



Instructions and Maintenance Manual

Air Cylinder
Series 55-CS1

CE II 2GD c 95°C (T5) Ta 0°C to 40°C
115°C (T4) Ta 40°C to 60°C

Read this manual before using this product.

For future reference, please keep this manual in a safe place.

The information within this document is to be used by pneumatically trained personnel only.

This manual should be read in conjunction with the current catalogue.

Marking description

II 2GD c 95°C (T5) Ta 0°C to 40°C
115°C (T4) Ta 40°C to 60°C

Group II

Category 2

Suitable for Dust and Gas environment

Type of protection "constructional safety"

Max surface temperature 95°C and temperature class T5 when ambient temperature is from 0°C to 40°C

Max surface temperature 115°C and temperature class T4 when ambient temperature is from 40°C to 60°C

1 SAFETY RECOMMENDATION

1.1 General recommendation

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO4414 (Note1), JIS B 8370 (Note2) and other safety practices.

Note 1: ISO 4414: Pneumatic fluid power - Recommendations for the application of equipment to transmission and control systems. Note 2: JIS B 8370: Pneumatic system axiom.

CAUTION: Operator error could result in injury or equipment damage.

WARNING: Operator error could result in injury or loss of life.

DANGER: In extreme conditions, there is possible result of serious injury or loss of life.

WARNING

1. **The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.**

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. **Only trained personnel should operate pneumatically operated machinery and equipment.**

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. **Do not service machinery/equipment or attempt to remove component until safety is confirmed.**

- 1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
- 2) When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.
- 3) Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Bleed air into the system gradually to create backpressure, i.e. incorporate a soft-start valve).

4. **Contact SMC if the product is to be used in any of the following conditions:**

- 1) Conditions and environments beyond the given specifications, or if product is used outdoors.
- 2) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
- 3) Applications, which have the possibility of having negative effects on people, properties or animals, requiring special safety analysis.

1.2 Conformity to standard

This product is certified to and complies with the following standards:

- Directive 94/9/EC
- EN 13463-1:2001
Non-electrical equipment for potentially explosive atmospheres
Part 1: Basic method and requirements

1.3 Specific recommendations

WARNING

1. **Do not turn the cushion valve too much in to the opening direction (counter clockwise).**
Otherwise it may drop or break. The cushion valve for CS1 will be in a fully opened state after 4 turns from the closed state.
2. **Be certain to activate the air cushion at the stroke end.**
When the cylinder is used with cushion valve in a fully opened position, a suitable external device should be installed to absorb all the kinetic energy of the mechanism, of which the actuator is part, before reaching each stroke end. If this is not done, tie-rods or piston-rod assembly will be damaged.

2 INTENDED CONDITIONS OF USE

Fluid	Air	
Max. operating pressure	∅180~∅200 & with magnet	0.7 MPa
	Otherwise	0.97 MPa
Min. operating pressure	0.05 MPa	
Ambient and fluid temperature	0 to 60 °C	
Lubrication	Not required type & required type	
Operating piston speed	50 to 500 mm/s	
Cushion	Air cushion & No cushion	
Allowable kinetic energy	∅125	32.3 J (with air cushion)
	∅140	44.6 J (with air cushion)
	∅160	58.8 J (with air cushion)
	∅180	78.4 J (with air cushion)
	∅200	98.0 J (with air cushion)
	∅250	147 J (with air cushion)
	∅300	265 J (with air cushion)
Explosive atmosphere	Gas and Dust	
Zone	1, 21, 2 and 22	

WARNING

- In case the kinetic energy exceeds the value given in the table, please contact SMC.
- Do not use in case of heavy dusty environment where dust can penetrate into the cylinder and dry the grease.

