CKD

SM－227267－A

INSTRUCTION MANUAL

SUPER MICRO CYLINDER

Heat resistance type

SCM-T

- 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

The 2nd edition

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 applications, 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.

INDEX

SCM-T

Super micro cylinder
Heat resistance type

Manual No. SM-227267-A

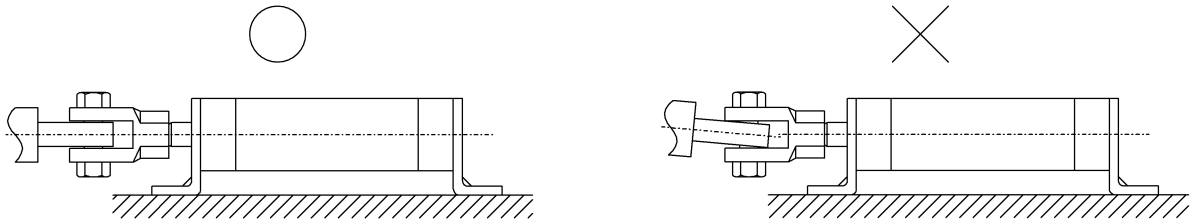
1. UNPACKING

1) Make sure that the type No. on the nameplate of the delivered Super Micro 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.

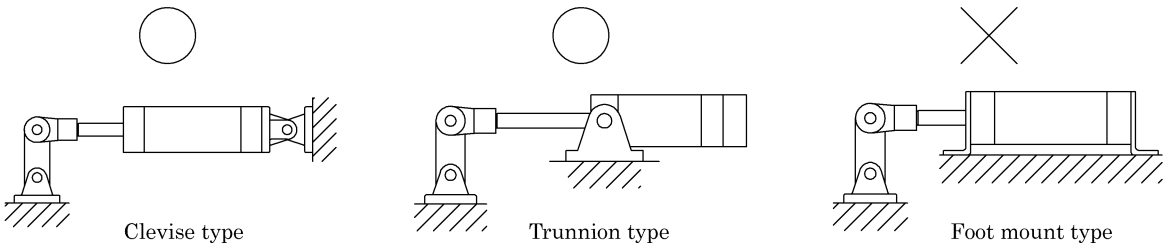
2. INSTALLATION

2.1 Installation

1) The ambient temperature for this cylinder is 5 to 120℃.
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 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 (Simplified floating joint).
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.



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.



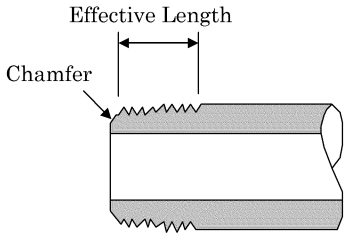
2.2 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc. If the operating ambient temperature exceeds 60℃, use copper pipes.

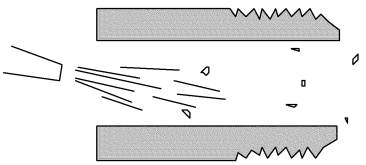
2) See to it that the pipe connecting cylinder and solenoid valve has effective cross-sectional area which is needed for the cylinder to drive at the specified speed.

3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

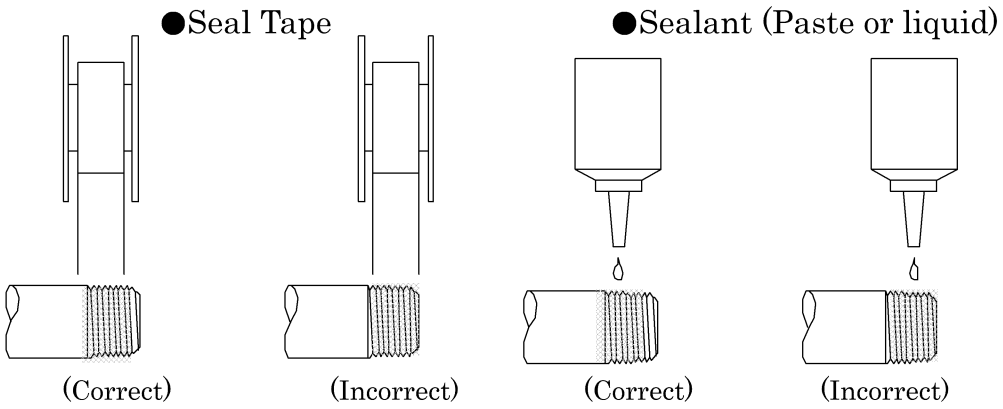
4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.



