



ORIGINAL INSTRUCTIONS

Instruction Manual

Electro-Pneumatic Positioner

Series IP8#00-0#0-#-X14-#

II 2G Ex h ib IIC T5/T6 Gb
-20°C≤Ta≤+80°C (T5), -20°C≤Ta≤+60°C (T6)
[IP8#00-0#0-#-X14-L = -40°C≤Ta≤+60°C (T6)]

The intended use of the positioner is to accurately control and monitor the position of a pneumatic actuator.

1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) and other safety regulations.
ISO 4414: Pneumatic fluid power - General rules relating to systems.
ISO 4413: Hydraulic fluid power - General rules relating to systems.
IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots -Safety. etc.
• Refer to the product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
• Keep this manual in a safe place for future reference.

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

Warning

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

1.1 ATEX Safety Instructions

ATEX Marking Description	
II 2G Ex h ib IIC T5/T6 Gb	
-20°C≤Ta≤+80°C (T5), -20°C≤Ta≤+60°C (T6)	
[IP8#00-0#0-#-X14-L = -40°C≤Ta≤+60°C (T6)]	
Equipment Group II	IIC - For all types of Gas
Category 2	T5/T6 - Temperature
G - Gas environment	classification
Ex - European standards apply	Gb - EPL
h ib - Intrinsic Safety	Ta - Ambient temperature

Based on conformity assessment carried out by DEKRA Certification B.V.

Certificate Number:	DEKRA 03ATEX1119 X
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If the Certificate number includes an X, special conditions for safe use apply as follows :-

- The Positioner has an aluminium alloy enclosure. When mounted in a potentially explosive atmosphere where the use of category 2 G apparatus is required, it must be installed such that, in the event of rare incidents:
 - a) An ignition source due to impact or friction is excluded.
 - b) An ignition source due to electrostatic charging is excluded (for models with a plastic window).
- When using the positioner in a hazardous area ensure that the operational speed of the moving parts is less than 1 m/s, and that the actuator is not hunting.

1 Safety Instructions (continued)

- Take care during normal conditions of use, maintenance and cleaning to avoid danger of ignition due to electrostatic charging. Do not clean with a soft dry cloth.
- Avoid electrostatic charges on the non-metallic parts and coated parts.

1.2 General Safety Instructions

- Protect the product and electrical cables against all impact or mechanical damage.
- Do not use the product outside of the range of specifications.
- Refer to the Operation manual for further details.

Caution

- Ensure that the air supply system is filtered to 0.3 micron.

2 Specifications

2.1 Specifications

Item	IP8000-0*0-*X14-* Lever type		IP8100-0*0-*X14-* Rotary type	
	Single acting	Double acting	Single acting	Double acting
Input current	4 to 20 mA DC (standard) *1			
Minimum current	235 Ω ±15 Ω (4-20 mA DC)			
Supply air pressure	0.14 to 0.7 MPa			
Standard stroke	10 to 85 mm (Lever angle 10° to 30°)		60° to 100° *2	
Sensitivity	±0.1% F.S. or less	±0.5% F.S. or less		
Linearity	±1% F.S. or less	±2% F.S. or less		
Hysteresis	0.75% F.S. or less	1% F.S. or less		
Repeatability	±0.5% F.S. or less			
Temperature coefficient	0.1% F.S. / °C or less			
Output flow rate	80 L / min (ANR) max. (SUP = 0.14 MPa) *3			
Air consumption	5 L / min (ANR) max. (SUP = 0.14 MPa)			
Ambient temperature and operating fluid temperature	IP8*00-0*0-*X14 = -20°C to 80°C (T5) -20°C to 60°C (T6)			
	IP8*00-0*0-*X14-L = -40°C to 60°C (T6)			
Explosion Protection Construction	ATEX Intrinsic Safety Type of Protection C E 0344 (Ex) II 2G Ex h ib IIC T5/T6 Gb			
Intrinsically Safe Parameters	Ui=28V, Ii=125mA, Pi=1.2W, Ci=0nF, L1=0mH			
Air connection ports	1/4NPT female thread			
Electrical connections	M20x1.5 female thread			
Degree of Protection	JISF8007 IP65 (conforms to IEC 60529)			
Material	Body / Cover: Die cast aluminium (Coating: Epoxy resin baked)			
	Shaft / Screw: Stainless steel			
Weight	Approx. 2.4 kg			

