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CKD

SM－1107－A

INSTRUCTION MANUAL

SELEX CYLINDER

SCS-D (DOUBLE ROD TYPE)

(φ125～φ250)

- 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.

CKD Corporation

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.

We greatly appreciate your adoption for the CKD products.

We shall be obliged if you will look over this instruction manual for your effective use of the CKD products.

The CKD has supplied the market with many products in the past. The air cylinder, in particular, has history for many years and is now a leaking product of our air-operated system, with various improvements being applied to it.

The SELEX series has been developed for the purpose of further high performance, further easy use and further easy purchase to meet the need of the user.

Since all products are manufactured by extremely rigid quality control procedures, they are assured for your everlasting use.

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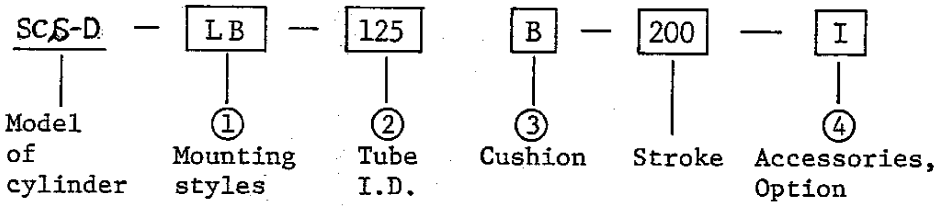
1. How to see model number



DOUBLE ROD TYPE SELEX CYLINDER (SCD) with tube I.D. (125), stroke (200), foot mounting type (LB), cushion at both end (B) and rod eye (I).

① Mounting styles	
LB	Foot mounting type
FA	Front flange mounting type
FB	Rear flange mounting type
TC	Intermediate trunnion mounting type
TA	Front trunnion mounting type
TB	Rear trunnion mounting type

② Tube I.D. (mm)	
125	ϕ 125
140	ϕ 140
160	ϕ 160
180	ϕ 180
200	ϕ 200
250	ϕ 250

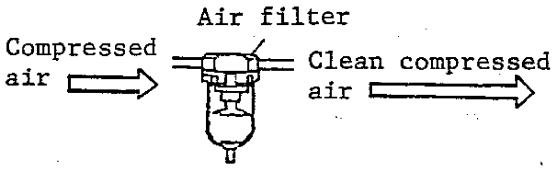
③ Cushion	
B	Cushion at both end
R	Cushion at front end
H	Cushion at rear end
N	Non-cushion

④ Accessories, Option	
I	Rod eye
Y	Rod clevis
B1	Eye bracket
B2	Clevis bracket
J	Bellows (Material: Nylon tarpoulin)
K	Bellows (Material; Neoprene sheet)
L	Bellows (Material: Silicone rubber-glass cloth)
M	Piston rod (Material: Stainless steel)
R	Cushion needle position: Standard
S	Cushion needle position: With the standard being changed by 90°
T	Cushion needle position: With the standard being changed by 180°
C2	Check valve attached on cushion part

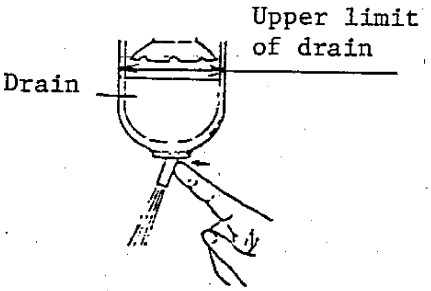
2. CAUTIONS IN USE

2-1 General cautions in use

1) On the compressed air used to drive a cylinder, use clean and moistureless air. For this purpose, use a filter at a circuit and take care of the degree of filtration (desirable for less than 5μ,) flow, mounting position (brought close to a directional control valve) and the like for the filter.



2) Exhaust the drain collected in the filter periodically before passing a fixed line.



