

Description

The Low Pressure Transducer can be used to measure positive, negative or differential pressure in the ranges of 0.5"wc to 12"wc. The piezoresistive sensor is ideal for monitoring the pressure for air or other clean inert gas and is limited only to those media which will not attack polyetherimide, silicon, fluorosilicone, silicone, EPDM and neoprene seals. It features field selectable pressure ranges and output signal types for the most flexible application. Typical HVAC applications include monitoring of filter differential pressure or clean room pressure. The output signal is factory calibrated and temperature compensated for highest startup accuracy and trouble-free operation.

Before Installation

Read these installation instructions carefully before commissioning the Pressure Transducer. Failure to follow these instructions may result in product damage. Do not use in an explosive or hazardous environment, with combustible or flammable gasses, as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Use electrostatic discharge precautions during installation and do not exceed the device ratings.

Mounting

Mount the Pressure Transducer on any surface using the two holes on the base of the unit. Ensure there is enough space around the unit to connect the pressure tubing without kinking and avoid locations with severe vibrations or excessive moisture. Mount the enclosure with two screws but do not over-tighten. It may be mounted in any position but typically is installed on a vertical surface with the pressure ports on the right and the cable entrance on the left. The enclosure has a standard 1/2" conduit opening and may be installed with either conduit and a conduit coupler or a cable gland type fitting.

Wiring Instruction

The transmitter has standard screw block connectors and easy wire access to facilitate wiring. It is recommended that shielded twisted pair wiring at least 22 AWG be used for all connections and that the device wires not be run in the same conduit with wiring used to supply inductive loads such as motors. Disconnect the power supply before making any connections to prevent electrical shock or equipment damage. Make all connections in accordance with national and local electrical codes.

The device power (12-28 Vac or 16.5-35 Vdc measured at the transmitter) is connected to the terminal marked **PWR**. This terminal is used for the positive dc voltage or the hot side of the ac voltage. The device is reverse voltage protected and as such will not operate if connected backwards.

For voltage output signal types (3-wire) or for AC power supply operation (3-wire), the common of the power supply is connected to the terminal marked **COM**. Note that this device has a half-wave type power supply which means the power supply common is the same as the output signal common. Therefore, several devices may be connected to one power supply and the output signals all share the same signal common. Use caution when grounding the secondary of an ac transformer or when wiring multiple devices to ensure that the circuit ground point is the same on all devices and the controller. This terminal is not used for loop-powered 4-20 mA output type (2-wire).

The analog output signal is available on the **OUT** terminal. This signal is jumper selectable for either a voltage output or a standard loop-powered 4-20 mA output signal type. When voltage mode is selected, either 0-5 Vdc or 0-10 Vdc can also be selected. These options are clearly indicated on the device circuit board. The analog output signal is typically connected directly to the Building Automation System (B.A.S.) and used as a control parameter or for logging purposes.

For voltage type output signal the device has a minimum load that it is able to drive, similarly for current type output signal the device has a maximum load that it is able to drive with a particular power supply voltage. Observe and follow these ratings in the Specification section or inaccurate reading may result. The 4-20 mA output signal can easily be converted to a 1-5 Vdc signal for controllers accepting this type of input. Simply insert a 250 ohm (0.1% is best) resistor between the "+" and "-" inputs of the controller. This will convert the 4-20 mA signal to the desired 1-5 Vdc.

Pneumatic Connections

The two pressure ports on the end of the enclosure are labeled **High** and **Low**. The output signal reads a positive value when the port pressure is higher on the **High** port than the **Low** port so ensure these ports are connected correctly. Use 0.170" I.D. flexible tubing for the pressure connections. Arrange the tubing to minimize stress on the connections and ensure there are no kinks in the tubing. For most accurate measurements, do not leave the **Low** port open to the atmosphere, run a return line from the **Low** port to the vicinity of the point being measured.

Ensure the tubing to be used is clean and do not allow material to fall into the pressure ports as contamination could damage the sensor. When removing tubing use care to avoid breaking the ports. In some cases it is better to cut the tubing off rather than pulling it off but be careful not to cut the fitting or an air leak may occur.

