Description
The Ultra Low Pressure Transducer is used to measure differential pressure in the range of 0.125 to 1"wc. It combines precision high sensitivity silicon sensing capabilities and the latest ASIC technology with Dynamic Self Compensation to substantially reduce offset errors due to changes in temperature, stability to warmup, long term instability and position sensitivity. It is ideal for monitoring pressure for air or other clean inert gas and is limited only to those media which will not attack silicon, nylon, silicone and epoxy adhesive. It features a field selectable uni- or bi-directional pressure range and output signal types for the most flexible application. The device has an on-board auto-zero function as well as a connection for remote zeroing. Options include an LCD to display the pressure value and a relay with a variable trip point.

Before Installation
Read these installation instructions carefully before installing and 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 gases, as a safety or emergency stop device or in any other application where failure of the product could result in personal injury. Take electrostatic discharge precautions during installation and do not exceed the device ratings.

Mounting
Mount the device using the two holes on the base of the unit. Leave enough space around the unit to connect the pressure tubing and avoid locations with severe vibrations or excessive moisture. 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 ½" 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. Use shielded twisted pair wiring of at least 22 AWG for all connections and do not run device wires 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.

This is a 3-wire sourcing device. Connect the positive dc or the ac voltage hot side (13-28 Vac or 18-35 Vdc measured at the transmitter) to the **PWR** terminal. The supply common is connected to the **COM** terminal. The device is reverse voltage protected and will not operate if connected backwards. It has a half-wave rectified power supply so the supply common is the same as the signal common. Several devices may be connected to one power supply and the output signals all share the same common. Use caution when grounding the secondary of a transformer or when wiring multiple devices to ensure the ground point is the same on all devices and the controller.

The analog output is available on the **OUT** terminal. This signal is jumper selectable for either voltage or 4-20 mA active output. In voltage mode the output is 0-5 or 0-10 Vdc. These options are indicated on the circuit board. The current output operates in the Active mode and does not require a loop power supply. This means **the signal current is generated by the transmitter and must not be connected to a powered input or device damage will result.** Check the controller Analog Input to determine the proper connection before applying power. Both current and voltage signals are referenced to the **COM** terminal. The voltage output signal has a minimum load that it is able to drive, similarly the current signal has a maximum load. Follow the ratings in the Specification section or inaccurate readings may result.

The remote zero feature may be used by wiring a dry-contact (relay only) digital output between the **ZERO** and **COM** terminals. Do not apply voltage to the **ZERO** terminal. The **RELAY** output is a normally open dry contact.

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 jumper from the position marked **Current** to the position marked **Voltage**. If the jumper is 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 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 on the device label and the circuit board. The pressure ranges are shown in the following chart:

Jumper Setting	Pressure Range							
	ULP01	**ULP02**	**ULP03**	**ULP04**	**ULP05**	**ULP06**	**ULP07**	**ULP08**
0 – MAX	0-1 "wc	0-0.5 "wc	0-0.25 "wc	0-0.125 "wc	0-250 Pa	0-125 Pa	0-60 Pa	0-30 Pa
+/- MAX	± 1 "wc	± 0.5 "wc	± 0.25 "wc	± 0.125 "wc	± 250 Pa	± 125 Pa	± 60 Pa	± 30 Pa

Power Up Instruction
Before turning on the power, verify all wiring to ensure that it complies with one of the included wiring diagram 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. The product should be allowed to warm-up for several minutes before attempting to verify accuracy. Allow the transmitter to operate for 20 minutes before any calibration is performed.

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 or 0-10 Vdc depending on the output range selected. For current output configuration, insert a mA meter in series with the **OUT** terminal and it should read between 4 and 20 mA.

Operation
If the unit is set to a unipolar range such as 0-1"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:

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

In the case of 0-1"wc, 4 mA or 0 V = 0"wc and 20 mA or 5 V or 10 V = 1"wc. Since the transmitter is linear, 0.5"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.

For a bipolar range such as ± 1"wc, the pressure applied to the **High** port should be higher than 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 ± 1" wc, 4 mA or 0 V = -1" wc and 20 mA or 5 V or 10 V = +1" wc. Since the transmitter is linear, 0" wc would be 12 mA or 2.5 V or 5 V.

The relay option operates as follows. A setpoint can be set with the **Relay Setpoint** control on the pcb. Moving the control clockwise changes the setpoint from the minimum to the maximum pressure of the selected range, either 0-MAX or –MAX to +MAX, depending on the jumper position. The LCD will show the setpoint briefly while it is being adjusted and will revert to normal display when adjustment stops. When the input pressure exceeds the setpoint for at least 5 seconds, then the relay contacts will close. When the input pressure decreases below the setpoint for at least 5 seconds then the relay contacts will open again.

