

Installation and Maintenance Instructions for ZX11 Non-Sparking High Purity Transmitter



Cautions for proper and safe operation. To use this product safely, please read this instruction manual carefully. Incorrect operation may cause malfunction, damage or accident. The cautions and warnings in the document are indicated by the following:



⚠ WARNING: Indicates that incorrect use may result in service injury or loss of life.

⚠ CAUTION: Indicates that incorrect use may result in service injury or property damage.

⚠ WARNING:

1. Do not apply pressure greater than the maximum allowable pressure. This may cause damage or rupture the pressure element, resulting in injury or damage to the surroundings.
2. Do not use this product to measure fluid which causes gas/liquid contact area to corrode. This may cause damage or rupture the pressure element, resulting in injury or damage to the surroundings.
3. Do not apply excessive weight, vibration or shock. This may cause damage or rupture the pressure element, resulting in injury or damage to the surroundings.
4. Use of a non-designated power source may cause fires or electric shocks.
5. Use this device within the operating temperature range. Using the instrument outside of the recommended operating temperature range may cause malfunction or damage and result in injury or damage to the surroundings.
6. Perform wire connection according to the wire connection faceplate or the wire connection instructions within the instruction manual. Incorrect wiring may cause injury or fire.
7. Use explosion-proof product when required or explosive gas exists; this is due to the potential of ignition or explosion.
8. Use instruments that have been properly cleaned and are free of oil when the process media is oxygen. Standard (uncleaned) product may contain oil; contact with oxygen can result in ignition and/or explosive reactions.
9. Perform installation according to the instruction manual.

10. Do not alter this product in any manner or form. In addition, **do not disassemble this product**. Contact Ashcroft for repairs.

11. Since this product is a precision measuring instrument, it is advised that the product be removed from all sources of noise. Remove noise from the power source by using noise filter, etc.

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1. INTRODUCTION

Please double-check the specifications for the model that you have received.

If specifications such as the pressure range, power source, or output are incorrect, accidents can occur. Please be sure to use a model that is appropriate for your specifications, in a location which is appropriate for your usage environment, and which has been correctly wired and installed.

2. ATTENTION

Ashcroft shall have no liability for failure, product issue, or physical injury resulting from the following:

- Modification and repair performed by any non-Ashcroft personnel.
- Product issue caused by product of another company
- Misuse of product instructions, instrument operation and/or not observing conditions/methods stipulated within the instruction manual.
- Natural disasters, such as fire, seismic activity, water/flood damage, lightning, etc.

3. GENERAL DESCRIPTION

This pressure transmitter is developed for the semiconductor industry. In contrast to conventional transmitters, this product offers a compact and lightweight design. Pressure is converted into electric signals and transmitted by the sensing portion equipped with strain gauges and a built-in electronic circuit. The ZX11 transmitter complies with the stated IECEx and ATEX directives. This product can be used without a safety barrier within environments (Zone 2/Category 3G) where gas (Gas group II A/B/C and Temperature class T4/T5/T6.) may exist.

