



# Instructions and Maintenance Manual

Cylinder positioner  
Series 56-IP200/56-IP210



II 3GD c T6 -5°C ≤ Ta ≤ 60°C\*

\*for High / Low temperature model ATEX classifications refer to specifications table

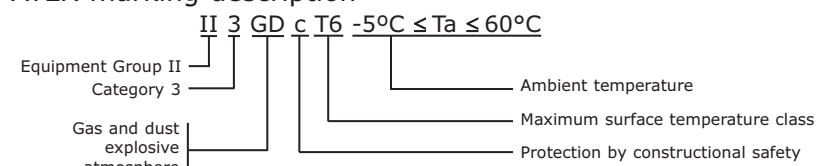
Read this manual before using this product.

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.

## ATEX marking description



## 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.

**WARNING:** Avoid hitting the product with metallic objects!

**WARNING:** Avoid hitting this product in non-explosive environment which can become explosive due to air leakage!

**WARNING:** Ensure that the operating speed of the moving parts is less than 1m/s and that hunting does not occur when the product is used in explosive atmosphere!

**CAUTION:** Ensure that the air supply system is filtered to 5 micron.

## 1.2 Conformity to standard

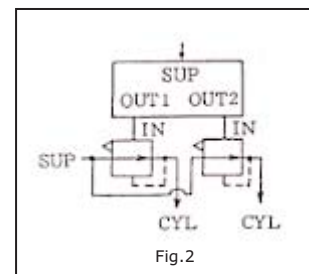
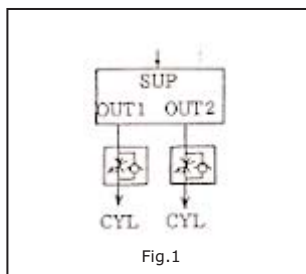
This product is certified to and complies with the following standards:

- Directive 94/9/EC
- EN 13463-1:2001  
Non-electrical equipment for potentially explosive atmospheres  
Part 1: Basic method and requirements
- prEN 13463-5:2003  
Non-electrical equipment for potentially explosive atmospheres  
Part 5: Protection by constructional safety "c"

## 2 INTENDED CONDITIONS OF USE

**CAUTION:**

1. Supply air must be dry and dust free. SMC Mist Separator is recommended for perfect filtration.
2. If the cylinder requires air line lubrication, the lubricator should be installed in the output air lines and not in the supply air line.
3. The velocity of the piston must not be so great as to exceed the speed corresponding to the minimum stroke time indicated in the response time diagram. Instability and stroke exceeding can occur if the speed reaches fast levels.

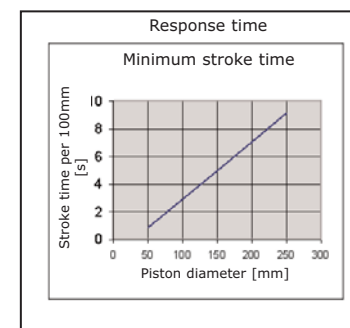


### Speed adjustment methods:

- When the speed is too fast (2 seconds/full stroke), attach meter-out type speed controllers in the output side as indicated in Fig.1, as it may cause overshooting or hunting.
  - When the speed is too slow, attach booster relays on the output side of the positioner, as indicated in Fig.2.
4. The positioner should be protected from vibration as it may cause oscillation of the feed back spring and a generally unstable behaviour. The sensitivity to these vibrations increases in proportion to the total development of the cylinder capacity. Naturally, they can be damped by reducing the work pressure or also using the regulation valves, as was mentioned previously.
  5. Use copper or brass tubes for pipe line arrangement and blow them out before installation.

