

INSTRUCTION MANUAL
SELEX CYLINDER
Heat resistance type
SCS-T (ϕ 125 - ϕ 250)

- 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.

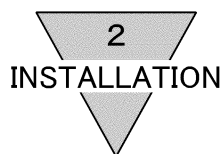
This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, **read this operation manual carefully for proper operation.**

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.



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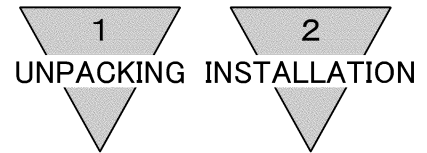
SCS-T (ϕ 125 - ϕ 250)

Selex Cylinder

Heat resistance type

Manual No. SM-5242-A

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1. UNPACKING

- 1) Make sure that the type No. on the nameplate of the delivered Selex Cylinder matches the type No. you ordered.
- 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.

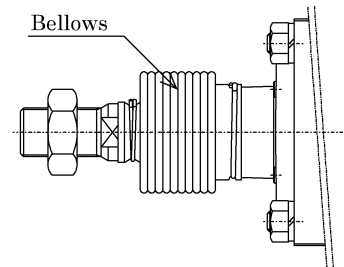
2. INSTALLATION

2.1 Installation

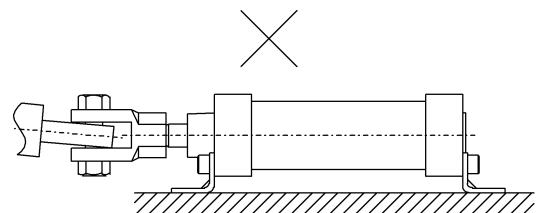
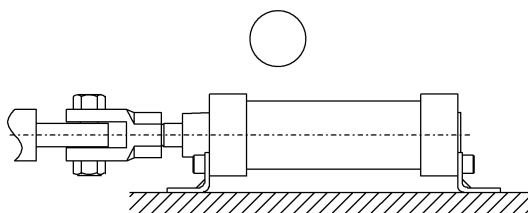
- 1) The ambient temperature for this cylinder is 5 to 120°C.
- 2) Use cylinder with bellows over its rod within the area with much dust.

Ambient temperature of bellows		Unit : °C
Material of bellows	Max. ambient temperature	Momentary Max. temp.
Silicon rubber glass cloth	250	400

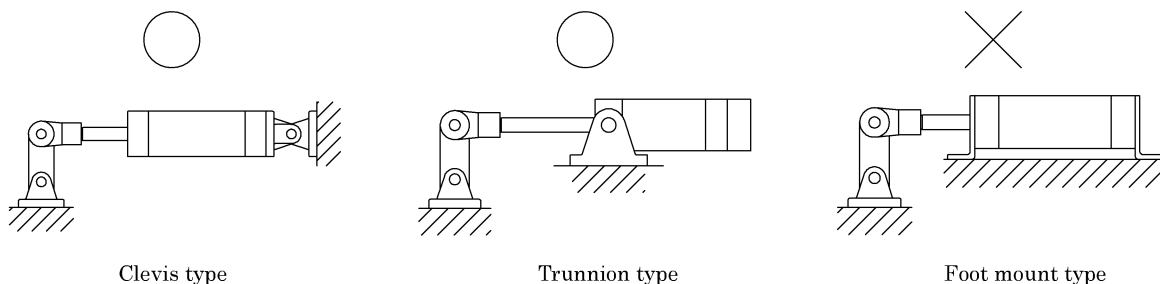
Note : Momentary max. temperature is the temperature as sparks or welding spatter hitting bellows momentarily.



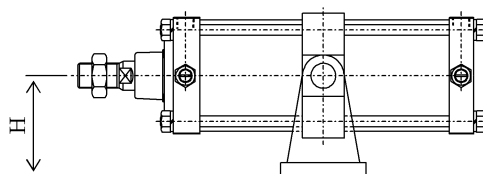
- 3) Carefully avoid other object from hitting the tube. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.
- 4) When the piston rod of cylinder and the load are misaligned.
The bushes and packings of the cylinder are extremely worn out. Hence, connect them with CKD floating connector (spherical bearing).
- 5) When 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.



- 6) When the load acting direction changes with the cylinder operation.
Use an oscillating type (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.