5) Flush air into the pipe to blow out foreign substances and chips before piping.

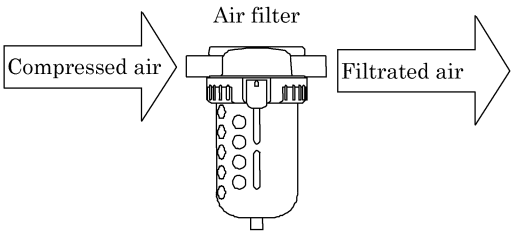


6) Refrain from mapplying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

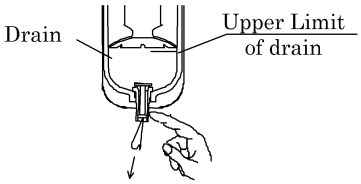


2.3 Fluid

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 μ 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 Operating the Cylinder

1) The working pressure for this type of cylinder is specified in “Product Specifications”. Operate the system within this range.

2) 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 3, consider of providing a shock absorber.

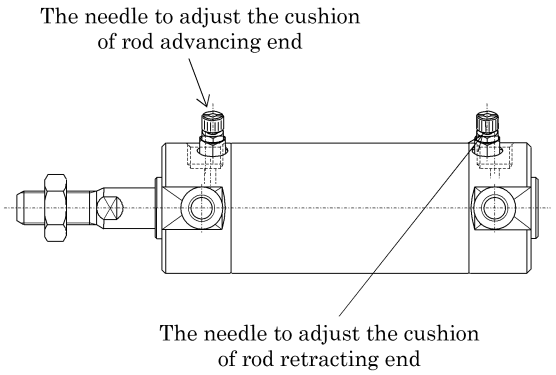


Table 3 Table of cushion characteristics

Bore size (mm)	Rubber cushion	Air cushion	
	Allowable energy absorption (J)	Effective air cushion length (mm)	Allowable energy absorption (J)
ϕ 20	0.1	—	
ϕ 25	0.2	—	
ϕ 32	0.5	—	
ϕ 40	0.9	—	
ϕ 50	—	13.4	8.0
ϕ 63	—	13.4	14.4
ϕ 80	—	15.4	25.4
ϕ 100	—	15.4	45.6

3) Adjust the working piston speed with the speed controller mounted.

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.

2) Inspection items
   (1) Check the bolts and nuts fitting the piston rod end bracket and mounting bracket 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.

4.2 Disassembly Procedure

1) This cylinder is able to be disassembled.
   Replace component parts listed in Expendable parts List by disassembling cylinder referring to internal structure diagram when air leakage is ever occurred.
   (1) Shut off the fluid and remove the residual pressure.
   (2) Disconnect cylinder from piping and load.
   (3) Tuck a cover, either head cover ⑮ or rod cover ⑤, onto a pair of vise.
   (4) Remove the cover by holding the unfixed width across the flats of the cover with a spanner or monkey wrench.
   For tools required to remove the cover, see Table 2.

Table 2

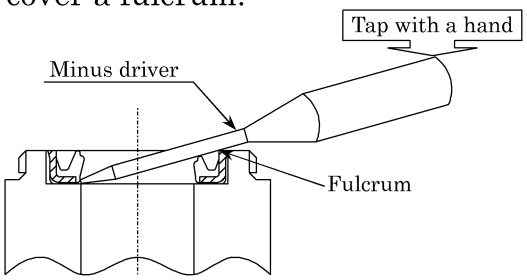
Bore size (mm)	Pair face of cover (mm)	Recommended hand tools
ϕ 20	24	Spanner 24Adjustable wrench 250 Pipe wrench 250
ϕ 25	29	〃 29 〃 250 〃 350
ϕ 32	36	〃 36 〃 375 〃 350
ϕ 40	44	〃 375 〃 450
ϕ 50	55	〃 600
ϕ 63	69	〃 900
ϕ 80	80	〃 1200
ϕ 100	100	〃 1200

Note ・Pipe wrench may sometimes give defects to cover.
・Fairly large torque (350N・m or more) is required for ϕ 80, ϕ 100. Using rigid enough vise to fix the cylinder, also apply a piece of pipe of approx. 1.5monto the handle of spanner, adjustable wrench or pipe wrench to loosen cylinder cover.

   (5) Remove rod packing ③, piston packing ⑩, cylinder gasket ⑥ & wear ring ⑬ using sharp pointed tool such as standard driver or bodkin.

