Installation & Maintenance Instructions

# TX200™ Pressure Transmitter

UNITED ELECTRIC CONTROLS

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## Installation and Maintenance Instructions

*Please read all instructional literature carefully and thoroughly before starting. Refer to the final page for the listing of Recommended Practices, Liabilities and Warranties.*

## GENERAL

BEFORE INSTALLING, CHECK THE SENSOR MODEL SELECTED FOR COMPATIBILITY TO THE PROCESS MEDIA IN CONTACT WITH THE SENSOR AND WETTED PARTS.

MISUSE OF THIS PRODUCT MAY CAUSE EXPLOSION AND PERSONAL INJURY. THESE INSTRUCTIONS MUST BE THOROUGHLY READ AND UNDERSTOOD BEFORE UNIT IS INSTALLED.

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISIONS 1 & 2, GROUPS A, B, C AND D; CLASS II, DIVISIONS 1 & 2, GROUPS E, F AND G; CLASS III; OR NON-HAZARDOUS LOCATIONS ONLY. -40°C (-40°F) ≤ Tamb. ≤ 85°C (185°F), ENCLOSURE TYPE 4X.

THIS EQUIPMENT IS ATEX CERTIFIED FOR EQUIPMENT CATEGORY 2. SUITABLE FOR APPROPRIATE USE IN GAS ZONE 1 AND DUST ZONE 21 APPLICATIONS.

CE 0539 DEMKO 07 ATEX 0715718X

Ex II 2 G Ex d IIC T5

Ex II 2 D T+90°C

-40°C ≤ Tamb. ≤+80ºC, IP66

The TX200™ transmitter utilize a bonded foil strain gage bridge sensor to detect and continuously monitor pressure in a system. The strain gage is a resistive element whose resistance changes with the amount of strain (pressure) placed upon it. Flexing of the diaphragm causes the resistance change and electronically communicates this via a 4 to 20 mA output signal or optional 1-5 VDC output signal to a digital meter or gauge, a PLC (programmable logic controller) or other device. The TX200B is "fixed range" while the TX200A is "field adjustable" with a 5:1 turndown ratio (see Part II – Adjustments).

PROOF PRESSURE* LIMITS STATED IN THE LITERATURE AND ON TRANSMITTER HOUSING MUST NEVER BE EXCEEDED, EVEN BY SURGES IN THE SYSTEM. OCCASIONAL OPERATION OF UNIT UP TO MAXIMUM PRESSURE IS ACCEPTABLE (E.G., START-UP, TESTING). CONTINUOUS OPERATION SHOULD NOT EXCEED THE DESIGNATED OVER RANGE PRESSURE.

*Proof Pressure

The maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage (e.g., start-up, testing). The units may require re-adjustment.

THESE PRODUCTS DO NOT HAVE ANY FIELD REPLACEABLE PARTS. ANY SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 1.

THE EPOXY RESIN SHALL NOT BE SUBJECTED TO A TEMPERATURE GREATER THAN 125°C.

# Part I - Installation

**Tools Needed**

Adjustable Wrench

## MOUNTING

ALWAYS LOCATE UNITS WHERE SHOCK, VIBRATION AND AMBIENT TEMPERATURE FLUCTUATIONS ARE MINIMAL. DO NOT MOUNT IN AMBIENT TEMPERATURE AREAS EXCEEDING 185°F (IF UL/cUL APPROVAL IS APPLICABLE) OR 80 °C (IF ATEX APPROVAL IS APPLICABLE). IF SEVERE PRESSURE SURGES ARE EXPECTED, CONSIDER THE USE OF A PRESSURE SNUBBER.

UNIT MAY BE MOUNTED IN ANY POSITION. ALWAYS HOLD A WRENCH ON THE SENSOR FLATS (PRESSURE PORT) WHEN MOUNTING UNIT.

## WIRING

DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING UNIT. ELECTRICAL RATINGS STATED IN LITERATURE AND ON THE TRANSMITTER MUST NOT BE EXCEEDED.

EXTERNAL GROUNDING SCREW (OPTION M460) IS REQUIRED FOR NON-METALLIC CONDUIT SYSTEMS. (ATEX REQUIREMENT ONLY).

IN ORDER TO MEET EUROPEAN EMC REQUIREMENTS, THE TX200™ WIRING MUST BE INSTALLED IN A GROUNDED METAL CONDUIT OR WITH OTHER SUITABLE SHIELDING.