TYPE

ZX11

PRESSURE TRANSMITTER

IECEx CML 20.0057X
CML 19ATEX4524X
Ex nA II C T4/T5/T6 Gc
0°C ≤ Ta ≤ 60/50/35°C

RANGE : -0.1/0.5MPa

POWER : 15~24VDC

OUTPUT: 4~20mA

LOAD : 250~700Ω

No. : 123456R

DATE : 11.2019

ASHCROFT

250 East Main Street
Stratford, CT 06614
MADE IN JAPAN



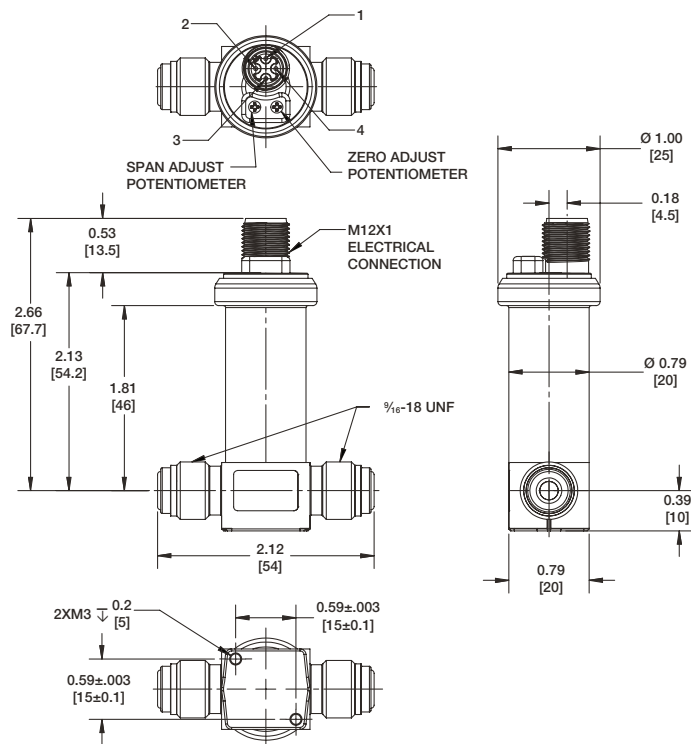
Operating Temperature

T4: 32/140 °F (0/60 °C)

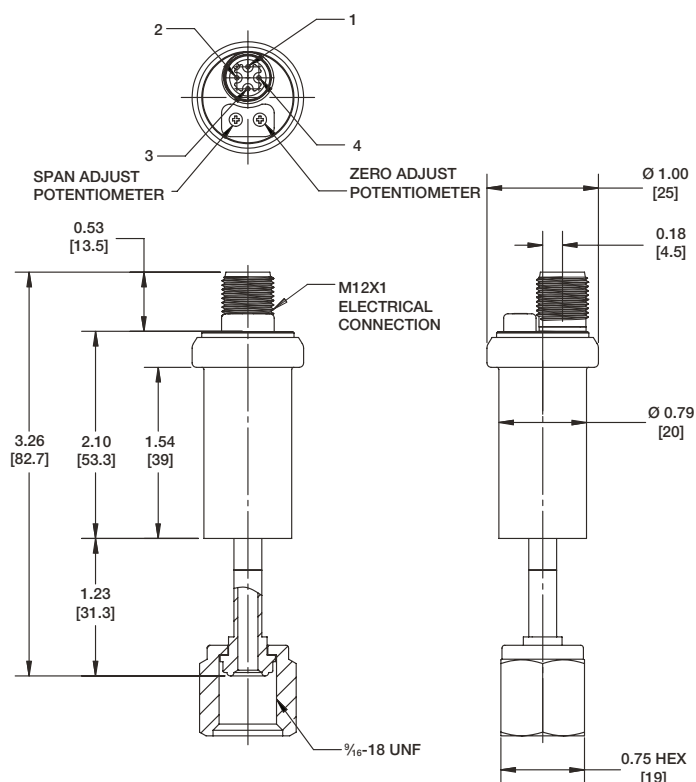
T5: 32/122 °F (0/50 °C)

T6: 32/95 °F (0/35 °C)