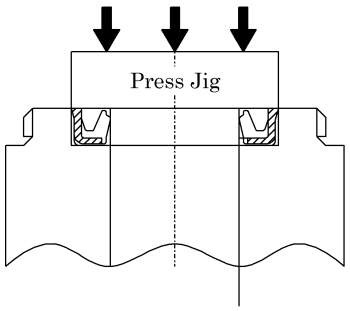
(6) To replace cushion packing on the cover with cushion which was not disassembled, tuck pair face of the cover onto a pair of vise and loosen the tube by applying pipe wrench to OD of the tube as near to the cover as possible. (Beware that cylinder tube may be scratched by pipe wrench.)

(7) To remove cushion packing, tuck the pair face of cover with a pair of vise, then ply it out with a minus driver by tapping the handle of screw driver with a hand upon inserting the tip under the loin of packing while making the corner edge of cover a fulcrum.



4.3 Assembly Procedure

1) Clean each component parts.
2) Take reversed sequence of disassembly to assemble cylinder after cleaning parts. Carefully avoid giving damage to packings to prevent malfunction or air leakage.
3) Assembling cushion packings.
To prevent a damage to packing also a tilt of it, use a jig and carefully press it in the place. Make sure to press it down so as the upper edge of its metal ring sink about 0.5mm below the top surface of the cover.
Table 3 and the illustration is an example of the jig.
Make it a reference of jig fabrication.



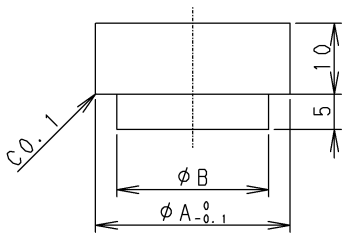


Table 3 Press Jig dimension (mm)

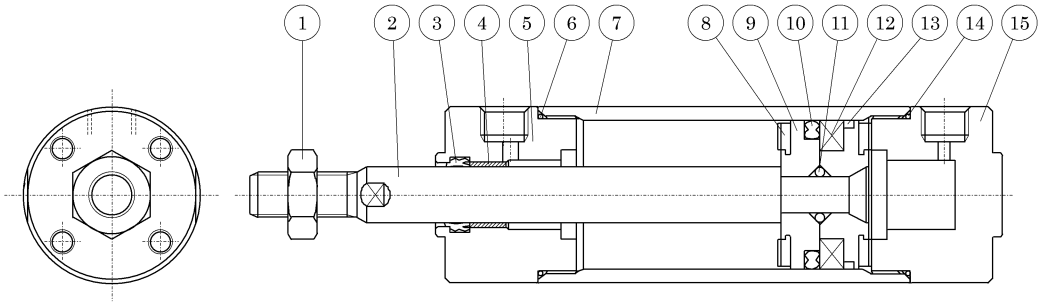
Bore size	A	B
φ50, φ63	32	24
φ80, φ100	45	35

4) Apply heat resistant grease over the internal surface of cylinder tube, external surface of piston and packings.
5) When tightly assembling rod cover and head cover onto tube, make sure, for tight finishing, to turn the cover approx. 2° beyond former position before disassembling. (As for both end angle mounting type, carefully select tight finishing position so as to have both mounting faces of bracket become flat.)

4.4 Internal structure drawings and Expendable parts list

1) Double acting,heat resistance type : Internal structure and parts list (with rubber cushions)

- φ20 to φ40



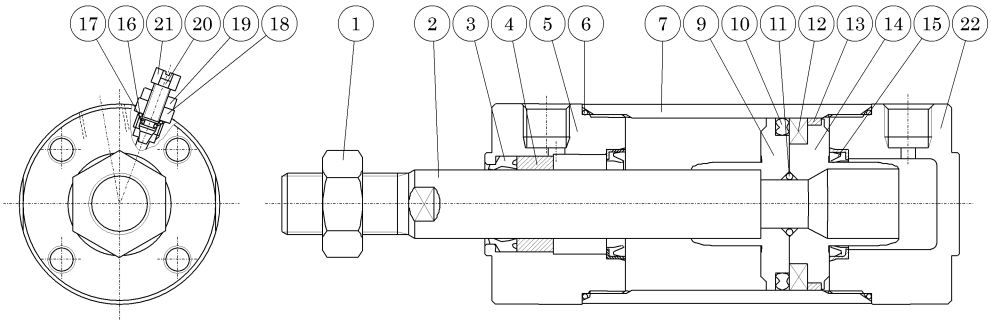
No.	Parts Name	Material	Remarks
1	Rod nut	Steel	Nickel plated
2	Piston rod	φ20 to φ25 : Stainless steel φ32 to φ40 : Steel	Industrial chrome planting
3	Rod packing	Fluoro rubber	Packing standard PDU
4	Bush	Oil inpregnated bearing alloy	Copper (type 6 : cast iron)
5	Rod cover	Aluminum alloy	Paint
6	Cylinder gasket	Fluoro rubber	
7	Cylinder tube	Aluminum alloy	Hard almite
8	Cushion rubber	Fluoro rubber	
9	Piston (R)	Aluminum alloy	
10	Piston packing	Fluoro rubber	Packing standard PSD
11	Piston gasket	Fluoro rubber	
12	Piston ring	Steel	
13	Wear ring	fluororesin	
14	Piston (H)	Aluminum alloy	
15	Head cover	Aluminum alloy	Paint