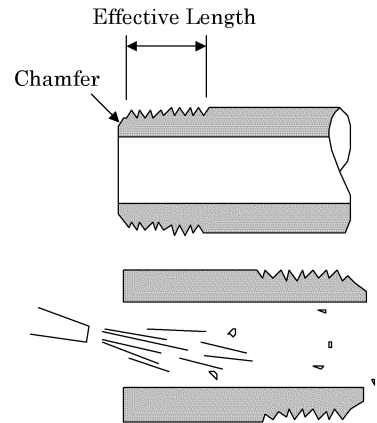


- 7) When using a cylinder with a long stroke, install support to prevent damage to the rod caused by rod sagging, tube deflection, vibration, or external weight.
- 8) If clearance between the clevis or trunnion and mate bearing is large, bending will be applied on the pin or shaft. Do not increase this clearance too much. (Recommended maximum fitting : H10/e8)
- 9) If height H from the bearing bracket installation to the bearing position is high, a large force will be generated at the bracket installation section because of cylinder force. This could damage bolts, etc.



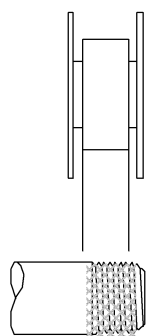
2.2 Piping

- 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 cross-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.

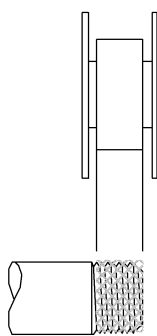


- 6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

● Seal Tape

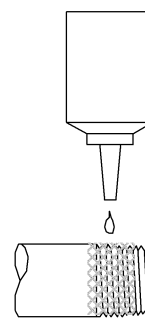


(Correct)

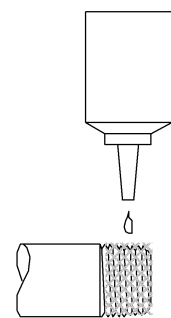


(Incorrect)

● Sealant (liquid)



(Correct)

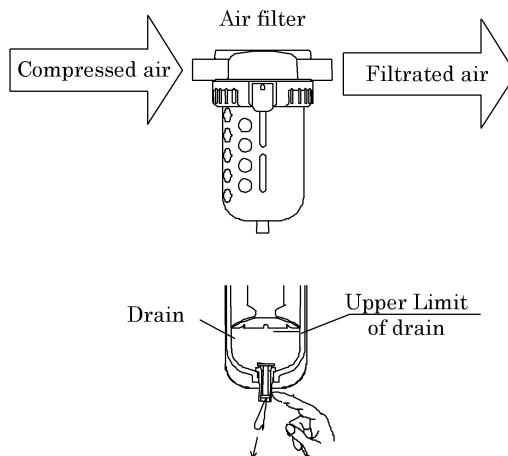


(Incorrect)

- 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 Fluid

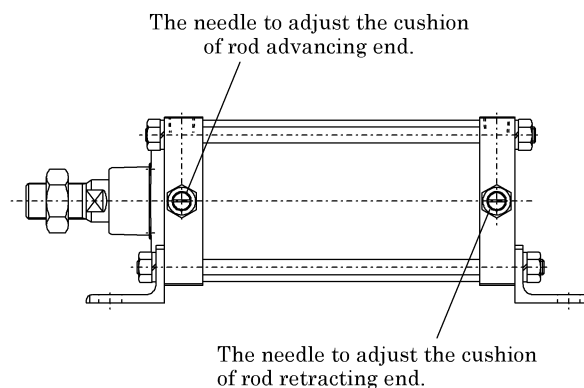
- 1) It is necessary to use dehumidified air that has been filtered from compressed air. Carefully select an adequate filter that has an adequate filtration rate (preferably $5\ \mu\text{m}$ or less), flow rate and its mounting location (as nearest to the directional control valve as possible).
- 2) 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 with oil-free specifications. (Must be oil-free)



3. OPERATION

3.1 Operation

- 1) The working pressure for this type of cylinder is specified in “Product Specifications”. Operate the system within this range.
- 2) The working pressure for this type of cylinder is 0.05 to 1.0MPa. Operate the system within this range.
- 3) 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.

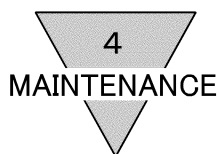


However, if kinetic energy such as load is heavy or speed is too fast, exceeding the values given in Table 1, consider of providing a shock absorber.