4. OUTLINE DRAWINGS: ZX11 Male Flow-Thru



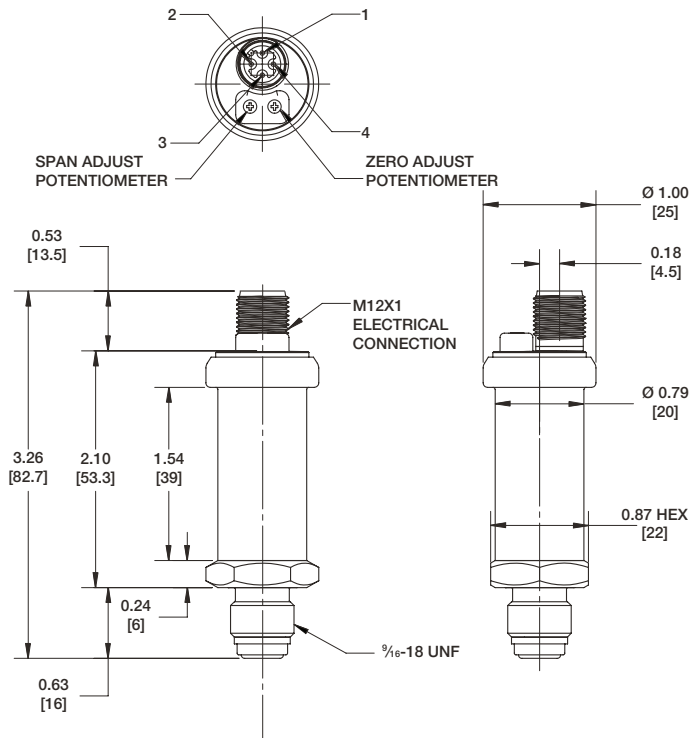
OUTLINE DRAWINGS: ZX11 Female Swivel



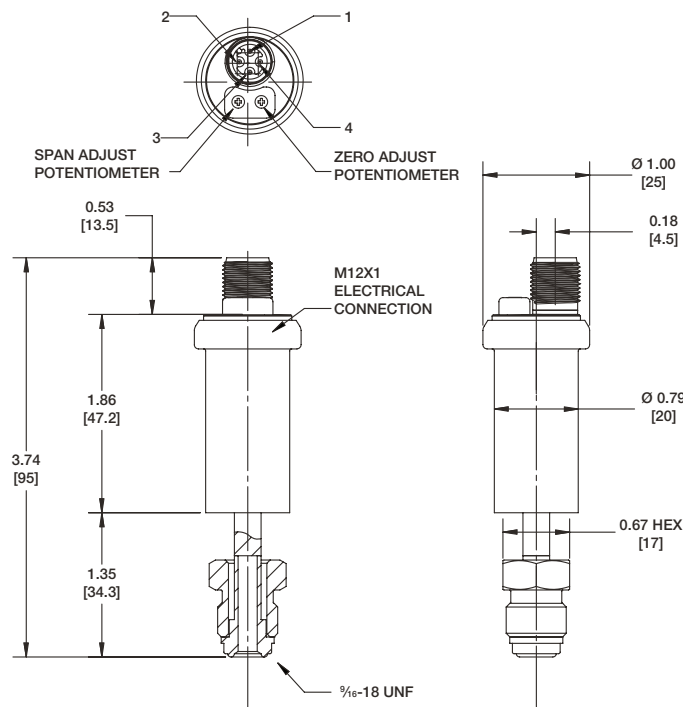
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OUTLINE DRAWINGS: ZX11 Male Fixed



OUTLINE DRAWINGS: ZX11 Male Swivel



5. PRECAUTIONS FOR USE

5.1 Transportation Precautions



CAUTION:

This is a precision measuring instrument. Do not drop or impact when transporting as shock may cause damage and render the instrument inoperable.

5.2 Unpacking Precautions



CAUTION:

- Check packaging appearance prior to unpacking.
- Carefully handle and do not drop unit carton.
- Open instrument's sealed bag in a clean environment. Do not expose Pressure Transmitter's gas contact parts to moisture, dust, etc.
- Upon unpacking, inspect unit to verify that the model type and physical appearance are correct and free from damage.
- Contact distributor or Ashcroft if any abnormality has been identified with the product.

5.3 Installation Precautions

(1) ZX11 pressure transmitter is equipped with a union connection that is compatible with a VCR fitting. For installation, make sure to use hexagonal flats to tighten fitting. Do apply force to the unit enclosure when attached to the pressure line.