3) Mixing of a carbide (carbon or tar-shaped material) of compressor oil into the circuit causes the wrong operation of a valve and a cylinder.

   Full care of the maintenance and check of a compressor should be taken.

4) Use Turbin Oil ISOVG32 (Turbin Oil #90) for this cylinder.

5) Most suitable ambient temperature for this cylinder is 5 - 60 °C. If the temperature exceed, 60°C, material of packing, lubricant, etc., are to be considered to change.

   If the temperature is lower than 5°C, water inside the may freeze, resulting in trouble. Provide a measure to prevent the circuit from freezing.

   * Recommended oil

     For high temperature ... Molytherm #0 (Sumitomo Kosan)

     For low temperature .... Daphne Grease XLA-2 (Idemitsu)
     SH33 (Torysilicon)

   * Anti-freezing methods

     (a) Remove moisute contained in the compressed air, (Recommended: Dry pack dryer)

     (b) Mix with an anti-freeze (Ethylene Glycol)

     (c) Keep the devices and pipes warm to maintain the temperature more than the freezing point.

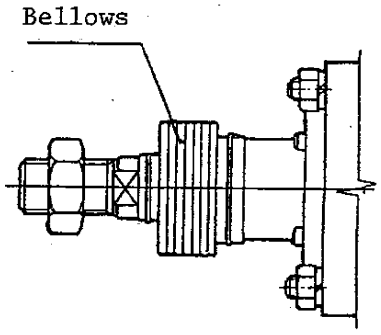
6) In case of operating the cylinder under bad circumstance, be sure to install bellow at the rod part.

- Service temperature of a bellows

Unit:°C

Material of a bellows	Max. ambient temperature	Max. instantaneous temperature
Nylon tarpoulin	60	100
Neo plain sheet	100	200
Silicone rubber glass cloth	250	400

Note: Maximum instantaneous temperature means the temperature where spar, chip and the like strike on a bellows instantaneously.



2-2 Cautionary instructions at the time of piping

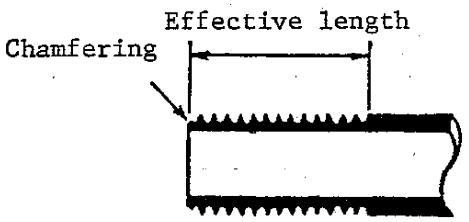
1) Use a pipe pard to corrode such as a galvanized pipe, a nylon pipe, a rubber pipe and the like for the piping material after a filter. (A galvanized pipe shall be recommended also for the piping material before a filter).

2) On the line connecting a cylinder with a directional control valve, make sure whether the sectional area has an effective sectional area enough to attain a fixed piston speed.

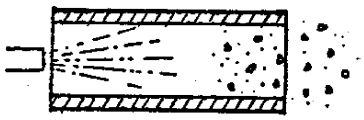
3) Install a filter as close as possible to a directional control valve to remove rust, foreign matter and drain in the line.

4) Keep the effective screw length for the screw length of a gas pipe.

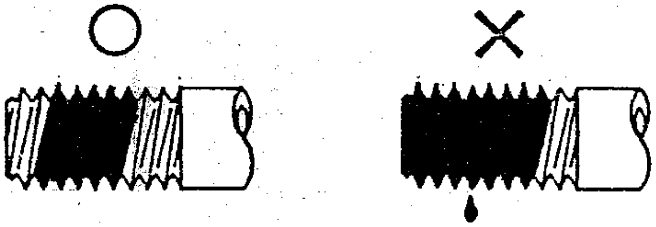
   In addition, perform the chamfered finish for a half pitch grade from the extreme point of a screw area.



5) Perform flushing to remove the foreign matter chips and the like in the pipe before piping.



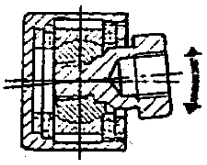
6) When the lines are connected to the product, cautions should be taken to the amount of a sealant, the applied position, and also to the wound position of a sealing tape, so that the sealant, the sealing tape and the like may not enter the lines.