2.1 Production batch code

The production batch code printed on the label indicates the month and year of production as per the following table:

Production batch codes		2003	2004	2005	...	2021	2022	2023	...
Year	Month	H	I	J	...	Z	A	B	...
Jan	O	HO	IO	JO	...	ZO	AO	BO	...
Feb	P	HP	IP	JP	...	ZP	AP	BP	...
Mar	Q	HQ	IQ	JQ	...	ZQ	AQ	BQ	...
Apr	R	HR	IR	JR	...	ZR	AR	BR	...
May	S	HS	IS	JS	...	ZS	AS	BS	...
Jun	T	HT	IT	JT	...	ZT	AT	BT	...
Jul	U	HU	IU	JU	...	ZU	AU	BU	...
Aug	V	HV	IV	JV	...	ZV	AV	BV	...
Sep	W	HW	IW	JW	...	ZW	AW	BW	...
Oct	X	HX	IX	JX	...	ZX	AX	BX	...
Nov	Y	HY	IY	JY	...	ZY	AY	BY	...
Dec	Z	HZ	IZ	JZ	...	ZZ	AZ	BZ	...

3 INSTALLATION

WARNING

- Do not install unless the safety instructions have been read and understood.

3.1 Environment

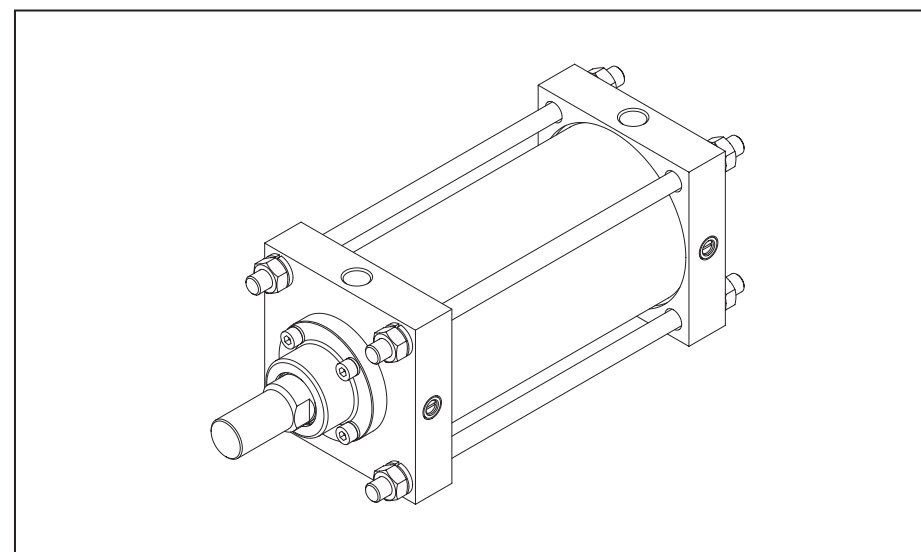
WARNING

- Do not use in an environment where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.
- The product should not be exposed to prolonged sunlight such to generate surface temperature higher than the value given for temperature class. Use a protective cover.
- Do not mount the product in a location where it is subjected to strong vibrations such to generate surface temperature higher than the value given for temperature class. Avoid any kind of shock or impact.
- Do not mount the product in a location where it is exposed to radiant heat.

3.2 Piping

WARNING

- Before piping clean away all chips, cutting oil, dust, etc.
- When installing piping or fitting into a port, in case of using sealant type fittings, ensure that sealant material does not enter the port inside. When using seal tape, leave 1.5 to 2 threads exposed on the end of pipe/fitting.



