear trunnion mounting type

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

Tube I.D. (mm)	
40	ϕ40
50	ϕ50
63	ϕ63
80	ϕ80
100	ϕ100

Cushion	
B	With cushion at both ends
R	With cushion at rod side
H	With cushion at head side
N	Without cushion

Stroke (mm)		
Std. stroke	Max. stroke	
25	Tube I.D.	Stroke
50	ϕ40	600
75	ϕ50	600
100	ϕ63	600
150	ϕ80	700
200	ϕ100	800
250		
300		
350		
400		
450		
500		

Accessories & options	
I	Rod eye
Y	Rod clevis
Bl	Eye bracket
B2	Clevis bracket
J	Bellow material: nylon tarpaulin
K	Bellow material: neoprene sheet
L	Bellow material: silicone rubber glass cloth
M	Alteration in piston rod material
N	Alteration in piston rod lug length and thread area.
No mark	Cushion needle position R (Standard)
S	Cushion needle position S
T	Cushion needle position T

Note: Refer to the external dimension drawing for SCA2 catalogue for the position of cushion needle.