(2) This product has protection class IP67 (connector mating state/JIS C 0920).

For longer-term operation, select a location that is not exposed to direct sunlight, condensation, dust, oil or water. In addition, please pay particular attention to the following during installation.

- Do not drop or impact unit as shock may render unit inoperable.
- Do not install product in an environment exposed to vibration, impact, direct sunlight or dust.
- Use product in ambient temperatures between 0 to 140 °F (0 to 60 °C)
- Allow for space around the instrument for maintenance and adjustment.
- Do not touch or breathe on the gas contact parts, while taking care not to damage the Indicates that incorrect use may result in service injury or loss of life.seat surface.



CAUTION: Do not apply excessive force to the enclosure during installation.

- ⚠ WARNING:**
- Take care not to block the air inlet on the top of the instrument (Refer to “5. Outline drawings”). Unit will not provide prescribed performance if the air inlet is obstructed/ blocked.
 - Do not apply excessive force or excessive bending to the cable once the connector is attached to the product and the mating connector.
 - Snoop test of the sensor part should be avoided as this may cause an insulation resistance defect.
 - Prior to commencing operation, it is recommended to purge the unit with sufficient inert gas. This will remove any atmospheric component, particles, and/or foreign matter within the pipe

5.4 Storage Precautions

- To avoid failure or damage, do not store product under the following conditions:
- Do not expose to water
- Susceptible to adverse effects due to air pressure, temperature, humidity, ventilation, sunlight, particles, salt or sulfur in the air
- Do not expose to inclination, vibration or shock (including during transportation)
- Do not expose to chemicals (chemicals' storage area) or gas
- Do not expose to direct sunlight or high temperature
- Deformation and discoloration of resin parts may occur when product is stored in a sealed bag under high temperature and high humidity environments.

6. WIRING

6.1 Wiring schematic of mating connector

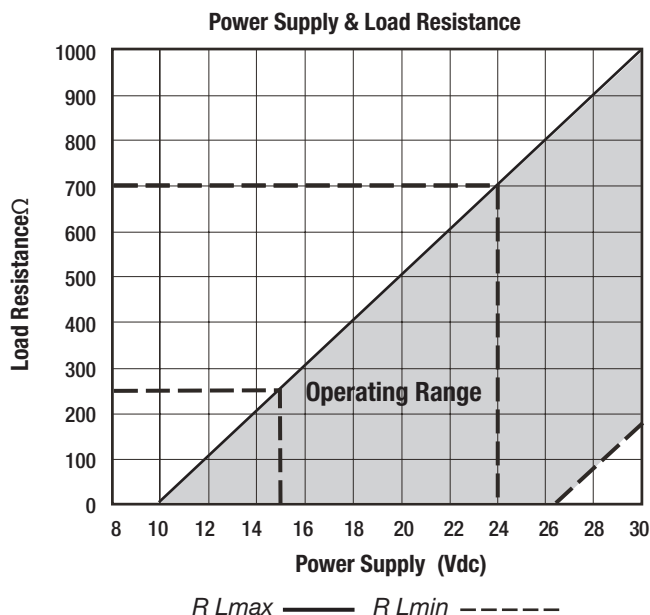
Wire connection and external connection should be carried out as follows.

Insert the cable with M12 connector (optional) while aligning to the connector groove on the instrument. Hand-tighten until the nut does not move. [Tightening torque: 0.4 to 0.5N·m]

CONNECTOR TERMINAL ARRAY	TERMINAL ARRAY	2-WIRE SYSTEM	CABLE COLOR
	1	Power Source +	Brown
	2	—	White
	3	Power Source -	Blue
	4	—	Black