Bore size	Port size
∅125	Rc 1/2
∅140	
∅160	Rc 3/4
∅180	
∅200	Rc 1
∅250	
∅300	

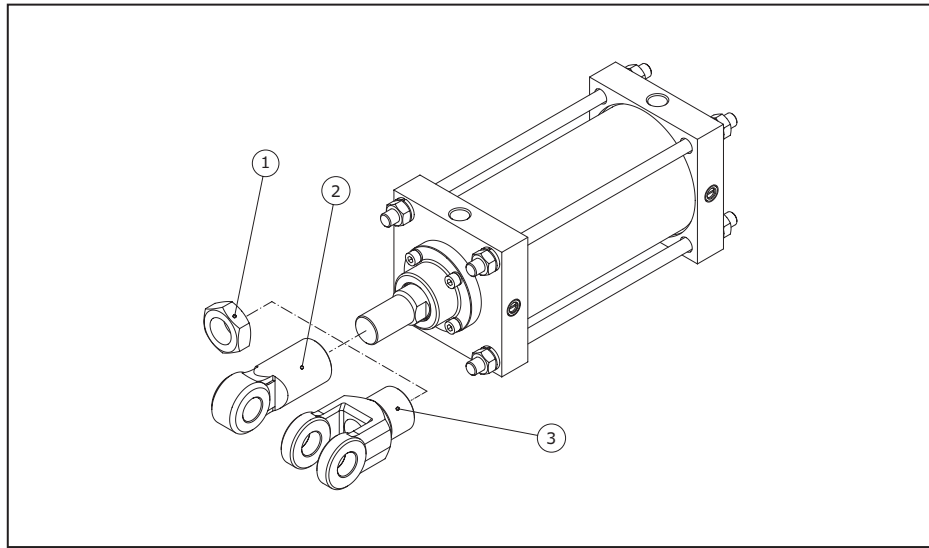
3.3 Electrical connection

WARNING

Provide grounding connection to the actuator to avoid any spark arising from potential differences.

3.4 Mounting accessories

Rod end accessories



1	Rod end nut
2	Single knuckle joint
3	Double knuckle joint

Mounting procedure:

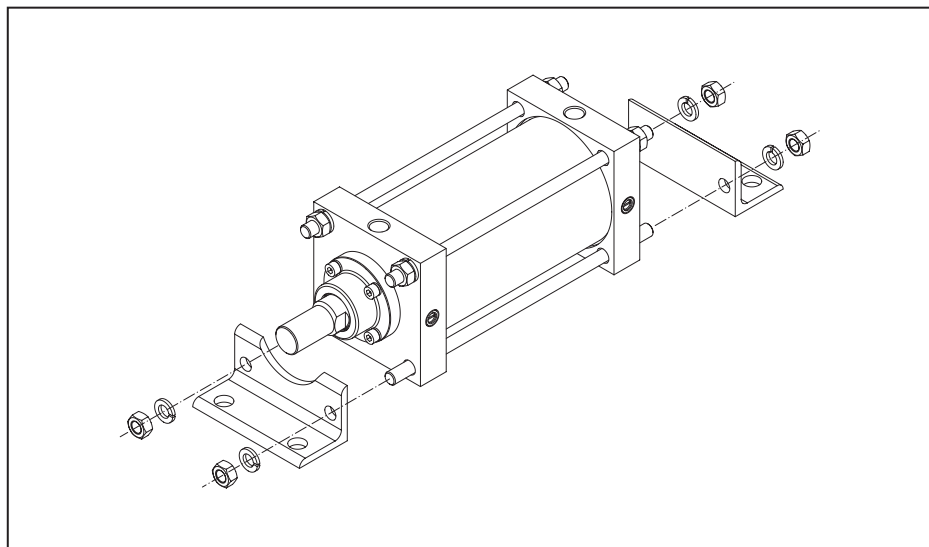
1. Screw the nut (4) loosely on rod end thread.
2. Screw the accessory (2 or 3) on the rod end.
3. Tighten the nut against the accessory to fix it.

Use wrenches of the following dimensions:

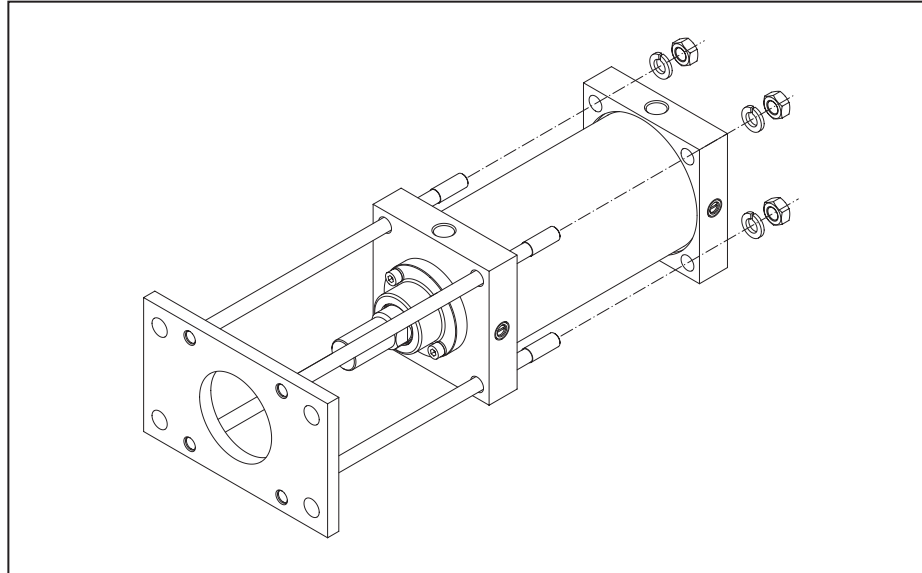
Bore size (mm)	Single knuckle joint Width across flats (mm)	Double knuckle joint Width across flats (mm)	Rod end nut Width across flats (mm)
125	32	64	46
140	36	72	46
160	40	80	55
180	50	100	60
200	50	100	70
250	63	126	85
300	80	160	95

Apply the tool to the suitable flat surfaces on the accessory.

