



Installation and Maintenance Manual

Air cylinder series, 55-CS1

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

Marking description
Group II, Category 2
Suitable for Gas and Dust environment
Type of protection "constructional safety"
The maximum surface temperature is 95°C and the temperature class is T5 when the ambient temperature is: 0°C to 40°C
The maximum surface temperature is 115°C and the temperature class is T4 when the ambient temperature is 40°C to 60°C

1 Safety Instructions

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

	Caution	Indicates a hazard with a low level of risk, which if not avoided, could result in minor or moderate injury.
	Warning	Indicates a hazard with a medium level of risk, which if not avoided, could result in death or serious injury.
	Danger	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

Warning

- 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 can be used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet specific requirements.
- 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 personnel.
- Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
 - Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
 - 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.
 - Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Supply air into the system gradually to create back pressure, i.e. incorporate a soft-start valve).
- Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**
 - Conditions and environments beyond the given specifications, or if the product is to be used outdoors.
 - 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.

1 Safety Instructions (Continued)

- An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

Caution

- Ensure that the air supply system is filtered to 5 microns.

2 Specifications

2.1 Specifications

Refer to the operation manual for this product.

Fluid	Air	
Max. operating pressure	Ø180~Ø200 & 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	
Operating piston speed	50 to 500 mm/s	
Cushion	Air cushion & No cushion	
Allowable kinetic energy	Ø125	32.3 J (with air cushion)
	Ø140	44.6 J (with air cushion)
	Ø160	58.8 J (with air cushion)
	Ø180	78.4 J (with air cushion)
	Ø200	98.0 J (with air cushion)
	Ø250	147 J (with air cushion)
Explosive atmosphere Zone	Gas and Dust	
	1, 21, 2 and 22	

Warning

For actuators with no cushions, install an external device to absorb the kinetic energy. In this case, the rigidity of the machine should also be considered

2.2 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									
Year	2003	2004	2005	...	2021	2022	2023	...	
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

3.1 Installation

Warning

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

3.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere except within the specified rating.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not mount in a location exposed to radiant heat.

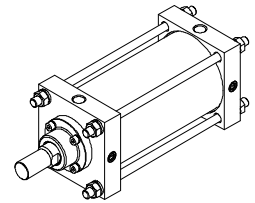
3 Installation (Continued)

- Do not use in case of heavy dusty environment where dust can penetrate into the cylinder and dry the grease.
- Do not use in wet environments.

3.3 Piping

Caution

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.



Bore size (mm)	Port size
Ø125, Ø140	Rc 1/2
Ø160, Ø180, Ø200	Rc 3/4
Ø250, Ø300	Rc 1

3.4 Lubrication

Caution

- SMC products have been lubricated for life at manufacture, 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.

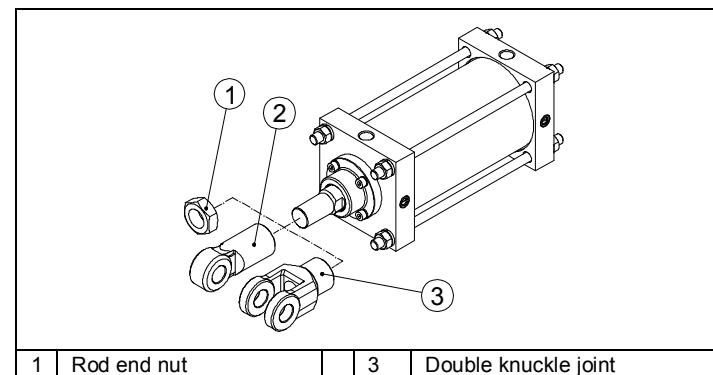
3.5 Electrical connection

Warning

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

3.6 Mounting accessories

Rod end accessories



- Mounting procedure:

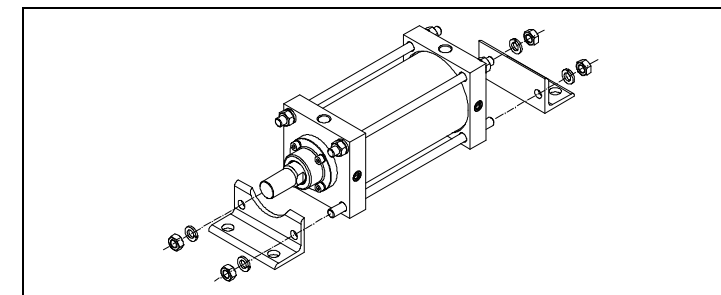
- Screw the nut (1) loosely onto the rod end thread.
- Screw the accessory (2 or 3) onto the rod end thread.
- Tighten the nut against the accessory to fix it in place.