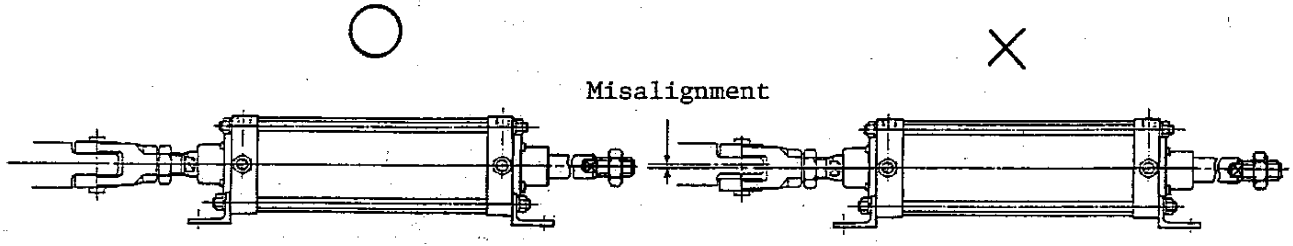
7) After the piping, make sure the presence of leakage by applying soap at each connected area. Be sure to wipe it out after the checking.

2-3 Cautionary instructions at the time of installation

1) In order to prevent the breakage of a screw at the point of a rod and the wear or seizure of bushing, the connection area between the point portion of the rod and load should be connected with a spherical bearing so that it may not be twisted at any position of stroke.

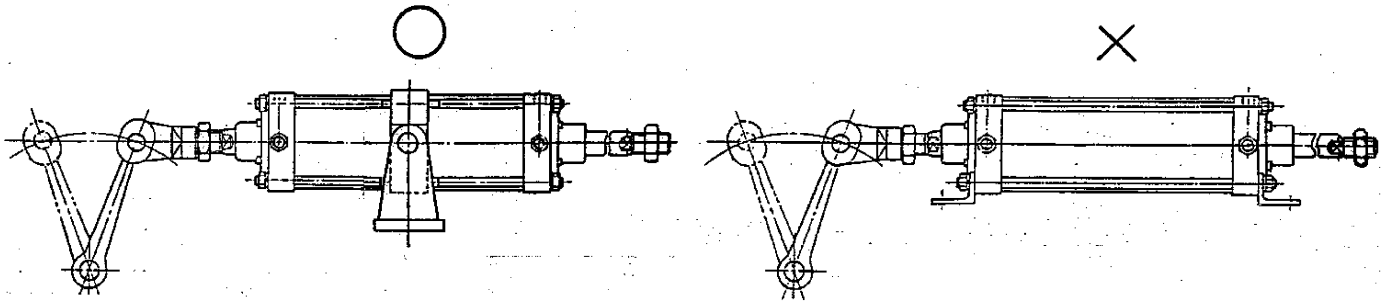


2) In the case where the load moving direction is not in parallel with the axis of a rod, twist is caused at the rod or a tube. As a result, there is the possibility of seizure or breakage. Accordingly, the coincidence of the axis of the rod with the load moving direction is mandatory.



3) In the case of a cylinder with long stroke, install a support, in order to prevent the sag of a rod, the flexure of a tube and the injure of a rod due to vibration and an external load.

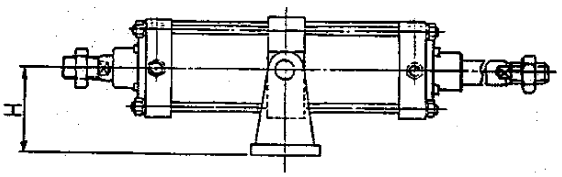
4) It is undesirable to connect a fixed cylinder with an arm in a circular motion.
In this case, connect the arm with an oscillating cylinder.