Expendable parts list (Specify the kit No. on your purchase order.)

Bore size (mm)	Kit No.	③ Rod packing	⑥ Cylinder gasket	⑩ Piston packing	⑬ Wear ring
φ20	SCM-T-20K	PDU-8F	O ring φ20× φ1.3	PSD-20F	F4-655118
φ25	SCM-T-25K	PDU-10F	O ring φ24.99× φ1.27	PSD-25F	F4-197252
φ32	SCM-T-32K	PDU-12F	O ring φ31.93× φ1.35	PSD-32F	F4-197253
φ40	SCM-T-40K	PDU-16F	AS568-030	PSD-40F	F4-650583

2) Double acting,heat resistance type : Internal structure and parts list (with air cushions)

- φ50 to φ100



No.	Parts Name	Material	Remarks
1	Rod nut	Steel	Nickel plated
2	piston rod	Steel	Industrial chrome planting
3	Rod packing	Fluoro rubber	Packing standard PDU
4	Bush	Pregnated bearing alloy	
5	Rod cover	※ Aluminum alloy	Paint
6	Cylinder gasket	Fluoro rubber	
7	Cylinder tube	Aluminum alloy	Hard almite
9	Piston R	Aluminum alloy die casted	
10	Piston packing	Fluoro rubber	Packing standard PSD
11	Piston gasket	Fluoro rubber	
12	Piston ring	Steel	
13	Wear ring	fluororesin	
14	Piston H	Aluminum alloy die casted	
15	Head cover	※ Aluminum alloy	Paint
16	Needle gasket	Fluoro rubber	
17	Holder gasket	Fluoro rubber	
18	Needle holder	Aluminum alloy	
19	Lock nut	Steel	Nickel plated
20	Needle	Stainless steel	
21	Knob	Aluminum alloy	
22	Cushion packing	Fluoro rubber・steel	

※ Material of φ50, φ63 is Aluminum alloy, die casted and painted finish.

Expendable parts list (Specify the kit No. on your purchase order.)

Parts No. / Parts name / Bore size (mm) / Kit No.	③ Rod packing	⑥ Cylinder gasket	⑩ Piston packing	⑬ Wear ring
φ50	SCM-T-50K	PDU-20F	AS568-033	PSD-50F	F4-650584
φ63	SCM-T-63K		AS568-037	PSD-63F	F4-650585
φ80	SCM-T-80K	PDU-25F	AS568-042	PSD-80F	F4-650586
φ100	SCM-T-100K	PDU-30F	AS568-155	PSD-100F	F4-650587

Parts No. / Parts name / Bore size (mm) / Kit No.	⑯ Needole gasket	⑰ Holder gasket	㉒ Cushion packing
φ50	SCM-T-50K	O ring φ2.9×1.2	O ring φ6.5×φ1.0	PCS-24
φ63	SCM-T-63K			
φ80	SCM-T-80K			PCS-35
φ100	SCM-T-100K			

5. TROUBLE SHOOTING

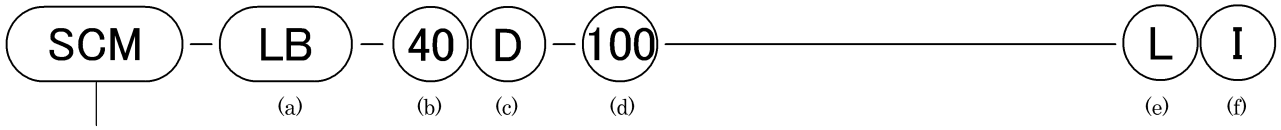
1) Cylinder

Trouble	Causes	Remedies
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 mounting style.
	Broken piston packing	Replace the piston packing.
Does not function smoothly.	Speed is below the low speed limit	Limit the load variation.
	Improper or misalignment of installation.	Correct the installation state and/or 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.