THE TX200™ TRANSMITTER ACCEPTS 10-36 VDC FOR 4-20 MA OUTPUT UNITS AND 10-30 VDC FOR 1-5 VDC OUTPUT UNITS. THE SUPPLY VOLTAGE SHALL NOT EXCEED 36 VDC FOR 4-20 MA OUTPUT UNITS AND 30 VDC FOR 1-5 VDC OUTPUT UNITS. THE SUPPLY MUST BE ISOLATED FROM MAINS VOLTAGE BY DOUBLE/REINFORCED INSULATION.

EARTH GROUND MUST ALWAYS BE CONNECTED TO THE GREEN WIRE TO PROVIDE SHIELDING AND ELECTRICAL SAFETY.

WIRE IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES. BY THE INSTALLATION, THE WIRES SHALL BE PROTECTED AGAINST MECHANICAL DAMAGE. E.G. BY USE OF A CONDUIT.

THE WIRING TO THE PRESSURE TRANSMITTER MUST ONLY BE CONNECTED IN THE SAFE AREA OR BY AN APPROVED TERMINAL BOX CERTIFIED TO EN 60079-0 OR EN 60079-1 FOR HAZARDOUS LOCATIONS/FLAMEPROOF ATMOSPHERES. (ATEX REQUIREMENTS ONLY)

A 1/2" NPT (male) conduit connection is provided on top of the transmitter with 18 AWG, 72" leadwires. The leadwires are color coded as follows:

| **4-20 mA Output** | | **1-5 VDC Output (Option M204)** | |
|---|---|---|---|
| Red: | +VDC signal | Red: | +VDC signal |
| Black: | -VDC signal | Black: | -VDC signal |
| Green: | Earth Ground | Green: | Earth Ground |
| | | Blue: | 1-5 V Output |

The transmitter may be wired in either a sourcing (see diagram 1A) or sinking (see diagram 1B) circuit. (Option M204 1-5 Volt output, see diagram 1C.)

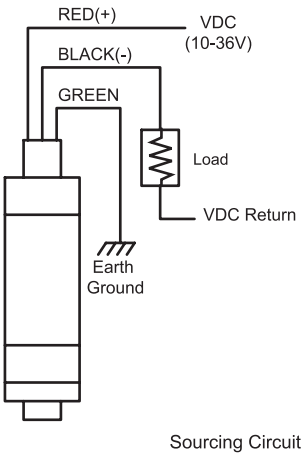



**Diagram 1A**

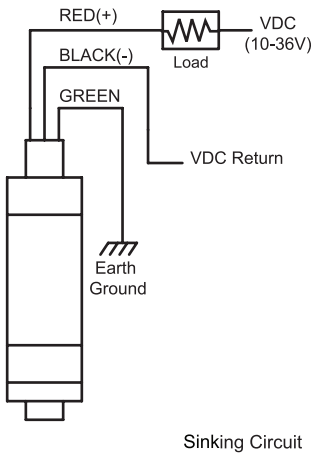



**Diagram 1B**

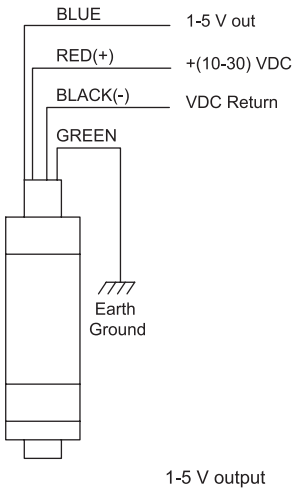



**Diagram 1C**

## LOAD IMPEDANCE

| | |
|---|---|
| 4-20mA output | 1300 ohms max. at 36 VDC<br>700 ohms max at 24 VDC |
| 1-5 V output | 2000 ohms min. |

# Part II - Adjustments

## SPANNING THE MODEL TX200™ TRANSMITTER USING THE SHUNT CAL FEATURE

A feature of the field adjustable transmitter (TX200A) is its span ratio of 5:1. The span can be field adjusted using the control buttons located on the transmitter (see diagram 2) and without removing it from service or the necessity of a precise pressure source. Using the following formula and procedure below, the transmitter is easily recalibrated to the desired pressure range.

**Formula: Ical = (Cal# x 16/Pcal) + 4**

**Formula Key:** **Ical** is the output current that the user will set, with the shunt cal on, in order to achieve the desired full scale pressure (Pcal).
**Cal#** is the amount of pressure simulated by turning the shunt cal on. The value is engraved on the TX200 housing and written on the Certificate of Calibration.
**Pcal** is the desired (user defined) full-scale pressure recalibration point.