5) In the case where the load moving direction varies with the operation of a cylinder, use an oscillating cylinder (Clevis type or trunnion type) where the cylinder itself is rotatable for any angle. In addition, install the connecting metal fittings (Knuckle) at the point of the rod, too, so that it may move in the same direction as that of the motion of the cylinder body.

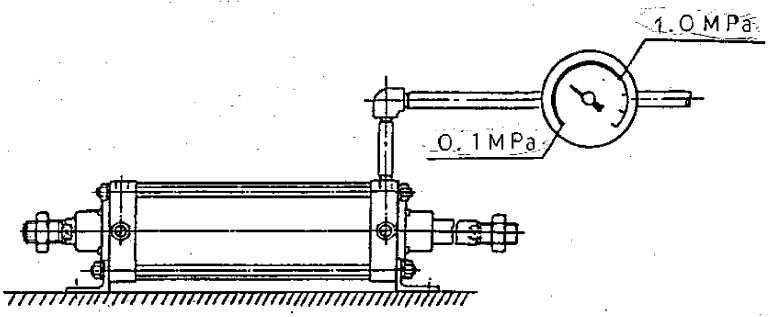
6) Large clearance between a clevis or a trunnion and the opposite bearing causes the working of bending action upon a pen or an axis. Therefore, the clearance should not be too large. (Recommended maximum fit: H 10/e8)

7) When the height (H) from the attached surface of a bearing bracket to the bearing position is high, the large force generated by a cylinder force at the attached area of a bracket may cause the failure of fitting bolt and the like.

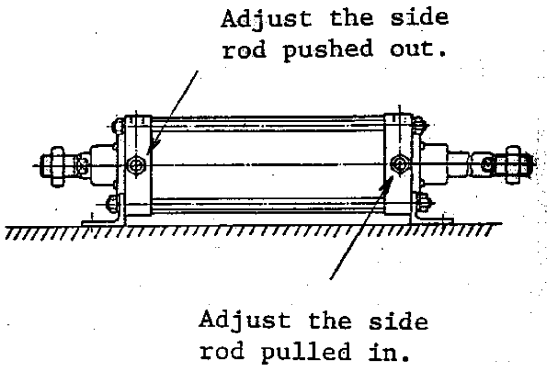


2-4 Operation and adjustment

1) The supply pressure to a cylinder should be kept within the range of 0.1 to 1.0 MPa. Smooth operation may not be performed at less than 0.1 MPa. In addition, the operation should never be performed at the pressure more than 1.0 MPa.



2) An effect of a cushion has been adjusted at no-load when delivered, but adjust a cushion needle when the effect of the cushion is changed to match load. Tightening of a needle (clockwise) results in a good effect of a cushion. Tighten and set a needle nut after the adjustment.



In addition, take particular consideration into a shock absorber, in the case where the kinetic energy such as heavy load, fast speed and the like is larger than the value in Table 1.

Table 1 Characteristic table of a cushion

Tube I.D. (mm)	Allowable absorbed energy (J)		
	Effective cushion length(mm)	Cushion-loaded	Non-cushion
125	21.6	63.5	0.96
140	21.6	91.5	0.99
160	21.6	116	1.42
180	21.6	152	2.05
200	26.6	233	2.83
250	26.6	362	3.90

3. Maintenance - Check

3-1 Periodic check

1) Perform a periodic check once to twice a year so that a cylinder may be used at the optimum condition.

2) Items to be checked

(a) Looseness of a cylinder attaching bolt and nut.

(b) Looseness of metal fittings at the point of a piston rod and of the bolt and nut for mounting of a support.

(c) Smoothness of operating condition.

(d) Change in a piston speed, a cycle time.

(e) External and internal leakage.

(f) Flaw and deformation of a piston rod.

(g) The presence of the abnormal state for the stroke.

(h) The presence of the corrosion on the inside of a port.

The above p-ints should be checked. If something unusual are found there, they should be further tightened or disassembled, and treated.