Configuration

The transmitter is configured with push-on type jumpers located on the circuit board as shown on the pcb drawing. These jumpers are used to select the output signal type and the input pressure range.

The unit is factory configured to operate in the 4-20 mA output mode. This can be changed to the voltage mode by moving the three jumpers from the position marked **Current** to the positions marked **Voltage**. Before moving these jumpers, study the current jumper position and then move the jumpers to the new position. If these jumpers are rotated 90 degrees and installed incorrectly the product will not work and device damage may occur. Once the output mode is changed to voltage, the output scale may be changed to either 0-5 Vdc or 0-10 Vdc. This is done by moving the single jumper to the **5V** or **10V** position. The pressure range is set by moving a jumper to the appropriate range. The available ranges are marked 1-4 on the circuit board. The pressure ranges are shown in the following chart:

Jumper Setting	Pressure Range								
	LP2A00	LP2A01	LP2A02	LP2A03	LP2A04	LP2A05	LP2A06	LP2A07	LP2A08
1	±0.5" wc	±1.5" wc	±2" wc	±2.5" wc	±3" wc	±100 Pa	±250 Pa	±400 Pa	±500 Pa
2	±1" wc	±3" wc	±4" wc	±5" wc	±6" wc	±200 Pa	±500 Pa	±800 Pa	±1000 Pa
3	0-1"wc	0-3"wc	0-4" wc	0-5" wc	0-6" wc	0-200 Pa	0-500 Pa	0-800 Pa	0-1000 Pa
4	0-2"wc	0-6"wc	0-8" wc	0-10" wc	0-12" wc	0-400 Pa	0-1000 Pa	0-1600 Pa	0-2000 Pa

Power Up Instruction

Before turning on the power, verify all wiring to ensure that it complies with one of the included wiring diagrams and verify that the output signal type is correctly selected on the jumpers. Also, review the specifications to ensure the power supply is correct and that the pressure is within the correct range. At this time, also inspect the internal pressure tubing that connects the sensor to the external ports to ensure that the tubing did not get kinked during shipping or installation.

This device uses a sophisticated temperature compensation circuit to ensure maximum accuracy of the device. The product should be allowed to warm-up for several minutes before attempting to verify the device accuracy or adjust the null offset. It is best to allow the transmitter to operate for 1 hour before any adjustment or calibration is performed.

Proper operation can be verified by measuring the output signal. For voltage output configuration, measure the voltage between the **OUT** and **COM** terminals. The voltmeter should read between 0-5 Vdc or 0-10 Vdc depending on the output range selected. For current output configuration, insert a mA meter in series with the **OUT** terminal. The mA meter should read between 4 and 20 mA.

Operation

If the unit is set to a unipolar range such as 0-2" wc, then the pressure applied to the **High** port must be higher than the pressure applied to the **Low** port. In this case, if the **Low** port is left open to ambient pressure and the **High** port is used to measure a positive pressure, then the output pressure can be calculated as follows:

$$\begin{aligned}
 4-20 \text{ mA} & \quad \text{Pressure} = [(\text{Output current} - 4 \text{ mA}) / 16 \text{ mA}] \times \text{Range} \\
 0-5 \text{ Vdc} & \quad \text{Pressure} = (\text{Output voltage} / 5 \text{ V}) \times \text{Range} \\
 0-10 \text{ Vdc} & \quad \text{Pressure} = (\text{Output voltage} / 10 \text{ V}) \times \text{Range}
 \end{aligned}$$

In the case of 0-2" wc, 4 mA or 0 V = 0" wc and 20 mA or 5 V or 10 V = 2" wc. Since the transmitter is linear, 1" wc would be 12 mA or 2.5 V or 5 V. If the positive pressure connection is reversed then the transmitter will always output 4 mA or 0 V.