## 3 SPECIFICATIONS

Fluid	Air, 5µm filtration degree, no lubrication
Supply pressure	0.3 to 0.7MPa
Signal pressure	0.02 to 0.1MPa
Port size	Rc1/4"
Pressure gauge port size	Rc1/8"
Linearity	Less than ± 2%
Hysteresis	Less than 1%
Repeatability	Less than 1%
Sensitivity	Less than 0.5%
Air consumption	18L/min (ANR) or less (at 0.5MPa supply)
Max. Air flow	200L/min (ANR) or more (at 0.5 MPa supply)
Supply pressure variation	1 % (at 0.5 ± 0.05MPa supply)
Applicable cylinder (mm)	50 to 300 mm bore size / 25 to 300 mm stroke
Operating temperature	-30° to 60°C (low temperature) -5° to 60°C (standard) -5° to 100°C (high temperature)



Classification	Ambient temperature range		
	Low Temp. model 56-IP2#0-***L**	Standard model 56-IP2#0-****	High Temp. model 56-IP2#0-***T**
II 3GD c T4			-5°C ≤ Ta ≤ 100°C
II 3GD c T5			-5°C ≤ Ta ≤ 80°C
II 3GD c T6	-30°C ≤ Ta ≤ 60°C	-5°C ≤ Ta ≤ 60°C	-5°C ≤ Ta ≤ 60°C