Table 1. Table of cushion characteristics

Bore size (mm)	Effective air cushion length (mm)	Allowable energy absorption (J)	
		With cushion	Without cushion
φ 125	21.6	63.5	0.1
φ 140		91.5	
φ 160		116	1.5
φ 180		152	2.1
φ 200	26.6	233	2.8
φ 250		362	3.9

- 4) Adjust the working piston speed with the speed controller mounted.



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4. MAINTENANCE

4.1 Periodical Inspection

- 1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.
In addition, apply grease to the cylinder in the case of a periodic inspection.

- 2) Inspection items

- (1) Check the bolts and nuts fitting the piston rod end brackets and mounting brackets for slackening.
- (2) Check to see that the cylinder operates smoothly.
- (3) Check any change of the working piston speed and cycle time.
- (4) Check for internal and/or external leakage.
- (5) Check the piston rod for flaw (scratch) and deformation.
- (6) Check the stroke for abnormality.

See “Trouble shooting” , 5. should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

- 3) Inspect the following items.

- (1) Scratch marks on the bore surface of the tube
- (2) Scratch marks on the surface of piston rod, peel-off of plating and rusting
- (3) Scratch marks and wear inside of the bush
- (4) Scratch marks, wear and crack of the surface of piston
- (5) Loosened connection of piston and rod
- (6) Crack of both end covers
- (7) 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.

No.	Name	Bore size (mm)	φ 125	φ 140	φ 160	φ 180	φ 200	φ 250
		Kit No.	SCS-T-125K	SCS-T-140K	SCS-T-160K	SCS-T-180K	SCS-T-200K	SCS-T-250K
②	Dust wiper		SFR-35F	SFR-35F	SFR-40F	SFR-45F	SFR-50F	SFR-60F
③	Rod packing		PNY-35F	PNY-35F	PNY-40F	PNY-45F	PNY-50F	PNY-60F
⑤	Metal gasket		RG-53F	RG-53F	RG-63F	RG-63F	RG-70F	RG-85F
⑦	Cylinder gasket		F4-670411	F4-670412	F4-670413	F4-670414	F4-670415	F4-670432
⑧	Cushion packing		PCS-45F	PCS-45F	PCS-55F	PCS-55F	PCS-60F	PCS-75F
⑭	Piston packing		P-115F	P-130F	P-150F	P-165F	P-185F	P-235F
⑳	Needle gasket		P-9F	P-9F	P-9F	P-9F	P-9F	P-9F

Note : Packings are stocked as a kit. This kit basically contains parts necessary for replacement. It is recommended not only to replace the defective parts, but also to replace the complete parts with ones included in the kit.
Specify the kit No. when ordering.

4.2 Disassembling

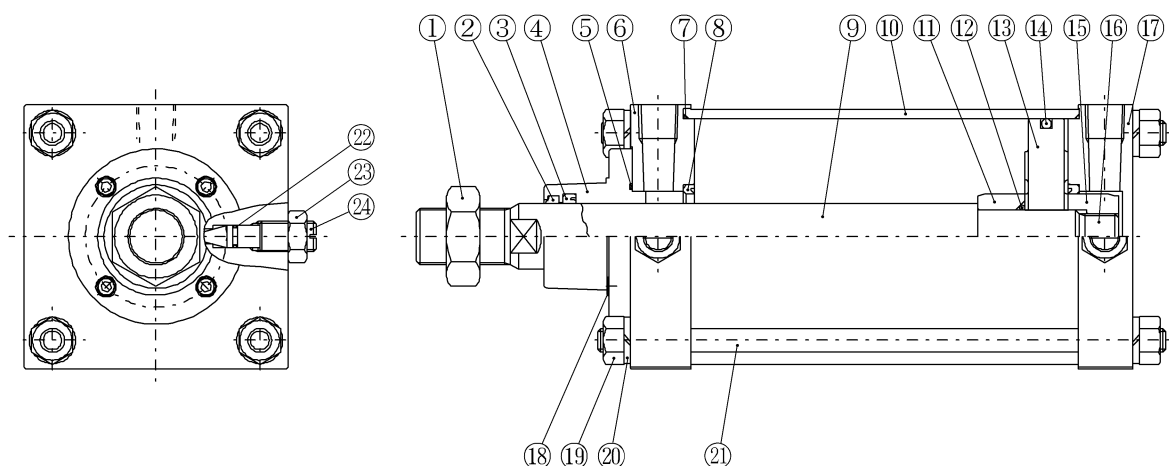
Should any trouble occur, take the following corrective actions.