Notes

- *1: 1/2 split range is possible using the standard type (by adjusting the span).
- *2: The stroke is adjustable in 0° to 60° and 0° to 100°.
- *3: (ANR) indicates standard air in accordance with JIS B0120: Temperature 20°C, Absolute pressure 760 mmHg, Humidity 65%.

3 Installation

3.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.
- Protect the product from impact and dropping during installation and when mounted. This may cause product failure.
- Avoid hitting the product with metallic objects.
- Avoid using the product in an environment which can become explosive due to air leakage.
- If the system is in possible danger because of a failure of the positioner, prepare the system with an alternative safety circuit.

3.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water, water or steam are present.
- Do not install in a location subject to vibration or impact in excess of the product specifications.
When the positioner is used in locations subject to vibration, use a suitable cable support to prevent lead wire damage.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product specifications.
- Do not mount the positioner in a location with high humidity and temperature.
- Do not expose to direct sunlight (UV light). Install a suitable protective cover for protection against the effects of direct UV light.
- Do not mount the product near a source of electrical noise.

3.3 Piping

Caution

- Before connecting 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.
- Use de-humified and dust free clean air as the air supply source.

- The Positioner has very fine internal paths. Therefore use dehydrated and filtered clean air, and avoid using lubricant. Use a cleaning system according to No. 4 or higher from the "Compressed Air Cleaning Equipment" listed in the manual for air-supply cleaning systems.
- Avoid using compressed air containing chemicals, synthetic fluid including organic solvent, salinity, and corrosive gas as it may cause malfunction.

Piping Layout – IP8000 Lever type

	Single action	Double action
Normal action	Actuation: The stem moves in the arrow direction when the input current increases. 	Actuation: The cylinder rod moves in the arrow direction when the input current increases.
Reverse action	Actuation: The stem moves in the arrow direction when the input current increases. (Reverse actuation using the normal actuation drive unit). 	Actuation: The cylinder rod moves in the arrow direction when the input current increases.

3 Installation (continued)

Piping Layout – IP8100 Rotary type

	Single action	Double action
Normal action	Actuation: The actuator main shaft turns clockwise when the input signal increases. 	Actuation: The actuator main shaft turns clockwise when the input signal increases.
Reverse action	Actuation: The actuator main shaft turns counter-clockwise when the input signal increases. (Reverse actuation using the normal actuation drive unit). 	Actuation: The actuator main shaft turns counter-clockwise when the input signal increases.

3.4 Lubrication

Caution

- The positioner has a fixed orifice and nozzle, which contain fine internal paths. Use filtered, dehydrated air and avoid the use of lubricants as this may cause malfunction of the positioner. Ensure that the air supply system is filtered to 0.3 micron.

3.5 Handling

- Avoid applying impact to the body and torque motor of the positioner and avoid excessive force to the armature because it may lead to failure. Handle with care during transportation and operation.
- If the positioner is left unused at the operation site for an extended period, ensure the body cover unit is fitted, and mount a plug on the wiring and piping ports. If the atmosphere is of high temperature or high humidity, take measures to avoid condensation inside the positioner. Condensation control measures must be taken thoroughly during export shipment.
- Avoid locations near magnetic fields because the positioner characteristics are affected.
- Be sure to mount the body cover unit when using the positioner. IP65 cannot be guaranteed if the mounting condition of the body cover is incorrect. To achieve the IP rating tighten the cover fixing screws using the appropriate torque (2.8 to 3.0 Nm).