Use hand wrenches of the following dimensions:

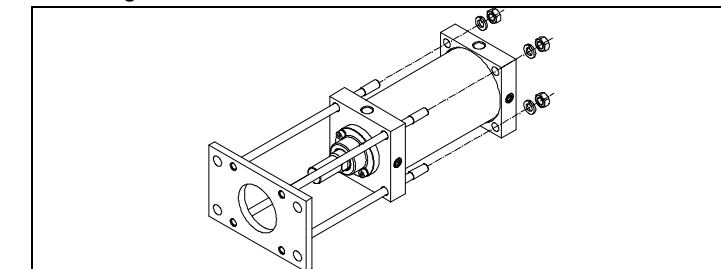
Bore size (mm)	Width across flats (mm)		
	Single knuckle joint	Double knuckle joint	Rod end nut
Ø125	37	64	46
Ø140	36	72	46
Ø160	40	80	55
Ø180	50	100	60
Ø200	50	100	70
Ø250	63	126	85
Ø300	80	160	95

3 Installation (Continued)

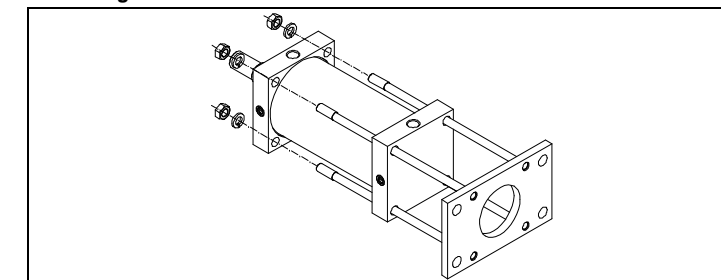
Foot brackets



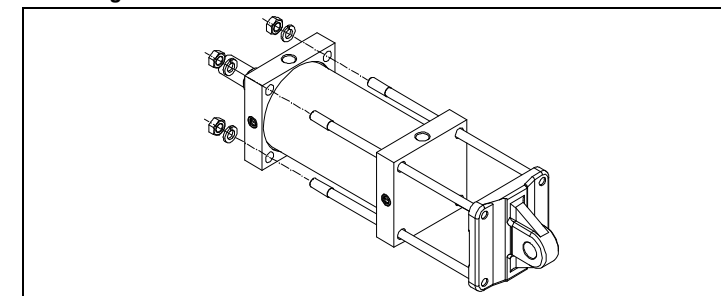
Front flange



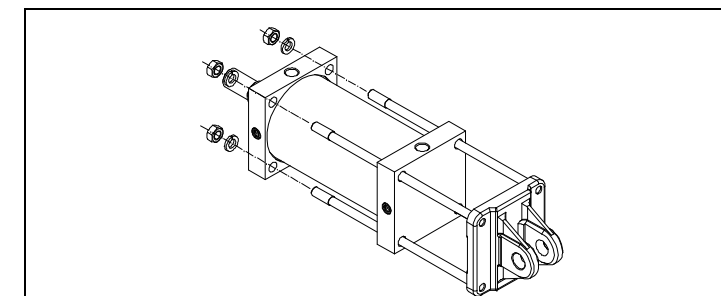
Rear flange



Rear single clevis



Rear double clevis



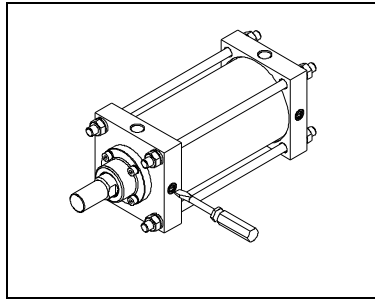
- When replacing brackets, use the hexagon wrenches shown below.

Bore size (mm)	Width across flats (mm)	Tightening torque (Nm)	
		In case of Al tube cylinder	In case of Fe tube cylinder
Ø125	22	39.2	49.0
Ø140	22	39.2	49.0
Ø160	24	62.8	75.5
Ø180	27	92.7	103
Ø200	30	132	147
Ø250	36		254
Ø300	46		451

4 Settings

4.1 Air cushion adjustment

- For air cushion adjustment, tighten or loosen the cushion valve using a suitable flat blade screwdriver.