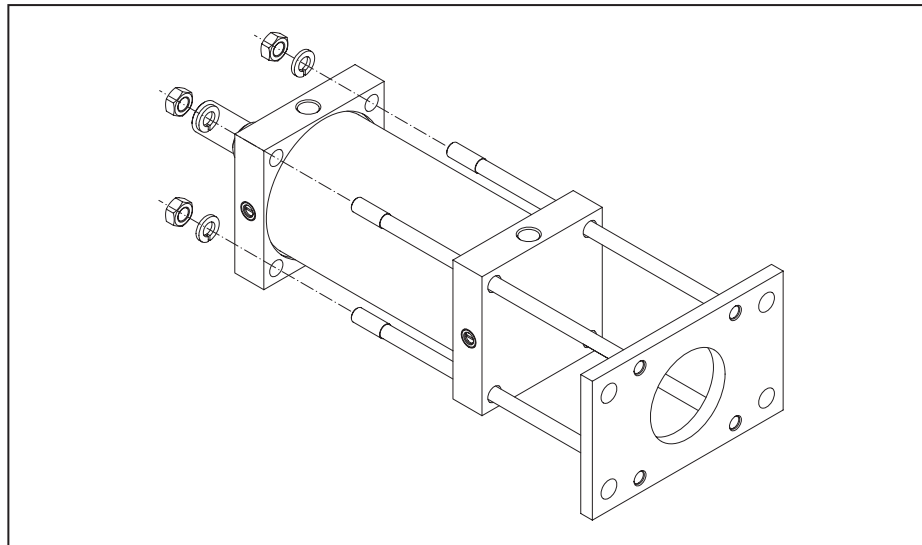
Foot brackets



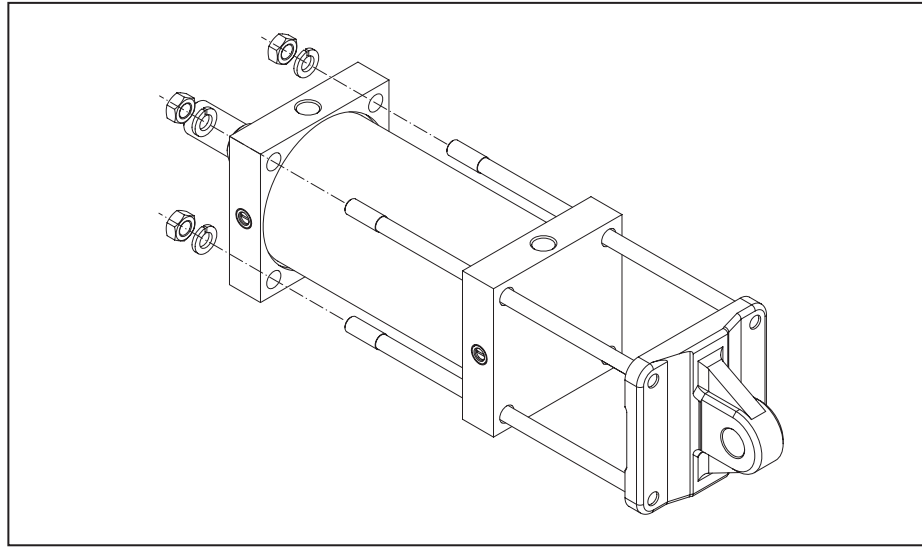
Front flange



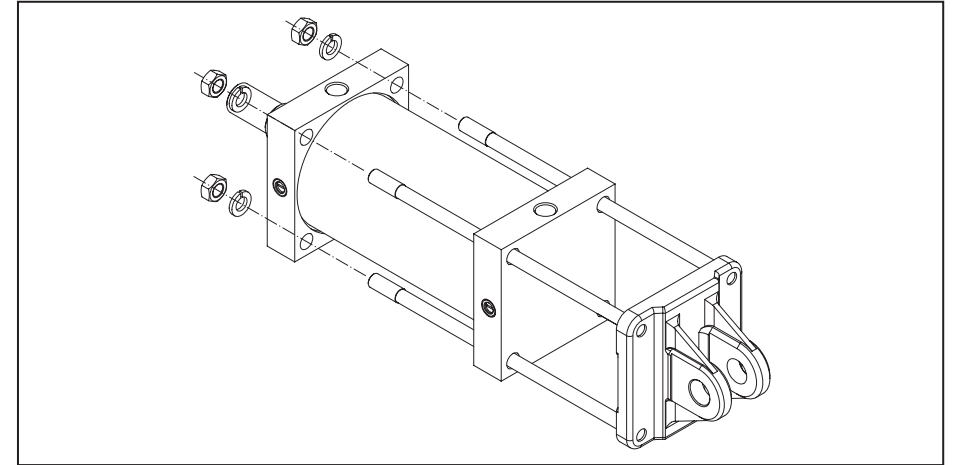
Rear flange



Rear single clevis



Rear double clevis



When replacing brackets, use the hexagon wrenches shown below.

Bore size (mm)	Width across flats (mm)	Tighting torque (Nm)	
		In case of Al tube cylinder	In case of Fe tube cylinder
125	21	39.2	49.0
140	21	39.2	49.0
160	24	62.8	75.5
180	27	92.7	103
200	30	132	147
250	36		254
300	46		451