### 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	...

## 4 MAINTENANCE

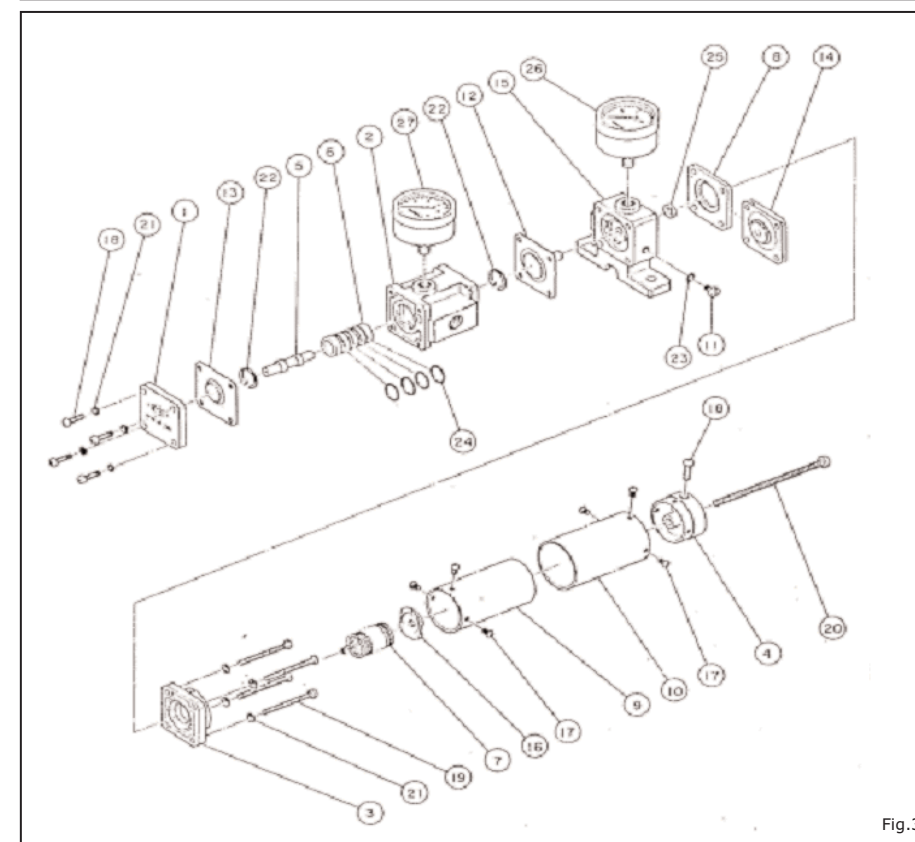


Fig.3

## Parts list for standard operating temperature model

No.	Part No.	Part Name	Material	Qty	Remarks
1	39021	Cover	ADC	1	Silver
2	39022	Body	ADC	1	Silver
3	39024	Cover	ADC	1	Silver
4	30925	Cover desk	ADC	1	Silver
5	39026	Spool	SUS440F	1	
6	39027	Sleeve	SUS440F	1	
7	390212	Feedback spring	SWP	1	Zn chromate
8	390213	Center ring	ADC	1	Silver
9	390216-stroke	Cover	A2017T	1	Silver
10	390217-stroke	Cover	A2017T	1	Silver
11	390219	Orifice	SUS304	1	Silver
12	39020-1	Back pressure diaphragm ass'y	NBR	1	
13	39020-2	Supply pressure diaphragm ass'y	NBR	1	
14	39020-3	Input pressure diaphragm ass'y	NBR	1	
15	39020-8	Body ass'y	ADC	1	Silver
16	T21-5-35	Span adjusting piece	C2680P	1	Ni plated
17		Cross-recessed pan head screw	SUS304	6	M3 x 0.5 x 5
18		Cross-recessed pan head screw	SUS304	5	M4 x 0.7 x16
19		Cross-recessed pan head screw	SUS304	4	M4 x 0.7 x 45
20		Slotted head screw	SWRM	1	M6 x 1 x 100 Zn chromate
21		Spring washer	SUS304	8	4, 2
22		C-shaped snap ring	SK-4	2	Kanita Denko 0-16 for hole
23		"O" ring	NBR	1	JIS B2401, P4,
24		"O" ring	NBR	4	AS568-014
25	MY-7	MY packing			
26	G43-2-01	Pressure gauge	SUS304	1	Nagano Keiki
27	G43-10-01	Pressure gauge	SUS304	1	Nagano Keiki

## Replacement parts

Part Number	Part Name
390212	Feedback spring
390218	Assembly plate ø50~100
390233	Assembly plate ø125~160
G43-2-01	0~0.2MPa Pressure gauge
G43-10-01	0~1.0MPa Pressure gauge

## 5 TRANSPORTATION AND STORAGE

### CAUTION:

- Always handle with care.
- Do not leave exposed to weather.
- When this product is shipped from the factory, it is protected by dust proof sealing (vinyl) against infiltration of dust into positioner cylinder. Leave sealing in place after unpacking until ready to connect to the pneumatic circuit.
- When it becomes necessary to store for a period after unpacking, select a storage area free from humidity and corrosive gases. When the product leaves the factory, the surfaces are painted and treated according to product specifications but under unfavorable conditions, corrosion may appear. Be careful of storage environment.

## 6 INSTALLATION

### 6.1 Air supply

#### CAUTION

- If the operating air supply contains dust or there is rust, metal filings or oil in the piping, they can cause clogging in the fixed orifice and faulty spool movements.
- Always supply clean air.

### 6.2 Piping

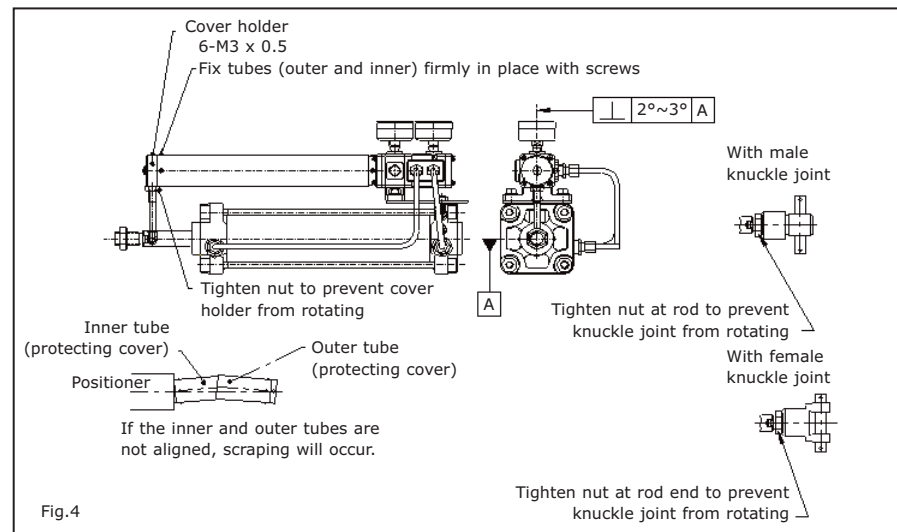
#### CAUTION

- Use copper piping for air supply and transmission of force to avoid corrosion. When connecting piping to positioner, carry out adequate air purging beforehand. Be careful to make correct connections. If high air pressure is inadvertently connected to the input pressure connecting port, the diaphragm will be damaged.

## 6.3 Lubrication

### CAUTION

- The nozzle flapper system has been adopted for the pilot valve and a lubricator should not be used in the supply air line. Furthermore, the positioner can install either lubricating or non lubricating type cylinders.