Bore size (mm)	Width of slot (mm)
Ø125 to Ø300	1.6

Warning

- Do not rotate the cushion valve more than 4 turns counter clockwise from the closed position, as this will cause the valve to be damaged or ejected from the assembly.
- Be certain to activate the air cushion at the stroke end. When the cylinder is used with the cushion valve in a fully open position, a suitable external device should be installed to absorb all of the kinetic energy of the mechanism, of which the actuator is part, before reaching each end of stroke. If this is not done, the tie rods or piston rod assembly will be damaged.
- Do not operate the cushion valve in the fully closed or fully opened state. Using it in the fully closed state will cause the cushion seal to be damaged. Using it in the fully opened state will cause the piston rod assembly or the cover to be damaged.
- If the cushion valve is used in the fully open position, adjust the speed and load to below the values given in the table below.

Load	Speed (mm/s)
80% of theoretical output with pressure of 0.97 MPa	130
40% of theoretical output with pressure of 0.97 MPa	190
15% of theoretical output with pressure of 0.97 MPa	300

5 How to order

Refer to the operation manual for this product.

6 Outline dimensions

Refer to the operation manual for this product.

7 Maintenance

7.1 General Maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous. Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- Periodically check the rod surface, the rod seal and the cylinder tube external surface. Any damage or rust appearing on 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)

- Do not allow dust to form deposits on the outer surface of the actuator and mounting bracket.
- Periodically check for presence of lubrication.

7 Maintenance (Continued)

7.2 Seal replacement

Warning

- Only use SMC seal kits as listed in the table below.

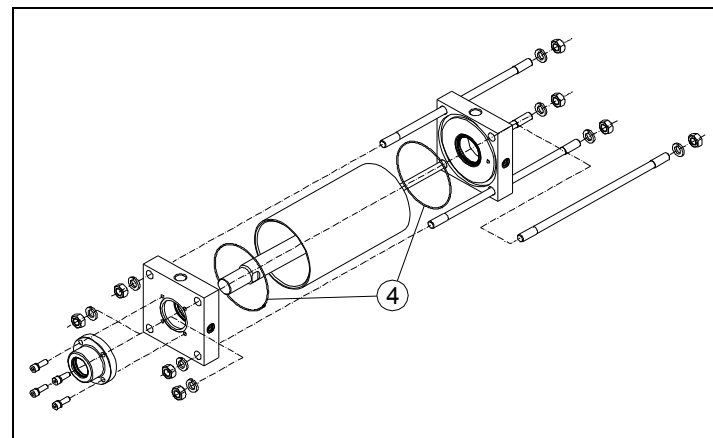
Bore size (mm)	Seal kit number	
	Single rod type	Double rod type
Ø125	CS1N125A-PS	CS1WN125A-PS
Ø140	CS1N140A-PS	CS1WN140A-PS
Ø160	CS1N160A-PS	CS1WN160A-PS
Ø180	CS1N180A-PS	CS1WN180A-PS
Ø200	CS1N200A-PS	CS1WN200A-PS
Ø250	CS1N250A-PS	CS1WN250A-PS
Ø300	CS1N300A-PS	CS1WN300A-PS

7.3 Disassembly procedure

- Loosen and disassemble the tie rods and tie rod nuts using suitable wrenches. The table below lists the width across flats of the tie rod nuts.

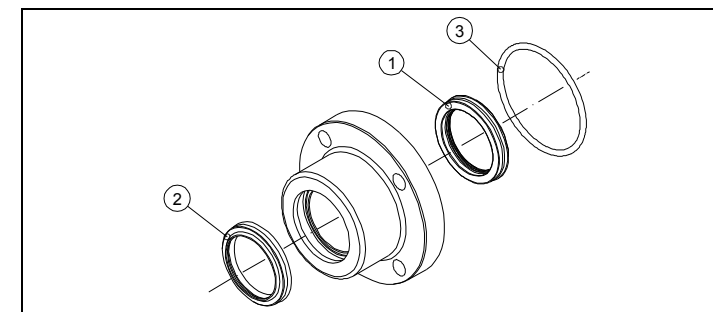
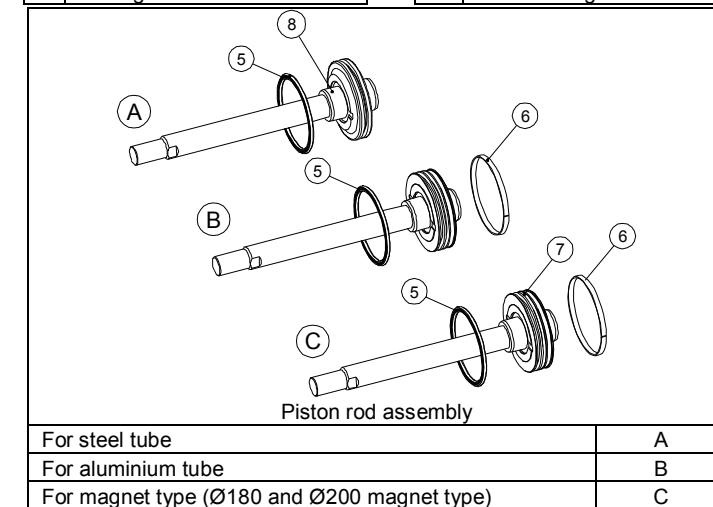
Bore size (mm)	Width across flats of tie-rod nuts (mm)	Width across flats of hex. cap screws (mm)
Ø125, Ø140	22	6
Ø160	24	6
Ø180	27	8
Ø200	30	8
Ø250	36	10
Ø300	46	10