3.5 Lubrication

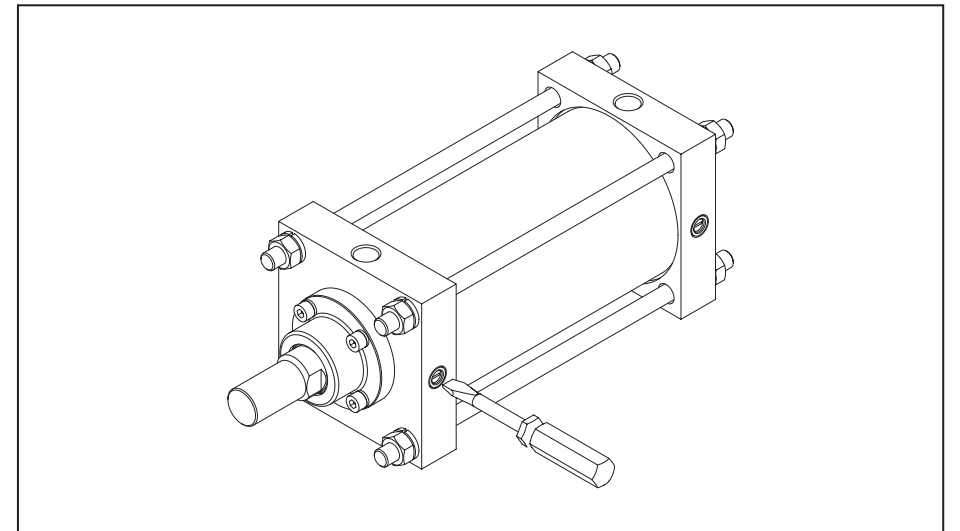


Our products have been lubricated for life at manufacturer, and do not require lubrication in service.

If a lubricant is used in the system, use turbine oil Class 1(no additive), ISO VG32. Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

4 AIR-CUSHION ADJUSTMENT

For air-cushion adjustment, tighten or loosen the cushion valve using a hexagon socket wrench.



Bore size (mm)	Width of slot (mm)
125 to 300	1.6

5 MAINTENANCE

WARNING

- Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.
- If handled improperly, compressed air can be dangerous. Assembly, handling and repair of pneumatic system should be performed by qualified personnel only.
- Drain: remove condensate from the filter bowl on a regular basis.
- Shut down before maintenance: before attempting any kind of maintenance make sure the supply pressure is shut off and all residual air pressure is released from the system to be worked on.
- Start up after maintenance: apply operating pressure and power to the equipment and check for proper operation and possible air leaks. If operation is abnormal, please verify product set-up parameters.
- Do not make any modification to the product.
- Periodically check the rod surface, the rod seal and the cylinder tube external surface. Any damage in these components could increase friction and lead to dangerous conditions. Replace the whole actuator if any of these conditions should appear.
- Replace the seals, when air leakage is above allowable value given in the table below.

Internal leakage	10.7 cm ³ /min (ANR)
External leakage	5.35 cm ³ /min (ANR)

Seals replacement

WARNING

Use only original SMC seal kits, given in the table below.

Lubricated type:

Bore size (mm)	Kit no.
125	CS1-125A-PS
140	CS1-140A-PS
160	CS1-160A-PS
180	CS1-180A-PS
200	CS1-200A-PS
250	CS1-250A-PS
300	CS1-300A-PS

Non-lubricated type:

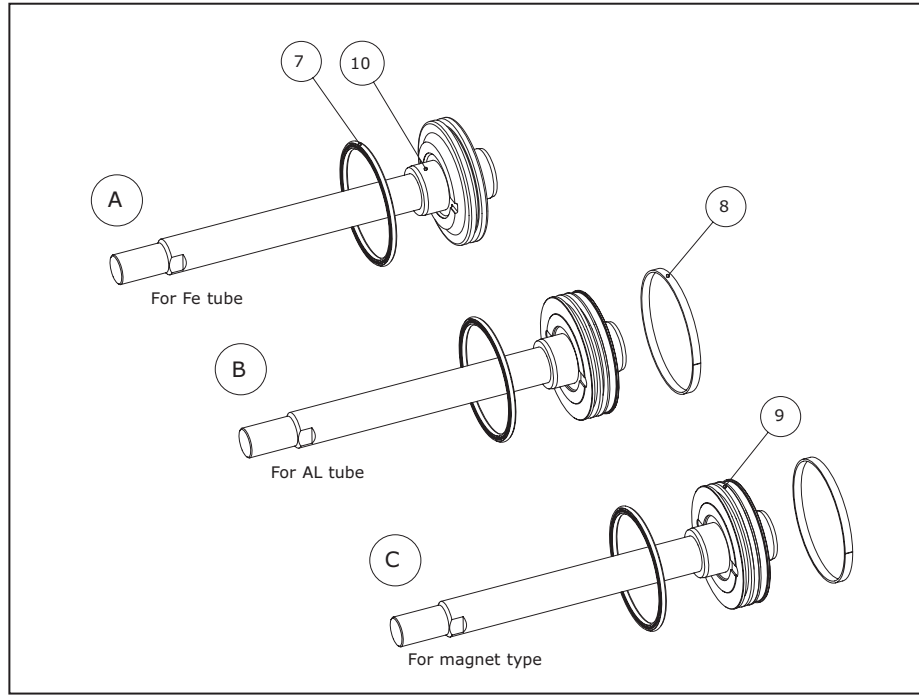
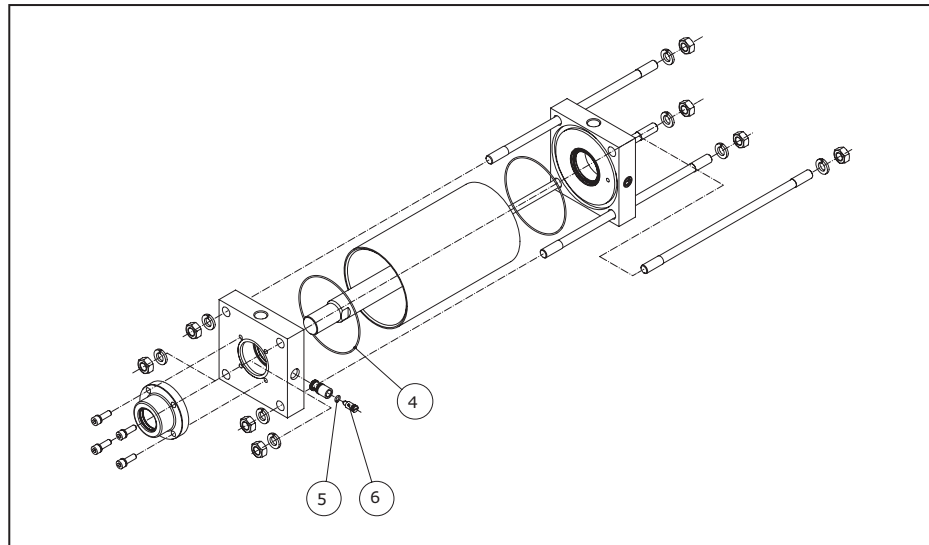
Bore size (mm)	Kit no.
125	CS1N125A-PS
140	CS1N140A-PS
160	CS1N160A-PS
180	CS1N180A-PS
200	CS1N200A-PS
250	CS1N250A-PS
300	CS1N300A-PS

Procedure

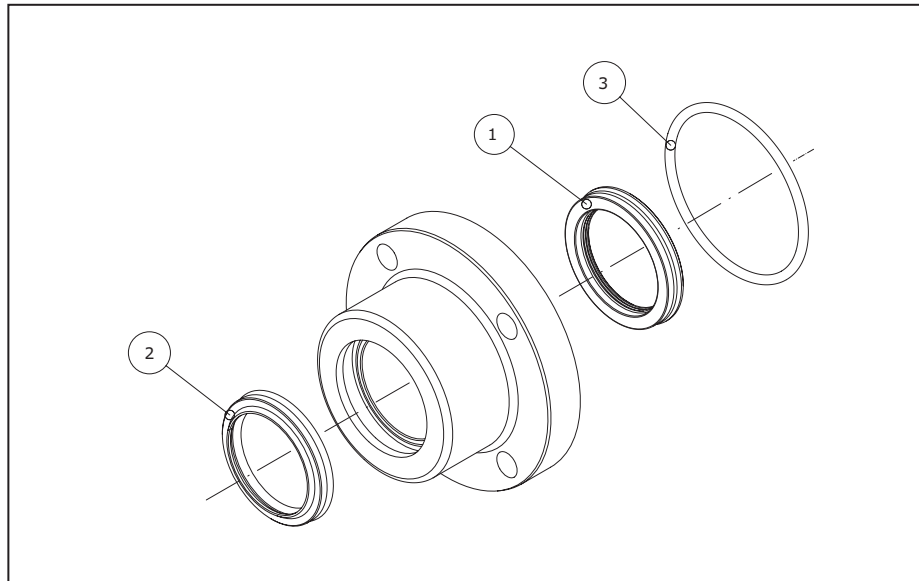
Disassemble the cylinder, remove the old grease and place all the parts on a clean cloth in a clean environment. The following socket wrenches shall be used to loosen the tie-rod nuts, hexagon wrenches shall be used for the holder.