6.2 Load Resistance

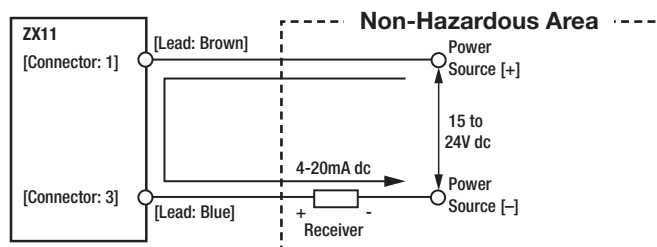
Refer to the following chart for relationship between load resistance and power supply voltage.



$$\text{Maximum load resistance } R_{Lmax} = \frac{E(V) - 10(V)}{0.02(A)} (\Omega)$$

$$\text{Minimum load resistance } R_{Lmin} = \frac{E(V) - 26.4(V)}{0.02(A)}, R_{Lmin} \geq 0(\Omega)$$

[Current output: 4 to 20 mA DC (2-wire system)]



When connecting equipment that can generate surge from the same power supply, it is recommended that a voltage-dependent resistor (varistor) be connected to the pressure transmitter for protection. In addition, take the following precautions when wiring:

- Do not pull or bend the cable with excessive force.
- When mounting, check the specification rating of the product and determine the power supply rating to be used. Once the product load resistance has been verified, use the

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connected device's internal resistance within its rated range.

CAUTION:

- When soldering, take care that the soldering iron does not touch the sheath of the case or cable.
 - Product protection class IP67 may be impaired if the tightening nut for the cable to the M12 connector (optional) proves insufficient. Be sure to tighten securely to counter possible vibration; tightening torque: 3.54 to 4.43 in. lb.
- Do not perform any wiring procedures when powering the unit.

6.3 Specifications of the cable with M-12 connector (optional)

If using a connector that has not been supplied by Ashcroft, please make sure your connector meets the following specifications.

CONNECTOR TERMINAL ARRAY	PUR Cable (Oilproof)	PVC Cable (Stainless Nut)
Straight		
L Type		
Material	(1) Zinc die-casting (nickel-plated) (2) TPU (Green) (3) PUR	1) Stainless (2) TPU (Black) (3) PVC
Cable Length (L)	2 m or 5 m	2 m or 5 m
Conductor Cross Section	0.34 mm ² (22AWG)	0.34 mm ² (22AWG)
Core Diameter Including Insulation	1.27 mm	1.52 mm
External Cable Diameter	4.7 mm	5.2 mm

* The protection structure of the cable with M-12 connector is protection class IP67 or higher in a mating state.

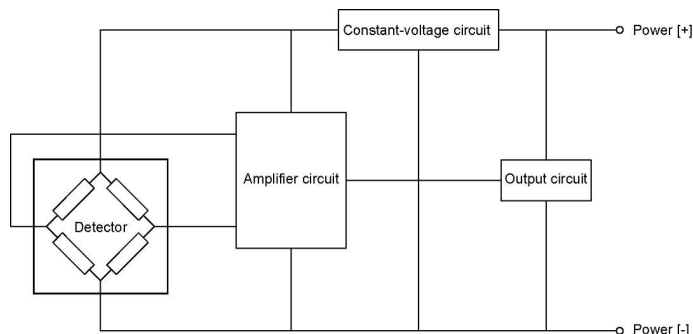
CAUTION:

The cable is comprised of a 4-wire system (white, black, blue, brown), however, the white and black wires are not used.

7. Principle of Operation

The transmitter's sensing diaphragm converts pressure to an electrical signal by use of strain gages. The circuit is a full-bridge system where the strain gages are positioned on all four bridge sides and detect the amount of strain. An electrical signal, in proportion to the strain amount, is then amplified to a specific value by the electrical circuit and transmitted as direct current output.

Block diagram (4 to 20 mA DC/2-wire system)



8. Zero and Span Calibration

- Prior to powering the unit, double-check to make sure all wires have been properly connected. Verify that voltage and amperage ratings of the power supply and internal resistance of the external adaptation equipment are within the rated range of the instrument's load resistance. Lastly, re-confirm that the pressure transmitter has been installed within an operating environment that complies with the explosion-proof specification.
- Zero adjustment can be performed once the unit has been powered for a 15-minute warm-up period. Zero adjustment can be performed by removing the rubber plug located at the top of the enclosure. Refer to "9-2. Adjustment" (below) to adjust properly.