- 1) Prepare the following tools for disassembling.

Disassembling tools

Name	Qty	Part No.	Place of use	Applicable tube ID (mm)
Hex. bar spanner (Nominal 5)	1	18	Hexagon socket head cap screw	φ 125, φ 140
Hex. bar spanner (Nominal 6)				φ 160, φ 180
Hex. bar spanner (Nominal 8)				φ 200
Hex. bar spanner (Nominal 10)				φ 250
Wrench (Nominal 22)	2	19	Hex. nut (Tie rod)	φ 125, φ 140
Wrench (Nominal 24)				φ 160
	1	23	Needle nut	For all tube ID
Wrench (Nominal 27)	2	19	Hex. nut (Tie rod)	φ 180
Wrench (Nominal 30)				φ 200
Wrench (Nominal 36)				φ 250
Standard driver	1	8	Cushion needle, Piston packing, Cushion packing disassembling	For all tube ID
		14		
		24		
Marret hammer	1	6	For disassembling Cover and Tube	
		10		
		17		
Ice pick	1		Packing other than piston packing	
Press jig	1	6	Cushion packing assembly	
		8		
		17		

2) Internal structure drawing



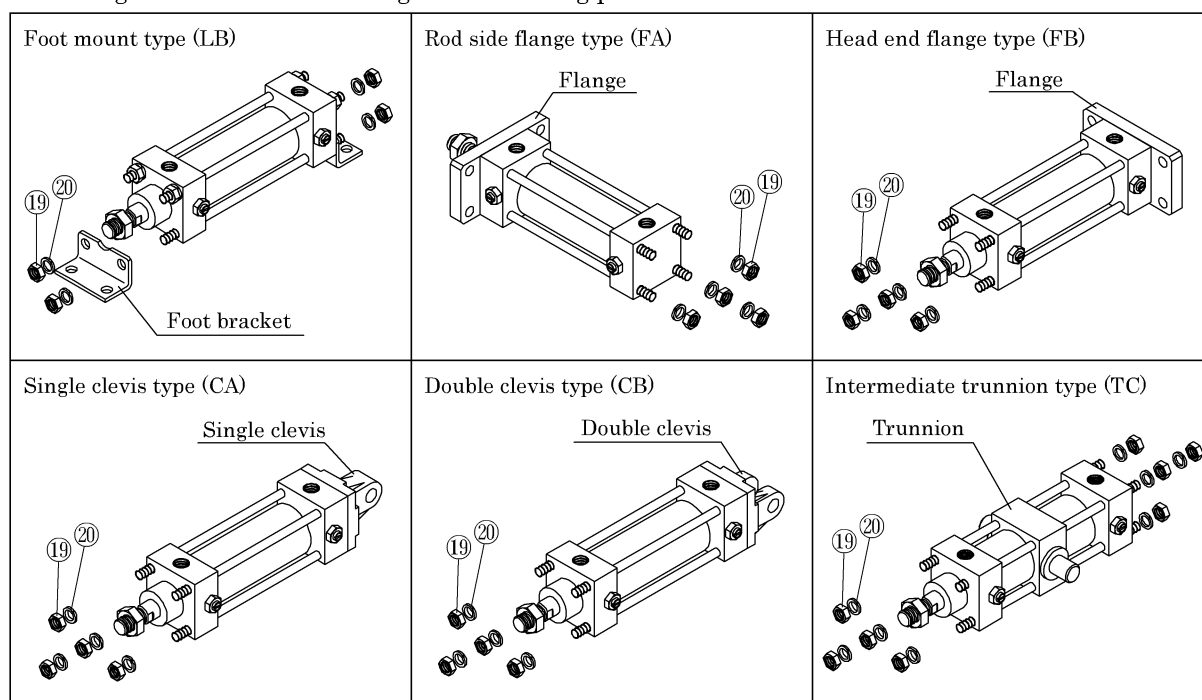
Part No.	Part Name	Material	Qty	Note
1	Rod nut	Carbon steel	1	Zinc chromate
2	Dust wiper	Fluoro rubber	1	
3	Rod packing	Fluoro rubber	1	
4	Rod metal	Cast iron	1	Paint
5	Metal gasket	Fluoro rubber	1	
6	Rod cover	Rolled steel	1	Paint
7	Cylinder gasket	Fluoro rubber	2	
8	Cushion packing	Fluoro rubber	2	
9	Piston rod	Carbon steel	1	Industrial chromium plating
10	Cylinder tube	Carbon steel pipe	1	Paint, Industrial chromium plating
11	Cushion ring A	Carbon steel	1	Zinc chromate
12	Piston gasket	Fluoro rubber	1	
13	Piston	Cast iron	1	
14	Piston packing	Fluoro rubber	1	
15	Cushion ring B	Carbon steel	1	Zinc chromate
16	Hexagon socket set screw	Alloy steel	1	Black oxide finish
17	Head cover	Rolled steel	1	Paint
18	Hexagon socket head cap screw	Alloy steel	4	Black oxide finish
19	Hexagonal nut	Carbon steel	8	Paint
20	Spring washer	Steel	8	Paint
21	Tie rod	Carbon steel	4	Paint
22	Needle gasket	Fluoro rubber	2	
23	Needle nut	Carbon steel	2	Zinc chromate
24	Cushion needle	Carbon steel	2	Zinc chromate