**Procedure:**

1) Determine transmitter pressure range for application and apply the above formula to get **Ical**.

**Example:** End-user has a UE transmitter P/N TX200A10S1(0 to 2500 psig /0 to 172,4 bar range). For a particular application, a 0-1500 psig (0 to 103,4 bar) range is desired using this transmitter - this is the **Pcal.** The **Cal#** engraved on the transmitter housing is 424 psi (29,2 bar). Using the formula above, **Ical** = (424 x 16/1500) +4, the **Ical** calculated is 8.52. When all steps below are completed, the transmitter in this example would be spanned so that the 4 mA output signal = 0 psig and the 20 mA output signal = 1500 psig (103,4 bar).

2) Connect the transmitter to a 24 volt-nominal voltage source through a 100 ohm load resistor (Reference Diagram 1A). Connect a digital voltmeter across the terminating resistor. The output across the resistor will be 100 mVolts/mA.

3) Zero the transmitter (if necessary).

4) Turn the Cal switch to the on position.

5) Adjust the Span and Fine Span control buttons until the **Ical** value appears on the digital voltmeter.

6) Turn the Cal switch to the off position.

The transmitter should now be spanned to the desired pressure range. To verify the new pressure range, check that the transmitter output is 4mA at zero pressure. Next, apply full-scale pressure to the transmitter and check that the transmitter output is 20 mA at **Pcal**.

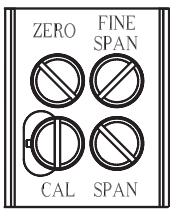
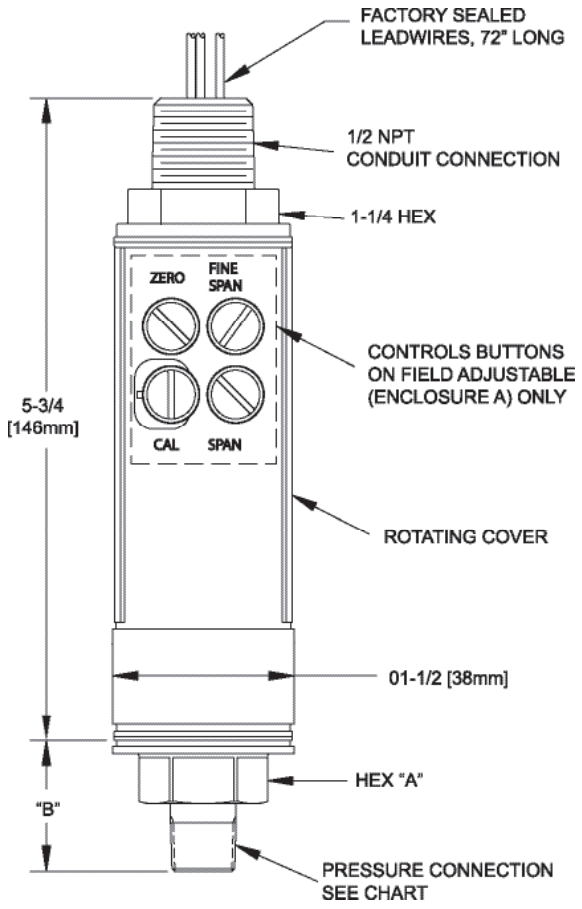



**Diagram 2**

## Dimensions

Dimensial drawings for all models may be found at www.ueonline.com




| Pressure Connection Chart | | | |
|---|---|---|---|
| **Code** | **Description** | **Hex "A"in** | **Length "B"in [mm]** |
| 1 | 1/4" NPT (female) | 15/16 | 0.54 [13.7] |
| 2 | 1/2" NPT (female) | 1-3/8 | 1.01 [25.7] |
| 3 | 1/2" NPT (male) | 15/16 | 1.26 [32.0] |
| 4 | HF4 Autoclave (female) | 15/16 | 0.54 [13.7] |
| 5 | FH6 Autoclave (female) | 1-3/8 | 0.90 [22.9] |
| 6 | LF4 Autoclave (female) | 15/16 | 0.54 [13.7] |
| 7 | LF6 Autoclave (female) | 15/16 | 0.65 [16.5] |
| 8 | 1/4" NPT (male) | 15/16 | 0.97 [24.6] |
| 9 | 7/16-20 SAE (female) | 15/16 | 0.54 [13.7] |
| A | G-1/4 (female) | 15/16 | 0.54 [13.7] |
| B | G-1/2 (female) | 1-3/8 | 1.01 [25.7] |
| C | 7/16-20 SAE (male) | 15/16 | 0.77 [19.6] |
| D | HM4 Autoclave (male) | 15/16 | 1.10 [27.9] |
| E | HM6 Autoclave (male) | 15/16 | 1.29 [32.8] |
| F | LM4 Autoclave (male) | 15/16 | 1.18 [30.0] |
| G | LM6 Autoclave (male) | 15/16 | 1.32 [33.5] |
| H | G-1/4 (male) | 15/16 | 1.03 [26.2] |
| J | G-1/2 (male) | 1-3/8 | 1.78 [45.2] |