Observe the following precautions while operating:

- Do not apply any pressure above that referenced on the product's label.
- Do not adjust wiring or insert/remove the connector while the device is powered, as this may damage the device and/or cause an electric shock. All wiring should be connected in accordance to the product wiring diagrams.
- If used with corrosive gas, it is highly recommended that the pressure transmitter be fully purged with nitrogen gas prior to being removed for maintenance or other servicing. Leaving corrosive gas within a device will accelerate corrosion by forming strong acid or alkaline substance generated internally by moisture or oxygen within the atmosphere.

CAUTION:

WARNING:

9. Maintenance and Adjustment

9.1 Maintenance

Routine inspection should be conducted at least once every 6 months with device recalibration or zero adjustment being performed as necessary. Product should only be inspected by properly trained personnel.

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Be sure to recalibrate the device using a set method or recalibration standards. Take special care not to effect the explosion-proof performance of the instrument when inspecting in a hazardous area. The following is a routine inspection checklist for your reference and use

Routine Inspection Checklist

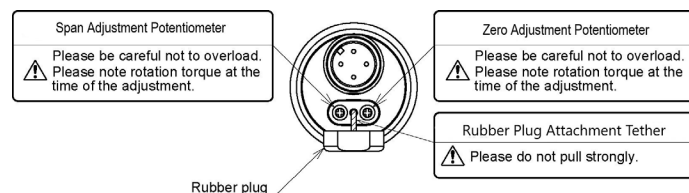
- Physical Appearance (scratches, cracks, warping, corrosion, etc.)
- Corrosion status of pressure inlet
- Clogging of the air inlet
- Leak test for the connection points and re-tightening of connecting screw
- Check and tighten all instrument screws
- Insulation resistance between each terminal and case (at 100 M Ω or more/50 V DC or less)
- Output check by a pressure reference device and measuring instrument

CAUTION:

- Avoid electrostatic discharge.
- Use a soft cloth moistened with water to only clean the external parts of the instrument. Do not use thinner, benzene, etc. which cause deterioration and failure.

9.2 Adjustment

Remove the rubber plug (tethered plug) mounted to top of the enclosure.



CAUTION:

- The rubber plug is equipped with a simple tethering function, however if it is pulled strongly, the function is impaired. Please be careful not to pull too much more than necessary [<17 in. lb.].

The “Z” on the rubber plug indicates the position of the potentiometer for Zero adjustment, and the “S” indicates the position of the potentiometer for Span adjustment.

CAUTION:

- Do not attempt adjustments if product is wet. Do not allow water to enter the product as this can lead to damage and/or accidents.
- Make adjustments once the product has been powered and allowed to warm up for 15 minutes (recommended 30 minutes).



CAUTION:

- Zero and span adjustment are performed by rotating zero/span potentiometer with resin or ceramic Phillips screwdriver. Be careful not to mistake the position and orientation of each adjustment.
- Avoid placing an excessive load [within 5N, 10 sec.] on the zero/span adjustment potentiometer as this can lead to damage.
- Be extremely careful not to cause a short circuit with the screwdriver.
- Use properly calibrated and traceable instrumentation to verify adjustments.

(1) Zero adjustment

Zero adjustment is performed by rotating zero/span adjustment potentiometer shown in the figure (Page 9) with Phillips screwdriver.

Note: Refer to the following directions as the adjustment method for positive and compound ranged products differ.

[Positive pressure range]

Be sure that the applied pressure to the sensor has been returned to atmospheric pressure (no pressure) state; adjust the sensor output at this time to 4 mA DC.