Note : Parts 8, 22, 23, 24 are not required when it is without cushion.

3) Disassembly (Refer to “Internal Structure Drawing” page 10)

- (1) Shut off the fluid and remove the residual pressure.
- (2) Disconnect pipes from cylinder.
- (3) Take out rod metal ④ by removing hexagon socket head cap screw ⑮.
- (4) As the hexagon nut ⑲ is removed, each mounting bracket and tie rod ⑳ can be removed. As the tie rod ㉑ is removed, the rod cover ⑥, head cover ⑰, and piston assembly (⑨, ⑪ to⑰) can then be removed.

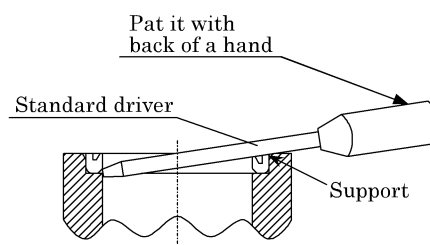
Mounting bracket disassembling or assembling procedures



- (5) Cushion needle ㉓ comes out when needle nut ㉔ is removed.

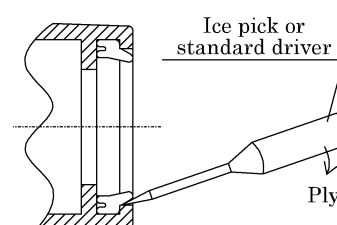
(6) Disassembling cushion packing ⑧

- Clamp the cover in a vise.
- Please the standard driver underneath of lip of packing, then ply the shuttle driver making the corner of the spot facing a fulcrum. Patting the driver handle with the back of hand will let the packing come out of its spot facing on the cover.



(7) Disassembling dust wiper ② and disassembling rod packing ③

- Ply the packing off with a tool having the sharp tip, such as standard screwdriver or ice pick.
- (Do not reuse the detached packing.)



4) Assembly

- (1) Clean and wash every part.
- (2) Carefully assemble them in the reversed procedure of disassembling, particularly, to prevent any damage to lips of packings and seals as it causes malfunction and/or air leakage when it is placed back to service.

- (3) Assembling the cushion packing.
Use special jig to press the packing into the spot facing on the cover to avoid its tilting and also its damage. Press it down to the point that lip tip of packing settle approx. 0.1 to 0.2mm below the surface of the cover.

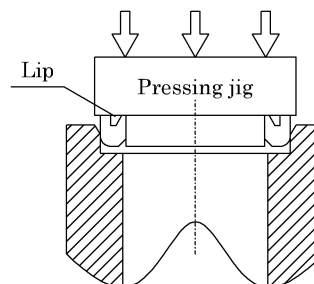
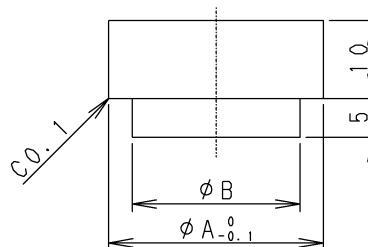


Table 2 and drawing are for a couple of examples of press jigs.