Bore size (mm)	Width across flats of tie-rod nuts (mm)	Width across flats of hex. cap screws (mm)
125	21	6
140	21	6
160	24	6
180	27	8
200	30	8
250	36	10
300	46	10

Remove the old tube gaskets, rod seal, piston seal, wear ring and cushion valve seal using a fine screwdriver where necessary. If a magnet is present on the piston, do not remove it. This part should not be replaced.



Piston rod assembly for ø180 and ø200 with magnet type is ©.



1	Rod seal
2	Wiper ring
3	Holder gasket
4	Tube gasket
5	Cushion valve seal
6	Cushion valve
7	Piston seal
8	Wear ring
9	Magnet
10	Cushion ring

Lubricate the parts using "Mitsubishi Multi Purpose Grease 2" or "Lithium Type Grease JIS 2".

Apply lubricant to:

- rod seal
- rod seal groove on the rod cover
- piston outer surface
- piston seal groove
- piston seal inner and outer surface
- tube gaskets
- cushion seals
- cushion seal grooves on the covers
- piston rod surface
- tube inner surface
- cushion ring surface

The amount of lubricant, to be applied, is given in the following table:

Bore size (mm)	Stroke up to 100 mm (g)	For each additional 50 mm (g)
125	15~17	3
140	20~22	3
160	24~26	3
180	27~29	4
200	30~32	4
250	33~35	5
300	36~38	5

The cylinder should be assembled in the following order: put rod seal to rod cover after apply sufficient grease to seal and groove at rod cover, then put plain washer and retaining ring. Check for cylinder smooth movement and for air leakage.

Tighten the diagonally opposing tie-rod nuts according to the torque values given below.

Bore size (mm)	Torque (Nm)	
	In case of Al tube cylinder	In case of Fe tube cylinder
125	39.2	49.0
140	39.2	49.0
160	62.8	75.5
180	92.7	103
200	132	147
250		254
300		451

Check for cylinder smooth movement and for air leakage.

6 LIMITATIONS OF USE

WARNING

- Do not exceed any of the specifications laid out in section 2 of this document or the specific product catalogue.

DANGER

- Air equipment has standard air leakage within certain limits.
- Do not use this equipment when the air itself can lead to explosion danger.

CAUTION

- Do not install and use this equipment in case of vibration such to lead to equipment failure. Contact SMC for this specific situation.

WARNING

- External impact on the cylinder body could result in spark and/or cylinder damage. Avoid any application where foreign objects can hit the cylinder. In such situations install suitable guard to prevent such impacts.
- Use only ATEX certified auto-switch. Order them separately.
- Do not use in presence of strong magnetic fields, which could generate surface temperature higher than the value given for the temperature class.

7 EUROPEAN CONTACT LIST

SMC Corporation

Country	Telephone	Country	Telephone
Austria	(43) 2262-62 280	Italy	(39) 02-92711
Belgium	(32) 3-355 1464	Netherlands	(31) 20-531 8888
Czech Republic	(420) 5-414 24611	Norway	(47) 67 12 90 20
Denmark	(45) 70 25 29 00	Poland	(48) 22-548 50 85
Finland	(358) 9-859 580	Portugal	(351) 22 610 89 22
France	(33) 1-64 76 1000	Spain	(34) 945-18 4100
Germany	(49) 6103 4020	Sweden	(46) 8-603 0700
Greece	(30) 1- 342 6076	Switzerland	(41) 52-396 3131
Hungary	(36) 1-371 1343	Turkey	(90) 212 221 1512
Ireland	(351) 1-403 9000	United Kingdom	(44) 1908-56 3888

Websites

SMC Corporation	www.smcworld.com
SMC Europe	www.smceu.com