[Compound range]

Be sure that the applied pressure to the sensor has been released to atmospheric pressure (no pressure) state; adjust the sensor output at this time to the value calculated by the following:

- Output 4 to 20 mA DC (current output)

$$[\text{Output mA DC in atmospheric pressure state}] = [16 \text{ mA DC}] / ([\text{Upper limit output in range (MPa)}] - [-0.1 \text{ MPa}]) \times 0.1 + [4 \text{ mA DC}]$$

e.g.) $<0.5 \text{ MPa, Compound range: } 6.67 \text{ mA DC} > / <1.0 \text{ MPa, Compound range: } 5.45 \text{ mA DC} >$



CAUTION:

- Do not rotate span adjustment potentiometer during zero adjustment.
- Avoid putting an excessive load, >44 in. lb., 10 sec., on the zero/span adjustment potentiometers as this may result in damage.

(2) Span adjustment

When attempting span adjustment with a pressure reference device, please follow the instructions listed below.

Zero/span adjustment is performed by rotating zero/span adjustment potentiometer with a slotted screwdriver as shown in the following figure.

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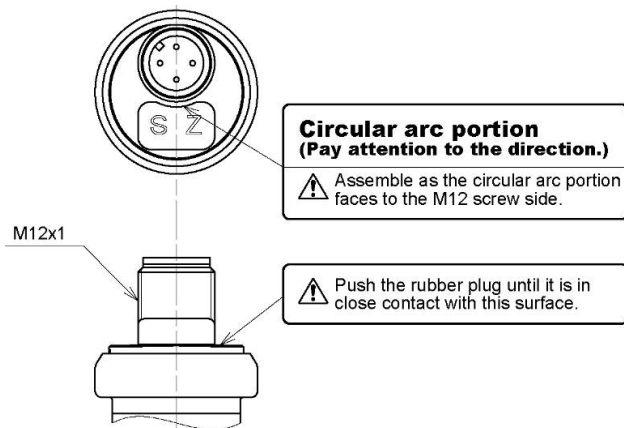


- a. Adjust the zero point output in the same way as [(1) Zero adjustment].
- b. Accurately apply pressure upper limit in the pressure range, and then adjust the output to 20 mA DC in span adjustment potentiometer.
- c. Repeat several times alternating Step a and b to make the span adjustment.

- Do not change zero adjustment while rotating span adjustment potentiometer.
- Avoid putting an excessive load, >44 in. lb., 10 sec., on the zero/span adjustment potentiometers as this may result in damage.
- Do not apply pressure above the pressure range indicated on the device label.

CAUTION:

After the adjustment, please be sure to attach the rubber plug by referring to the figure below.



The “Z” on the rubber plug indicates the position of the potentiometer for zero adjustment, and the “S” indicates the position of the potentiometer for span adjustment.

CAUTION:

- Ensure rubber plug has been returned to its original position to retain product protection class integrity. Protection class may be impaired if the rubber plug is not firmly affixed.

10. WARRANTY

If the delivered products within the warranty period (within one year from the delivered date) are determined to be non-conforming products according to “Defects due to the design or manufacturing”, they are repaired or replaced with conforming products free of charge.

However, note that the following cases are excluded.

- (1) Where the delivered products are disassembled, altered or where their parts are replaced or new function is added by the customer or any third party

- (2) Where directions described in the instruction manual or catalog are not observed.
- (3) Where the non-conformance is caused by deterioration due to use, natural disaster, fire or other force majeure events
- (4) The secondary damage caused by non-conformance of the products including the above.

Returned units are subject to evaluation by Ashcroft prior to determining warranty.

11. OTHERS

This instruction manual is not intended to cover all equipment and/or installation and maintenance details. Please contact Ashcroft if additional detail is sought, or in the event that the instrument does not adequately serve your company's intentions.

Additionally, this instruction manual may be changed, at any time, without prior notice for the purposes of version upgrades, revisions etc.

Thank you for your understanding and cooperation.