- Separate the covers, cylinder tube and piston rod assembly.
- Clear away the old grease and place all of the parts on a clean cloth in a clean environment.
- Remove the old tube gaskets, rod seal and cushion seals, piston seal and wear ring using a fine screwdriver where necessary.
- If a magnet is present on the piston do not remove it. The magnet is not replaceable.



7 Maintenance (Continued)

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



7.4 Lubrication procedure

- Apply lubricant to:
 - rod seal
 - rod seal groove on the holder
 - piston surface
 - piston seal groove
 - piston seal.
 - tube gaskets
 - cushion seals
 - piston rod surface
 - tube inner surface
 - cushion ring surface
 - wear ring

- Lubricate the parts with the grease packs provided with the seal kit. For additional grease use the grease pack listed below.

Product	Grease pack number	Weight (g)
Standard	GR-S-010	10
	GR-S-020	20

- The amount of lubricant to be applied is listed in the following table.

Bore size (mm)	Stroke up to 100 mm (g)	For each additional 50 mm stroke (g)
Ø125	15 ~ 17	3
Ø140	20 ~ 22	3
Ø160	24 ~ 26	3
Ø180	27 ~ 29	4
Ø200	30 ~ 32	4
Ø250	33 ~ 35	5
Ø300	36 ~ 38	5

7 Maintenance (Continued)

7.5 Assembly procedure

- Insert the new seals into the appropriate seal groove.
- Insert the piston rod assembly into the cylinder tube. Be careful not to damage the piston seal.
- Attach the covers to the cylinder tube. Be careful not to damage the tube gaskets and rod seal.
- Fit the tie rods, then tighten the tie rod nuts according to the torque values given below.

Bore size (mm)	Torque ± 10% (N m)	
	For aluminium tube cylinder	For steel tube cylinder
Ø125, Ø140	39.2	49.0
Ø160	62.8	75.5
Ø180	92.7	103
Ø200	132	147
Ø250		254
Ø300		451

8 Limitations of use

Danger

- Do not exceed any of the specifications listed in section 2 of this document or the specific product catalogue.
- Air equipment has standard air leakage within certain limits. Do not use the equipment when the air itself can lead to explosion.
- Do not use this equipment where vibration could lead to equipment failure. Contact SMC for this specific situation.
- External impacts 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 a suitable guard to prevent such impacts.
- Do not install or use this actuator in applications where the piston rod can impact foreign objects.

- Avoid applications where the piston rod end and the application joining parts create a possible ignition source.
- Use only ATEX certified auto switches. Order them separately.
- Do not use in the presence of strong magnetic fields that could generate a surface temperature higher than the value given for the temperature class.

9 Contacts

AUSTRIA	(43) 2262 62280-0	LATVIA	(371) 781 77 00
BELGIUM	(32) 3 355 1464	LITHUANIA	(370) 5 264 8126
BULGARIA	(359) 2 974 4492	NETHERLANDS	(31) 20 531 8888
CZECH REP.	(420) 541 424 611	NORWAY	(47) 67 12 90 20
DENMARK	(45) 7025 2900	POLAND	(48) 22 211 9600
ESTONIA	(372) 651 0370	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	ROMANIA	(40) 21 320 5111
FRANCE	(33) 1 6476 1000	SLOVAKIA	(421) 2 444 56725
GERMANY	(49) 6103 4020	SLOVENIA	(386) 73 885 412
GREECE	(30) 210 271 7265	SPAIN	(34) 945 184 100
HUNGARY	(36) 23 511 390	SWEDEN	(46) 8 603 1200
IRELAND	(353) 1 403 9000	SWITZERLAND	(41) 52 396 3131
ITALY	(39) 02 92711	UNITED KINGDOM	(44) 1908 563888

SMC Corporation

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