Table 2. Dimensions of press

Bore size (mm)	A	B
$\phi 125, \phi 140$	55	45
$\phi 160, \phi 180$	67	55
$\phi 200$	72	60
$\phi 250$	87	75



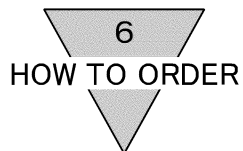
- (4) Apply a film of high grade grease (Fluoro grease) over the bore surface of Cylinder tube ⑩, circumference surface of Piston ⑬ and packings ②, ③, ⑤, ⑦, ⑧, ⑫, ⑭ and ⑫.
- (5) When tightening the nuts on tie rods, gradually tighten each nut on diagonal location to each other respectively, instead of tightening one nut all the way up. Table3 displays the recommended range of torque for tightening.

Table 3. Tightening torque

Bore size (mm)	Torque (N·m)
$\phi 125, \phi 140$	22
$\phi 160$	34
$\phi 180$	49
$\phi 200$	69
$\phi 250$	123

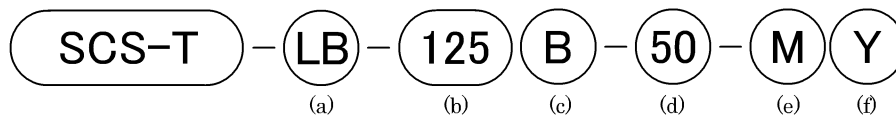
5. TROUBLE SHOOTING

Trouble	Causes	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 mounting status. Connect the floating connector. Change the mounting style.
	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 mounting status. Connect the floating connector. Change the mounting style.
	Exertion of transverse (lateral) load.	Install a guide. Revise the installation state and/or change the mounting style.
	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 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.	Install a guide. Reverse the installation state and/or change the mounting style.



Discontinue

6. HOW TO ORDER



(a) Mounting style Note1		(b) Bore size (mm) Note2		(c) Cushion	
00	Basic type	125	φ 125	B	With cushion at both ends
LB	Foot mount type, along axis	140	φ 140	R	With cushion at rod side
FA	Rod side flange type	160	φ 160	H	With cushion at head side
FB	Head end flange type	180	φ 180	N	Without cushion
CA	Single clevis type	200	φ 200		
CB	Double clevis type	250	φ 250		
TC	Intermediate trunnion type				
TA	Rod end trunnion type				
TB	Head end trunnion type				

(d) Stroke (mm)		(e) Options Note3		(f) Accessories	
50	50	C2	Cushion with a check valve	I	Rod eye
75	75	L	Bellow: Silicone rubber glass cloth	Y	Rod clevis
100	100	M	Alteration in piston rod material	B1	Eye bracket
150	150	No code	Cushion needle position R (Standard)	B2	Clevis bracket
200	200	S	Cushion needle position S		
250	250	T	Cushion needle position T		
300	300				

Note 1 : Please contact CKD when ordering the hole-type trunnion.

Note 2 : Refer to catalog as for cylinder exceeding max. stroke.

Note 3 : To check the cushion needle position marking, refer to the dimensioned outside drawing.

7. PRODUCT SPECIFICATIONS

Model		SCS-T (Heat resistance type)					
Item							
Bore size	mm	φ 125	φ 140	φ 160	φ 180	φ 200	φ 250
Actuation		Double-acting type					
Working fluid		Compressed Air					
Maxi. working pressure	MPa	1.0					
Min. working pressure	MPa	0.05					
Proof pressure	MPa	1.6					
Ambient temperature		5 to 120					
Port size		Rc1/2	Rc3/4				Rc1
Stroke tolerance	mm	+1.0 0 (300 or less)、+1.4 0 (over than 300 and 500 or less)、+1.8 0 (1000 or less)					
Working piston speed	mm/s	20 to 1000 (Set the speed within the range of allowable energy absorption.)					
Cushion		Air cushion					
Effective air cushion length	mm	21.6	21.6	21.6	21.6	26.6	26.6
Lubrication		Must be oil free <small>Note1</small>					
Allowable energy absorption J	With cushion	63.5	91.5	116	152	233	362
	Without cushion	The big energy generated by an external load the this cylinder cannot absorbed. We will recommend an outside accumulator to be used together.					

Note1: Regularly apply heat-resistance grease.