3) Items to be checked for disassembly

(a) Flow, plating exfoliation and rust at the internal surface of a tube.

(b) Flow, plating exfoliation and rust at the surface of a piston rod.

(c) Flow and wear at the internal surface of bushing.

(d) Flow, wear, rust and crack at the surface of a piston.

(e) Looseness at the connecting area of a piston with a rod.

(f) Corrosion and crack over both end covers.

(g) Flow and wear of a packing at a sliding area (Dust wiper, rod packing, cushion packing and piston packing).

Above points should be checked. If something unusual are found there, they should be repaired or replaced by parts and treated.

3-2 Disassembly —— Assembly —— Inspection

● Disassembly

1) Stop a fluid and remove residual pressure.

2) Demount the line and make a cylinder solid.

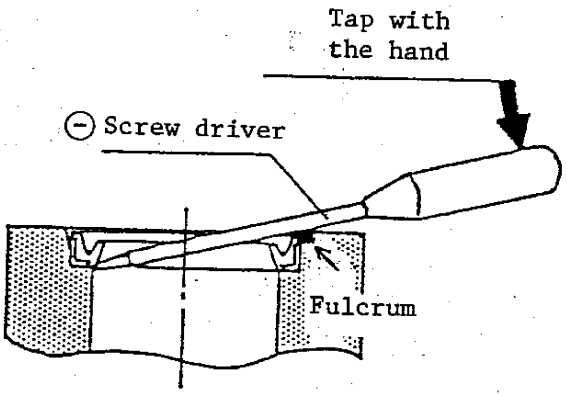
3) Demount the hexagon nut (19), then the supports can be removed, and supports (4) and (6), (10), (16), (21) can be removed when hex. socket bolt (18) and hex. nut (19) are removed.

4) Demount a needle nut (23) then (24) can be removed.

5) Disassembly of a cushion packing (8).

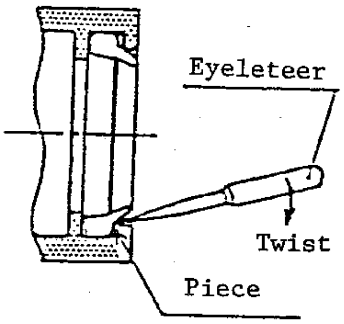
(a) Fix a rod cover, with it being placed between a vise (or vice).

(b) The packing will be easily free, when a knob of a screw driver is patted with the back of a hand while pressing the driver against the waist of the packing, with a corner of the cover being taken as a fulcrum.



6) Disassembly of a dust wiper (2) and a rod packing (3).

Twist them out, with the packing being pierced with a pointed tool (an eyeleteer). (Reuse of a demounted packing is impermissible).