If the unit is set to a bipolar range such as ± 2" wc, then the pressure applied to the **High** port should be higher than the pressure applied to the **Low** port for a positive output response. In this case, differential pressure can be measured using both ports. If the **High** port has a positive pressure with respect to the **Low** port, then the output indicates a positive pressure. Negative pressure is indicated if the **High** pressure is less than the **Low** pressure. For bipolar ranges, the output pressure can be calculated as follows:

4-20 mA	Pressure = [(Output current – 4 mA) / 16 mA] x 2 x Range – Offset
0-5 Vdc	Pressure = (Output voltage / 5 V) x 2 x Range – Offset
0-10 Vdc	Pressure = (Output voltage / 10 V) x 2 x Range – Offset

In the case of $\pm 2''$ wc, 4 mA or 0 V = $-2''$ wc and 20 mA or 5 V or 10 V = $+2''$ wc. Since the transmitter is linear, 0'' wc would be 12 mA or 2.5 V or 5 V.

Calibration

All pressure ranges are factory calibrated and no calibration is necessary. The user may adjust the zero point if desired when changing ranges for example. Make sure the unit is warmed up for at least 10 minutes (1 hour is best) before making a zero adjustment. With both ports open to the ambient pressure, press and hold the ZERO button for at least 3 seconds. Release the button after at least 3 seconds and the device will calculate and store the new zero point.

Generally, it is not recommended that the span calibration be performed in the field unless a high quality calibrator with low differential pressure ranges is available and the temperature of the sensor can be maintained. Contact the factory for information on this type of calibration.

Specifications

Pressure Ranges (4 per model, jumper selectable) . .	$\pm 0.5''$, $\pm 1''$, 0-1'', 0-2'' wc	± 100 , ± 200 , 0-200, 0-400 Pa
	$\pm 1.5''$, $\pm 3''$, 0-3'', 0-6'' wc	± 250 , ± 500 , 0-500, 0-1000 Pa
	$\pm 2''$, $\pm 4''$, 0-4'', 0-8'' wc	± 400 , ± 800 , 0-800, 0-1600 Pa
	$\pm 2.5''$, $\pm 5''$, 0-5'', 0-10'' wc	± 500 , ± 1000 , 0-1000, 0-2000 Pa
	$\pm 3''$, $\pm 6''$, 0-6'', 0-12'' wc	

Accuracy	$\pm 1\%$ F.S.O.
Measurement Type	Differential (two port)
Response Time	250 mS
Stability	$< \pm 1\%$ F.S.O. per year
Thermal Effects	$< \pm 3\%$ over compensated range
Compensated Range	10 - 50 °C (50 - 122 °F)
Over Pressure	20 psi or 2 x range (whichever is greater)
Operating Conditions	0 - 60 °C (32 - 140 °F), 10 - 90 %RH non-condensing
Media Compatibility	Limited only to those that will not attack polyetherimide, silicon, fluorosilicone, silicone, EPDM, and neoprene seals. Typically dry air or inert gas but liquid is allowed.
Power Supply (at transmitter)	12 - 28 Vac, 16.5 – 35 Vdc (non-isolated half-wave rectified)
Supply Current	< 4 mA
Input Voltage Effect	Negligible over specified operating range
Protection Circuitry	Reverse voltage protected and output limited
Output Signal	4-20 mA (2-wire), 0-5 Vdc or 0-10 Vdc (3-wire), Pin jumper selectable
Current Output Drive Capability . . .	400 ohms maximum @ 24 Vdc
Voltage Output Drive Capability . . .	2 Kohms minimum for 0-5 Vdc signal, 10 Kohms minimum for 0-10 Vdc signal
Zero Adjustment	Pushbutton auto-zero
Wiring Connections	Screw terminal block (14 to 22 AWG)
Pressure Connections	Barbed ports for 0.170" ID flexible tubing
Conduit Connection	Access hole for 1/2" NPT conduit or cable gland
Optional Display	3 1/2 digit LCD, 0.4" digit height
Enclosure	High Impact Black ABS, plenum rated with optional gasket 5.00" W x 3.3" H x 2.1" D (127mm x 84mm x 53mm)
Weight	159 grams (5.6 oz)
Approvals	EMC EN 61326