Calibration

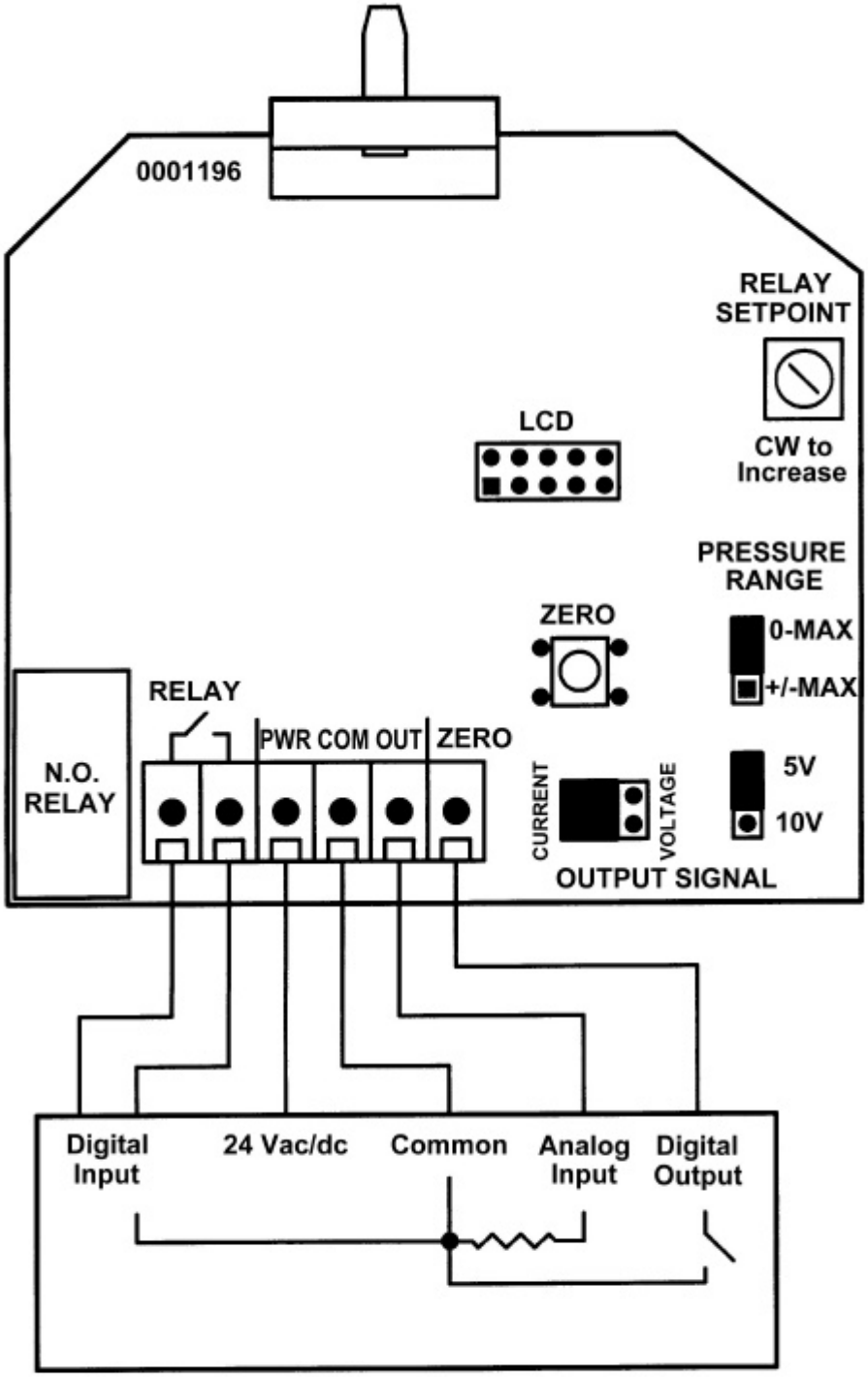
Only a zero calibration is necessary. With both ports open to the ambient pressure, press and hold the ZERO button for at least 3 seconds. Release the button after at least 3 seconds and the device will calculate and store the new zero point. This can also be done remotely by shorting the **ZERO** terminal to the **COM** terminal with a dry contact.

Generally, it is not recommended that a 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	± 1, 0-1"wc	± 250, 0-250 Pa
(2 per model, jumper selectable)	± 0.5, 0-0.5"wc	± 125, 0-125 Pa
	± 0.25, 0-0.25"wc	± 60, 0-60 Pa
	± 0.125, 0-0.125"wc	± 30, 0-30 Pa

Accuracy	± 1% F.S.O.
Measurement Type	Differential (two port)
Response Time	0.5 Sec
Thermal Effects	< ± 3% over compensated range
Compensated Range	0 - 50 °C (32 - 122 °F)
Over Pressure	100 "wc (24.9 kPa)
Operating Conditions	0 - 70 °C (32 - 158 °F), 10 - 90 %RH non-condensing
Media Compatibility	Low Port: dry gases only, media must be compatible with epoxy adhesive High Port: wetted materials compatible with nylon housing, epoxy adhesive and silicon
Power Supply (at transmitter)	13 - 28 Vac, 18 – 35 Vdc (non-isolated half-wave rectified)
Supply Current	< 30mA (without relay option), or 50mA (with relay option)
Input Voltage Effect	Negligible over specified operating range
Protection Circuitry	Reverse voltage protected and output limited
Output Signal	4-20 mA (3-wire), 0-5 Vdc or 0-10 Vdc (3-wire), Pin jumper selectable
Current Output Drive Capability	550 ohms maximum
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 (on device or remote)
Wiring Connections	Screw terminal block (14 to 22 AWG)
Pressure Connections	Barbed ports for 0.170" ID flexible tubing
Conduit Connection	Access hole for ½" NPT conduit or cable gland
Optional Display	3 ½ digit LCD, 0.4" digit height
Optional Relay Output	N.O. contact, 5 Amps @ 250 Vac, 5 Amps @ 30 Vdc
Relay Trip Point	Adjustable from ZERO to SPAN via trimpot
Relay Delay	5 seconds on / 5 seconds off
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



The RELAY output may also drive a load directly.
The current or voltage OUT signal is referenced to COMMON.
The minimum configuration requires three wires; PWR, COM and OUT.
The ZERO input must be a dry contact closure referenced to COMMON.