ORIGINAL INSTRUCTIONS

Refer to Declaration of Conformity for relevant Directives

Instruction Manual
Smart Positioner (Remote type)
Series IP8101-032-W-#-X419-Q

The intended use of the smart 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) *1), and other safety regulations.

*1) 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.

⚠ Caution

- Ensure that the air supply system is filtered to 0.3 micron.
- If the input current is disconnected during use, the output of OUT1 will become 0 MPa and the output of OUT2 will reach its maximum, regardless of the operating direction (parameter code: 200), whether in direct or reverse actuation.
- If reverse operation is selected (in parameter code: 200), when the power supply is turned off, OUT1 output will become 0 MPa and the positioner will start moving toward input current 20 mA DC direction.
- Depending on the parameter settings, the actuator will move erratically when an input current of 4 mA DC is applied.
- There is a capacitor for noise prevention between FG terminal (case) and each input / output terminal of the positioner respectively. Therefore avoid conducting withstand voltage testing or insulation resistance testing between the terminal and case.
- Do not use the product outside of the range of specifications.
- Refer to the Operation manual for further details.

2 Specifications

2.1 Specifications

Item	IP8101-032-W-*-X419-Q
Input current	4 to 20 mA DC *1 (2 wire system, separate power source not necessary)
Input feedback signal	4 +/-1 to 20 +/-1 mADC
Piping length	10 m or less
Tube size	O.D.: 8 mm, I.D.: 5 mm
Minimum current	3.85 mADC or more
Voltage between terminals	12 VDC (Input resistance equivalent to 600 Ω at 20 mADC)
Max supply power	1 W *2 (I_{max}:100 mADC, V_{max}:28 VDC)
Supply air pressure	0.3 to 0.7 MPa
Sensitivity	+/-0.2 (%) F.S. or less *3
Linearity	+/-8 (%) F.S. or less *3 (general linearity measurement without noise interference is +/-1% F.S. or less)
Hysteresis	0.5 (%) F.S. or less *3
Repeatability	+/-0.5 (%) F.S. or less *3
Temperature coefficient	0.05% F.S. / °C or less *3
Max output flow rate	200 l / min (ANR) or more, (SUP = 0.4 MPa) *4
Air consumption	11 l / min (ANR) or less (SUP = 0.4 MPa) *4
Ambient temperature and operating fluid temperature	-20°C to 80°C *5, *6
Degree of Protection	JISF8007 IP65 (conforms to IEC 60529)
Air connection ports *7	Rc1/4 female thread, (or 1/4 NPT or G1/4)
Electrical connections *7	M20 x 1.5 female thread (or G1/2 or 1/2 NPT)
Material	Body / Cover: Die cast aluminium （Coating: Epoxy resin baked）
	Screw: Stainless
Weight	Approx. 2.6 kg

2.2 Specification of Options

Alarm output1, 2 *8	
Wiring method	2 wire system
Power supply voltage	10 to 28 VDC
Load current	10 to 40 mADC *9
Internal Resistance	R = 350Ω +/-10 (%)
Current leakage *10	0.5 mADC or less
Response time	50 msec or less
Analogue output *11, *12	
Wiring method	2 wire system
Supply voltage	10 to 28 VDC
Output current	4 to 20 mADC
Load resistance	0 to 750 Ω
Accuracy	+/- 0.5 (%) F.S. or less *13

Notes

∗1: 1/2 split range is available using the split range setting (parameter code: 300).

∗2: <Ex.> When applying an input current of 80 mADC, a power supply voltage of 12.5V DC or less can prevent damage to the positioner.
Max. supply power = 80 mADC x 12.5 VDC = 1 W

∗3: Linearity is a characteristic verified using SMC's inspection machine (with built-in sensor shown in Table 3) with no load. The positioner does not function as a single unit, but as a part of a loop including driving equipment such as valve(s), actuator(s), DCS, etc. For this reason the characteristic varies depending on the loop conditions. The temperature coefficient does not include the temperature coefficient of an external sensor.
The linearity of +/-8% F.S. or less is based on measurements during EMC testing, measured under certain electrical noise conditions.