## 6.4 Installation

### CAUTION

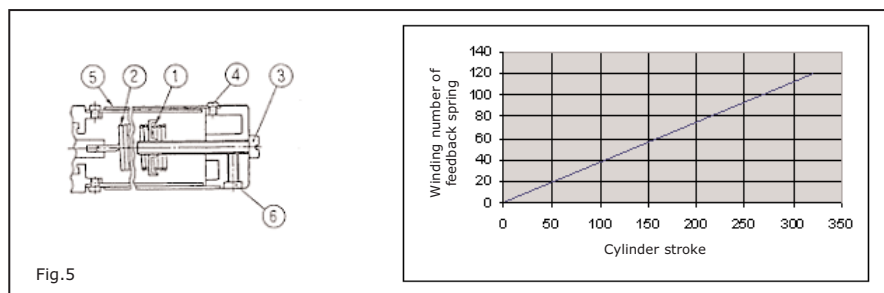
- Do not apply **pressure on the protection cover**. Install the cylinder rod without twisting (See Fig.4). If the cylinder rod is subject to twisting, there is a special anti rotation device that will restrict such twisting from being transmitted to the positioner. Ask for further information.
- This positioner cannot be used to cause cylinder to compress when input signal pressure is increased. It will be necessary to replace with a double rod cylinder or install a reversing relay for the input pressure signal.
- Make installation to keep the lateral load on cylinder bearings below one twentieth of the maximum cylinder force.
- Ask for special instruction when installing in areas subject to vibrations and shocks.

## 7 MOUNTING, SETTING AND PROGRAMMING

### 7.1 Adjusting method

#### CAUTION

- Span adjustment**  
In order to obtain a cylinder stroke corresponding to the pressure signal of 0.02~0.1MPa, the winding number of feedback spring (2) is varied by the span adjusting device (1). When the winding number is increased, the span will expand and when decreased, it will compress. When adjusting span, refer to Fig. 5 and check the winding number to a given stroke.  
Take out the feedback spring (2) and adjust the winding number by adjusting device (1). With the cylinder installed, adjust the zero adjusting screw (3) so that the cylinder will start moving at an input signal pressure of 0.02MPa and increase to 0.1MPa.  
If the cylinder does not reach full extension, increase the number of wiring, and if it over extends, decrease the number of winding. When changing the number of winding, remove the small screw (4) and shift cover (5) toward the left side with the signal pressure increased to 0.1MPa. Zero adjustment must be made when the winding number is changed.



- Zero adjustment**  
Loosen lock screw (6). When the zero adjusting screw (3) is turned right, the cylinder will retract and when turned left, it will extend.

## 8 MAINTENANCE

### WARNING

- Not following proper procedures could cause to the product to malfunction and could lead to damage to the equipment or machine.
- If handled improperly, compressed air can be dangerous. Only qualified personnel should perform assembly, handling and repair of pneumatic system.
- 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

### WARNING

#### Troubleshooting

Fluid	Possible causes	Corrective actions
Cylinder does not move when pressure signal is raised or lowered.	The fixed orifice in positioner is clogged.	Remove orifice and clean with a 0.4 mm pin.
When pressure signal is raised or lowered, operation is jerky.	Piston packing in cylinder is worn.	Replace packing.
	1. Action is not smooth due to object caught in spool. 2. Fixed orifice in positioner is clogged.	1. Clean out the spool. 2. Remove fixed orifice and clean out with 0.4mm pin.
Cylinder will not move at pressure signal of 0.02MPa.	The zero adjustment screw is loosened and is out of place.	Loosen lock screw and adjust zero point with zero adjusting screw.
Cylinder moves at pressure signal below 0.02MPa.		
Cylinder movement corresponding to pressure signal of 0.02~0.1MPa cannot be obtained.	Position of span adjusting device in positioner is not proper.	Remove screw from protection cover and adjust span adjustment device to best position with pressure signal at about 0.06MPa. If span is overextended, decrease spring winding, and if too short, increase spring winding. This adjustment should be made together with zero adjustment.

## 9 EUROPEAN CONTACT LIST

### SMC Corporation

Country	Telephone	Country	Telephone
Austria	(43) 2262-62 280	Italy	(39) 02-92711
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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
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### Websites

SMC Corporation	www.smcworld.com
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