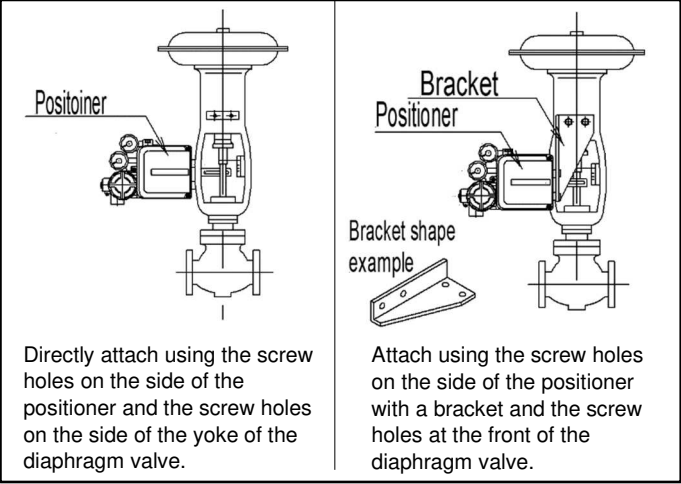
3.6 Mounting

Warning

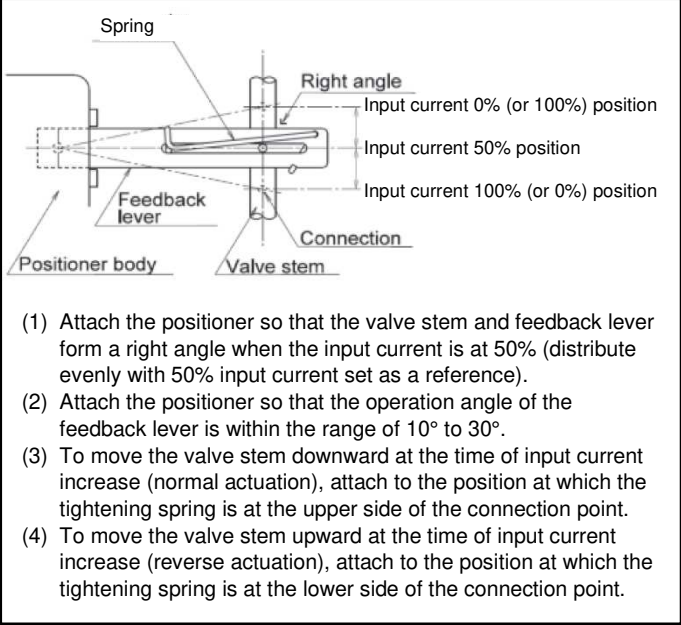
- Check that the positioner is securely mounted on to the actuator.
- Be careful not to get fingers caught when aligning the mounting positions.
- Allow sufficient space around the positioner for maintenance and adjustment during installation.
- Disconnect the supply pressure and ensure compressed air is discharged from the positioner and actuator completely before mounting / dismantling.

3 Installation (continued)

Examples of Mounting – IP8000 Lever type



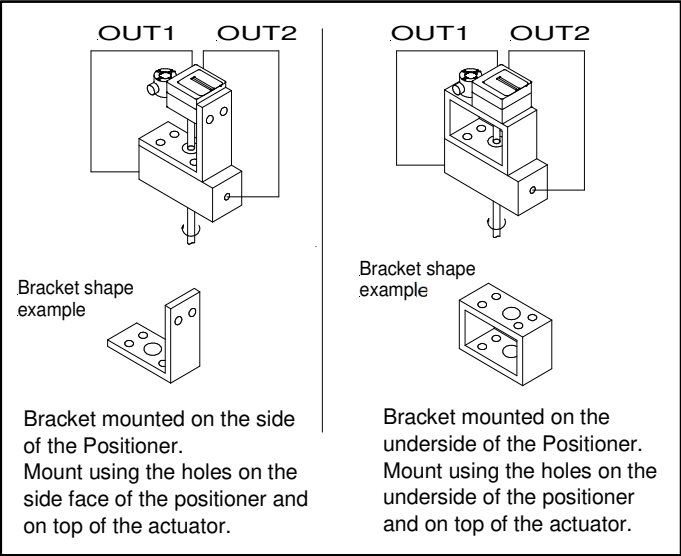
Connection of Feedback Lever



- Do not impact the feedback shaft of the positioner when the feedback lever is connected with the valve stem or installed on the positioner.