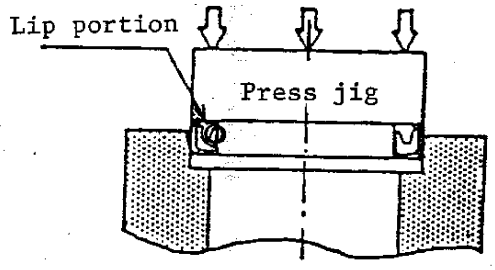
● Assembly

1) Clean each part

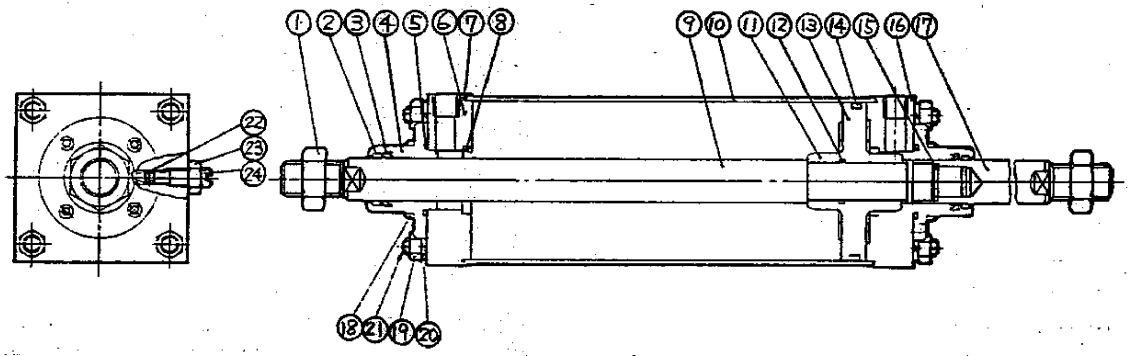
2) After cleaning, carefully assemble each part in the reverse procedure to the disassembly. In particular, the generation of flow at a packing and others causes a wrong operation and air leakage.

3) Installation of a cushion packing

Carefully press the cushion packing into a rod cover with a press jig to prevent the entrance with tilting of the packing and the generation of flow at a lip portion. When the packing is pressed into the cover, it should be accommodated by the cover until the upper surface of the packing reaches approximately 0.1 - 0.2 mm from the end of the cover.



* Internal structure

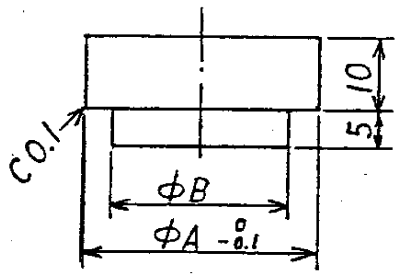


Part No.	Part name	Q'ty	Part No.	Part name	Q'ty
1	Rod nut	2	16	Rod cover B	1
2	Dust wiper	2	17	Piston rod B	1
3	Rod packing	2	18	Hex. socket bolt	8
4	Rod metal	2	19	Hex. nut	8
5	Metal gasket	2	20	Spring washer	8
6	Rod cover	1	21	Tie rod	4
7	Cylinder gasket	2	22	Needle gasket	2
8	Cushion packing	2	23	Needle nut	2
9	Piston rod	1	24	Cushion needle	2
10	Cylinder tube	1			
11	Cushion ring A	2			
12	Piston gasket	1			
13	Piston	1			
14	Piston packing	1			
15	Spring pin	1			

Table 2 and the figure are an example of a jig for a press. Refer to them.

Table 2. Size of jig for a press

Tube I.D. (mm)	A	B
125, 140	55	45
160, 180	67	55
200	72	60
250	87	75



4) Apply a good grease (Lithium soap base grease No.1, No.2 and the like) to the internal surface of a cylinder tube ⑩, external surface of piston ⑬, packing and others ② ③⑤⑦⑧⑫ ⑭ ㉒.

5) On the clamping of a circular and a socket screw for the mounting of a support, clamp them diagonally. Besides, Table 3 is recommended for torque.

Table 3. (Clamping) torque

Tube I.D. (mm)	Torque (N.m)
125, 140	57.9
160	89.2
180	122
200	171
250	324

● Inspection

1) Operation inspection

After an initial machine warm up several times, inspect whether a smooth operation is performed by giving pressure alternately from the head side and rod side of a cylinder.

* Inspection conditions

Supplied pressure; 0.1 MPa and working pressure
Average speed; adjusted to 20 mm/s
Cushion needle; full admission

2) Leakage inspection

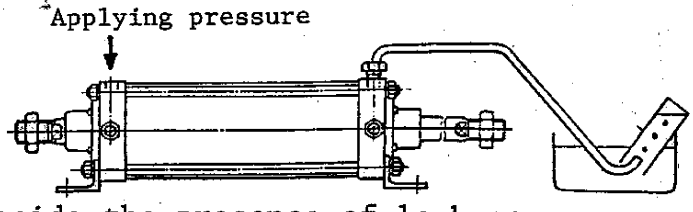
Pressure is applied (at working pressure) alternately from the head side and rod side, with a cylinder being laid at a static state.