2 Specifications (continued)

∗4: (ANR) shows standard air in accordance with JIS B0120.

∗5: The visibility of LCD display may be reduced at lower temperature. This does not affect the positioner operation.

∗6: Voltage between terminals depends on temperature change.

∗7: Connections can be selected from “How to Order".

∗8: When no input current has been applied, an alarm is output. Fig. 1 shows an internal alarm circuit of the IP8101.

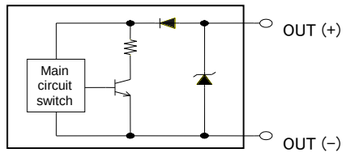


Fig.1

∗9: 10 mA or more load current is needed to operate the main circuit of the internal switch, and it should be 40 mA or less to protect the internal resistance circuit. Therefore, use a power supply voltage and load resistance with a load current of 10 to 40 mA when the output is on (refer to -Electrical wiring).

∗10: The required current consumption to drive the main internal switch circuit.

∗11: Connect a load resistance with consideration given to the minimum power supply voltage (refer to -Electrical wiring).

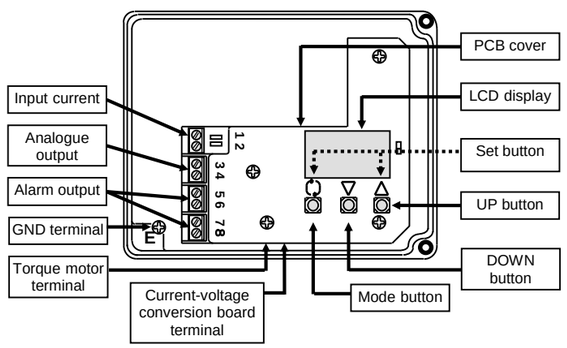
∗12: If the input current is cut while analogue output source voltage is supplied, analogue output current before the cut is maintained.

∗13: Analogue output accuracy to position value (P value) in the LCD display.

2.3 Specification of External (Remote) Sensor

Item	Requirements
Linearity	+/- 0.05 (%) F.S. or less
Resolution	0.01 (%) F.S. or less
Repeatability	+/-0.01 (%) F.S. or less
Output signal	4 to 20 mA DC

3 Names of Individual parts



4 Installation

4.1 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.

4.2 Environment

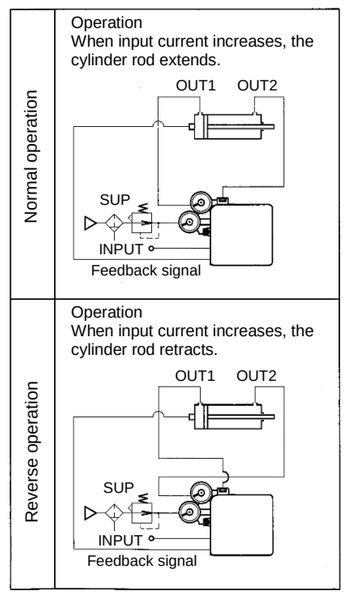
⚠ Warning

- Do not use in an environment where corrosive gases, chemicals, salt water, water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product specifications.
- Do not use in a location with high humidity and temperature.
- Do not mount the product near a source of electrical noise.

4.3 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.
- Tighten fittings to the specified tightening torque.
- 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**



4 Installation (continued)

4.4 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.

4.5 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.
- 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 screws with the appropriate torque (2.8 to 3.0 Nm).
- When the External scale plate (option H) is selected, the scale plate indicator moves with the actuator. Take care to keep hands clear during actuator operation.

4.6 Mounting

Warning

- Check that the positioner is securely mounted.
- Be sure to keep the necessary space available for maintenance (piping, wiring, adjustment, etc.) during installation.
- Disconnect the supply pressure and ensure compressed air is discharged from the positioner and actuator completely before mounting.