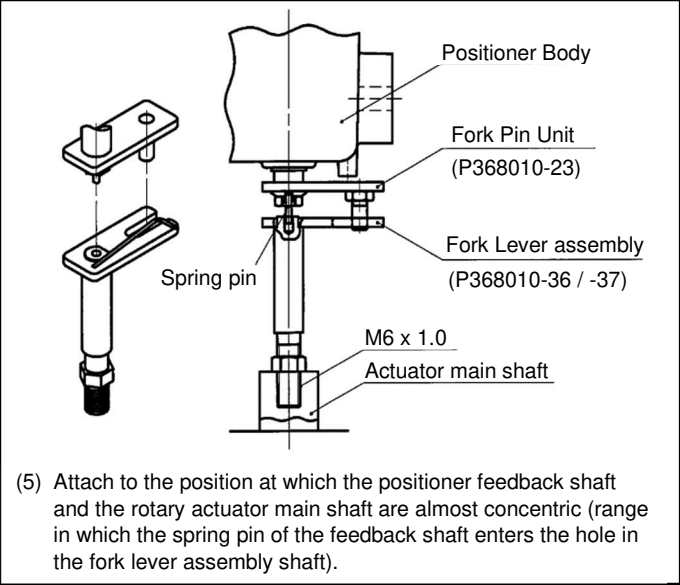
For further details of the feedback lever specifications refer to the operation manual on the SMC website (URL: [http:// www.smcworld.com](http://www.smcworld.com)).

Examples of Mounting – IP8100 Rotary type

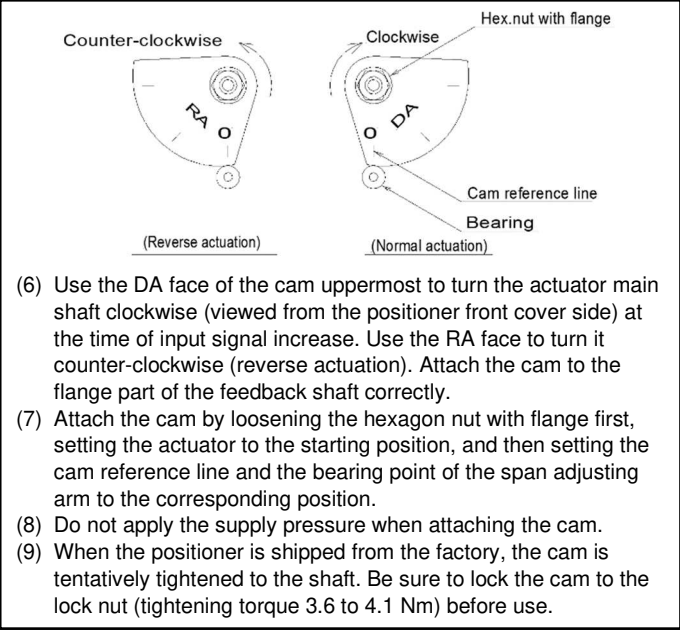


3 Installation (continued)

Connection of Rotary Feedback shaft



Cam attaching procedure



3.7 Electrical wiring

Caution

- Be sure to perform electrical wiring with the input current turned OFF.
- Use a ground connection and perform electrical installation following relevant local regulations, to prevent noise from disturbing the input current and static electricity from damaging the positioner.
- Ground connection wiring to be twisted pair wire 2.63 to 6.64 mm².
- Do not touch around the actuator axis when applying an input current after wiring.
- Use an input current source (4 to 20 mA DC) with a secure 12 V DC or greater voltage as close as possible to the input current terminal to avoid voltage drops.
- An M20 x 1.5 blue explosion proof cable gland is provided for the electrical connection.