Leakage (inside); $3 + 0.15 \times D$ cm^3/min (Standard)
Leakage (outside); $3 + 0.15 \times d$ cm^3/min (Standard)
} or less.

* Inspection method

(a) Substitution method (water)

(b) Soap film method



This method is to decide the presence of leakage. Leakage amount cannot be found.

3-3 Trouble and the countermeasure

Trouble	Cause	Countermeasure
Rod does not operate	* No pressure, of pressure.	* Secure pressure source
	* A signal is not feeded into a directional control valve.	* Correct control circuit
	* Installation is out of alignment.	* Correct installation state. * Change supporting type.
	* Breakage of piston packing.	* Replace packing.
Rod does not operate Smoothly	* Speed less than a low speed limit.	* Mitigate load fluctuation. * Examine the use of low hydraulic cylinder.
	* Installation is out of alignment.	* Correct installation state. * Change supporting type.
	* Lateral load is applied.	* Provide guide. * Correct installation state. * Change supporting type.
	* Large load	* Raise pressure. * Enlarge tube I.D.
	* Speed control valve has become a meter-in circuit.	* Change a mounting direction of speed control valve.
Breakage · Deformation	* Impact force due to a high speed operation.	* Cushion should be further calculated upon an effect. * Make a speed slow. * Lighten load. * Provide a further positive cushion mechanism. (External cushion mechanism)
	* Lateral load is applied.	* Provide guide. * Correct installation state. * Change supporting type.

Discontinue

4. Tools

Tool name	Q'ty	Points used (Part No.)	Applied tube I.D.(mm)
Hexagon stock spanner (Nominal size: 3)	1	Hex. socket set screw	All tube I.D.
" (Nominal size: 5)	1	Hex. socket screw	125, 140
" (Nominal size: 6)	1	"	160, 180
" (Nominal size: 8)	1	"	200
" (Nominal size: 10)	1	"	250
Spanner (Nominal size: 22)	2	Hex. nut (Tie rod)	125, 140
Spanner (Nominal size: 24)	2 1	Hex. nut (Tie rod) Needle nut	160 All tube I.D.
Spanner (Nominal size: 27)	2	Hex. nut (Tie rod)	180
Spanner (Nominal size: 30)	2	"	200
Spanner (Nominal size: 36)	2	"	250
⊖ Screwdriver	1	Cushion needle, piston packing, cushion packing disassembly.	All tube I.D.
Wooden hammer	1	Disassembly of cover and tube	"
Eyeleteer	1	Packings other than piston packing.	"
Press jig	1	Assembly of cushion packing.	"

5. Expendable Parts

Tube I.D. (mm)	125	140	160	180	200	250
Part No. \Kit No. Part name	SCS-D-125K	SCS-D-140K	SCS-D-160K	SCS-D-180K	SCS-D-200K	SCS-D-250K
(2) Dust wiper	SFR-35K	SFR-35K	SFR-40K	SFR-45K	SFR-50K	SFR-60K
(3) Rod packing	PNY-35	PNY-35	PNY-40	PNY-45	PNY-50	PNY-60
(5) Metal gasket	RG-53	RG-53	RG-63	RG-63	RG-70	RG-85
(8) Cushion packing	PCS-45	PCS-45	PCS-55	PCS-55	PCS-60	PCS-75
(7) Cylinder gasket	P12115-12150200	P12115-13450200	H4-543105	H4-543106	P12115-19450200	P12115-24097262
(14) Piston packing	P-115	P-130	P-150	P-165	P-185	P-235
(22) Needle gasket	P-9	P-9	P-9	P-9	P-9	P-9

Note: We have packings in inventry as a kit, where the part requiring displacement is, as a rule, set.
We recommend the replacement of not only a portion, but a complete line.
In addition, we shall be glad if you will designate the kit number at your order.