6. HOW TO ORDER

6.1 Product Number Coding

● Without switch



Super micro cylinder
Double acting, heat resistance type, equipped

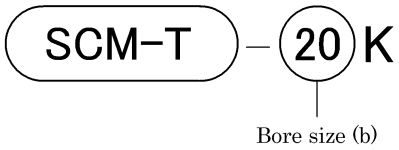
(a) Mounting style (Note1)		(b) Bore size (mm)		(c) Cushion	
00	Basic type	20	φ20	B	With air cushion at both ends
LB	Foot mount type, along axis	25	φ25	R	With air cushion at rod side
FA	Rod side flange type	32	φ32	H	With air cushion at head side
FB	Head end flange type	40	φ40	D	With rubber cushion at both ends
CA	Single clevis type (φ20 to φ63)	50	φ50	For 20 to 40mm bore, B/R/H are not available. D is only available. D is not available for 50 to 100 mm bore cylinder. B, R and H are available.	
CB	Double clevis type (φ80 to φ100)	63	φ63		
TA	Rod side trunnion type (φ20 to φ63)	80	φ80		
TB	Head end trunnion type (φ20 to φ63)	100	φ100		

(d) Stroke			(e) Option		(f) Accessory	
25	Max. stroke length		L	Bellows material・ Silicone rubber glass cloth	I	Rod eye
50	Bore size	Stroke			Y	Rod clevis
75	φ20	1000	M	Piston rod material・ stainless steel	B1	Eye bracket (φ80 to φ100)
100	φ25				B2	Clevis bracket (φ20 to φ63)
125	φ32		P6	Copper and PTFE free		
150	φ40	1500				
200	φ50					
250	φ63					
300	φ80					
	φ100					

Note1: Mounting bracket is attached to the product at shipment.

6.2 Component parts Model coding

1) Repair parts



(b) Bore size (mm)	
20	ϕ 20
25	ϕ 25
32	ϕ 32
40	ϕ 40
50	ϕ 50
63	ϕ 63
80	ϕ 80
100	ϕ 100

2) Model coding of mounting bracket

Bore size (mm) / Mounting bracket	ϕ 20	ϕ 25	ϕ 32	ϕ 40
End angle type (LB)	SCM-LB-20	SCM-LB-25	SCM-LB-32	SCM-LB-40
Flange type (FA/FB)	SCM-FA-20	SCM-FA-25	SCM-FA-32	SCM-FA-40
Single clevis type (CA)	SCM-CA-20	SCM-CA-25	SCM-CA-32	SCM-CA-40
Double clevis type (CB)	—	—	—	—
Trunnion type (TA/TB)	SCM-TA-20	SCM-TA-25	SCM-TA-32	SCM-TA-40

Bore size (mm) / Mounting bracket	ϕ 50	ϕ 63	ϕ 80	ϕ 100
End angle type (LB)	SCM-LB-50	SCM-LB-63	SCM-LB-80	SCM-LB-100
Flange type (FA/FB)	SCM-FA-50	SCM-FA-63	SCM-FA-80	SCM-FA-100
Single clevis type (CA)	SCM-CA-50	SCM-CA-63	—	—
Double clevis type (CB)	—	—	SCM-CB-80	SCM-CB-100
Trunnion type (TA/TB)	SCM-TA-50	SCM-TA-63	—	—

Note: Required mounting bolts are attached to bracket.

7. SPECIFICATION

7.1 Product Specifications

Part number / Item			SCM-T							
Bore size		mm	ϕ20	ϕ25	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100
Actuation			Double-acting / heat resistance type							
Working fluid			Compressed Air							
Max. working pressure		MPa	1.0							
Min. working pressure		MPa	0.1				0.05			
Proof pressure		MPa	1.6							
Ambient temperature		℃	5 to 120							
Port size			Rc1/8				Rc1/4		Rc3/8	Rc1/2
Stroke tolerance		mm	$^{+1.8}_{0}$ (less than 1000)			$^{+1.8}_{0}$ (less than 1500)	$^{+1.4}_{0}$ (less than1000), $^{+1.8}_{0}$ (less than1500)			
Working piston speed		mm/s	30 to 1000 (Set the speed within the range of allowable energy absorption.)							
Cushion			With rubber cushion				With air cushion			
Lubrication			Not available							
Allowable energy absorption	With rubber cushion	J	0.1	0.2	0.5	0.9	—	—	—	—
	With air cushion		—	—	—	—	8.0	14.4	25.4	45.6
	Non cushon		—	—	—	—	0.057	0.057	0.112	0.153