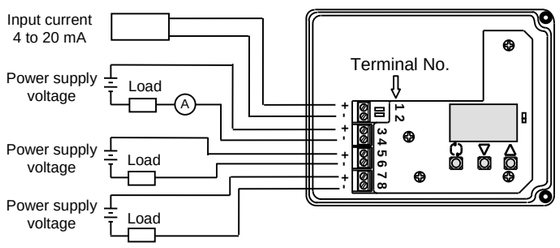
4.7 Electrical wiring

Caution

- Be sure to perform electrical wiring with the input current turned OFF.
- Be sure to use a ground terminal and perform electrical installation following relevant local regulations.
- 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.

1) Remove the positioner body cover.
2) Connect the input current wiring from a meter (controller) and connect each output wiring as shown:

- **Wiring with Output functions**



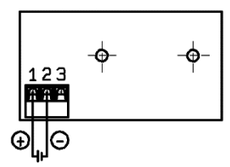
4 Installation (continued)

Terminal No.	Description	Wire diameter	Remarks
1	4 to 20 mA input current	0.14 to 1.5 mm^2 stranded wire (AWG26-14).	Minimum input current required for operation = 3.85 mA
2			
3	Analogue output		Output range: 3.85 to 24 mA
4			
5	Alarm output 1		–
6			
7	Alarm output 2		
8			

For further details of compatible analogue output and alarm output specifications refer to the operation manual on the SMC website (URL: http// www.smcworld.com).

- **Wiring of External (remote) sensor**

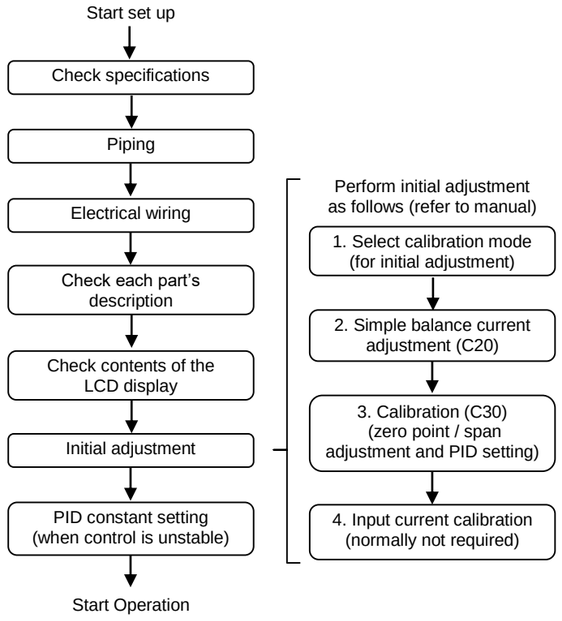
1) Refer to the specifications table for the compatible sensor.
2) Be sure to perform grounding as a countermeasure against malfunction due to noise and from damage due to static electricity.
3) Connect the input feedback signal from the external sensor to the current-voltage conversion board shown, which is located under the main circuit board.



Terminal 1: + Terminal 2: - Terminal 3: FG connection

5 Settings

The work flow from set-up to initial adjustment of the IP8101-032-W-#-X419-Q remote positioner is shown below. Follow this flow when performing set up and adjustment of the positioner.



6 How to Order

Refer to the SMC website (URL: https://www.smcworld.com) for "How to Order" details.

7 Outline Dimensions (mm)

Refer to the SMC website (URL: https://www.smcworld.com) for Outline dimensions.

8 Maintenance

8.1 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.
- Do not disassemble the product, unless required by installation or maintenance instructions.

- Check the positioner once a year. If excessively worn diaphragm, O-rings or seals are found, or any unit has been damaged, replace with new units. 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 switch screw (built-in fixed orifice) and clean it by inserting a φ0.2 wire into the aperture. If it must be replaced with new one, stop the supply pressure and remove the stopper screw of the pilot valve unit.
- When disassembling the pilot valve unit, apply a small amount of specified grease to the sliding surface.
- Check for air leak 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.

9 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.

10 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.

11 Contacts

Refer to www.smcworld.com or www.smc.eu for contacts.

SMC Corporation

URL : http// www.smcworld.com (Global) http// www.smc.eu (Europe)
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Specifications are subject to change without prior notice from the manufacturer.

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