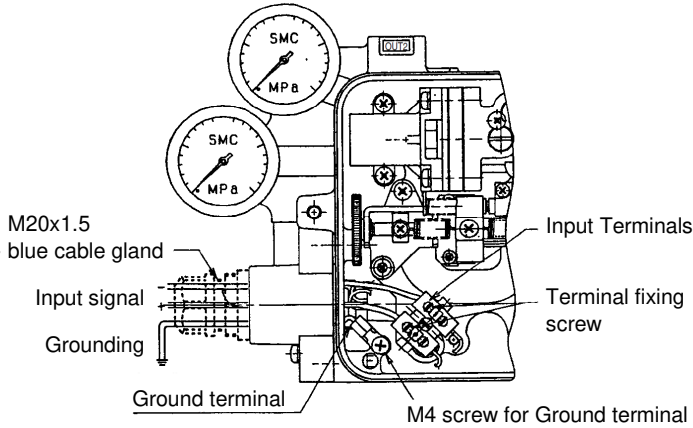
Warning

To use in an explosion protection specification the positioner may only be connected to a certified intrinsically safe electrical circuit with the maximum parameter given in the specifications.

3 Installation (continued)

Wiring Layout

- Remove the positioner body cover.
- Connect the (+) and (-) input signal wiring (0.5 to 1.5 mm²) to the input terminal of the positioner (+) and (-) respectively. The M20x1.5 input port is fitted with a blue cable gland.



For further details of intrinsically safe wiring specifications refer to the operation manual on the SMC website (URL: [https:// www.smcworld.com](https://www.smcworld.com)).

4 Adjustment

Caution

Check the following prior to starting adjustment of the positioner.

- Check that the piping is correctly connected to the pressure supply port and OUT1 and OUT2 ports.
- Check that the positioner and actuator are firmly fixed together.
- Check that the span adjusting lever internal feedback (IP8000) is attached to the correct position (normal or reverse).
- Check for correct use of the cam face (normal or reverse) and that the flange nut is firmly locked (IP8100).
- Check that the auto / manual changeover screw on the pilot valve is locked (fully tightened in the clockwise direction).
- Check that the wires are connected correctly to the (+), (-) and ground terminals.

Zero / Span adjustment

Set the zero and span adjustment of the positioner while referring to the procedure given in the operation manual on the SMC website (URL: <https://www.smcworld.com>).

Caution

- For this positioner the span and zero point adjustment for each actuator is necessary. Adjustment should be done based on each actuator size.
- Keep in mind that the span and zero adjustment interfere with each other.
- Characteristics will change due to changes in the mounting position, ambient temperature and supply pressure.
- If it takes a long time until operation after initial adjustment, check and adjust the positioner.
- Sensitive adjustment is effective only for double acting actuators.
- The manual change function is effective for single acting actuators which are controlled using OUT1.

5 How to Order

Refer to the catalogue or operation manual on the SMC website (URL: <https://www.smcworld.com>) for “How to Order” details.

6 Outline Dimensions (mm)

Refer to the catalogue or operation manual on the SMC website (URL: <https://www.smcworld.com>) for Outline dimensions.

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.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Check the positioner once a year. If excessively worn diaphragms, O-rings or seals are found, or any unit has been damaged, replace them. Treatment at an early stage is especially important if the positioner is used in a place of severe environment like coastal areas.
- If the fixed orifice is clogged with carbon particles or others, remove the pilot valve unit Auto/Manual change over screw (built-in fixed orifice) and clean it by inserting a φ0.2 mm wire into the aperture.
- It is recommended to replace the pilot valve unit every 3 years.

When the pilot valve unit is disassembled, apply a small amount of specified grease to the sliding surface.

- Check for air leaks from the compressed air piping. Air leaks could lower the performance characteristics of the positioner. Air is normally discharged from a bleed port, but this is a necessary air consumption based on the construction of the positioner, and is not an abnormality if the air consumption is within the specified range.

8 Limitations of Use

9.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

Warning

Do not exceed any of the product specifications.

9 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

10 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor/importer.

SMC Corporation

URL : [http:// www.smcworld.com](http://www.smcworld.com) (Global) [http:// www.smc.eu](http://www.smc.eu) (Europe)
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