| Wire Color Coding | |
|---|---|
| Red | + VDC |
| Black | - VDC |
| Green | Earth Ground |
| Blue | 1-5 VDC Output (Option M204 only) |

| Pressure Ranges | | |
|---|---|---|
| 03 | = | 0 to 15 psis |
| 04 | = | 0 to 30 psis |
| 05 | = | 0 to 50 psis |
| 06 | = | 0 to 100 psis |
| 07 | = | 0 to 250 psis |
| 08 | = | 0 to 500 psis |
| 09 | = | 0 to 1000 psis |
| 17 | = | 0 to 1500 psis |
| 18 | = | 0 to 2000 psis |
| 10 | = | 0 to 2500 psis |
| 19 | = | 0 to 3000 psis |
| 11 | = | 0 to 5000 psis |
| 20 | = | 0 to 6000 psis |
| 12 | = | 0 to 7500 psis |
| 13 | = | 0 to 10,000 psis |
| 14 | = | 0 to 15,000 psis |
| 15 | = | 0 to 20,000 psis |
| 16 | = | 0 to 25,000 psis |

## RECOMMENDED PRACTICES AND WARNINGS

United Electric Controls Company recommends careful consideration of the following factors when specifying and installing UE pressure and temperature units. Before installing a unit, the Installation and Maintenance instructions provided with unit must be read and understood.

- To avoid damaging unit, proof pressure and maximum temperature limits stated in literature and on nameplates must never be exceeded, even by surges in the system. Operation of the unit up to maximum temperature is acceptable on a limited basis (i.e., start-up, testing) but continuous operation must be restricted to the designated adjustable range. Excessive cycling at maximum temperature limits could reduce sensor life.
- A back-up unit is necessary for applications where damage to a primary unit could endanger life, limb or property. A high or low limit switch is necessary for applications where a dangerous runaway condition could result.
- The adjustable range must be selected so that incorrect, inadvertent or malicious setting at any range point cannot result in an unsafe system condition.
- Install unit where shock, vibration and ambient temperature fluctuations will not damage unit or affect operation. Orient unit so that moisture does not enter the enclosure via the electrical connection. When appropriate, this entry point should be sealed to prevent moisture entry.
- Unit must not be altered or modified after shipment. Consult UE if modification is necessary.
- Monitor operation to observe warning signs of possible damage to unit, such as drift in set point or faulty display. Check unit immediately.
- Preventative maintenance and periodic testing is necessary for critical applications where damage could endanger property or personnel.
- For all applications, a factory set unit should be tested before use.
- Electrical ratings stated in literature and on nameplate must not be exceeded. Overload on a switch can cause damage, even on the first cycle. Wire unit according to local and national electrical codes, using wire size recommended in installation sheet.
- Do not mount unit in ambient temp. exceeding published limits.

## LIMITED WARRANTY

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller (Ex-works, Factory, Watertown, Massachusetts. INCOTERMS); provided, however, that this warranty applies only to equipment found to be so defective within a period of 24 months from the date of manufacture by the Seller. Seller shall not be obligated under this warranty for alleged defects which examination discloses are due to tampering, misuse, neglect, improper storage, and in any case where products are disassembled by anyone other than authorized Seller's representatives. EXCEPT FOR THE LIMITED WARRANTY OF REPAIR AND REPLACEMENT STATED ABOVE, SELLER DISCLAIMS ALL WARRANTIES WHATSOEVER WITH RESPECT TO THE PRODUCT, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

## LIMITATION OF SELLER'S LIABILITY

Seller's liability to Buyer for any loss or claim, including liability incurred in connection with (i) breach of any warranty whatsoever, expressed or implied, (ii) a breach of contract, (iii) a negligent act or acts (or negligent failure to act) committed by Seller, or (iv) an act for which strict liability will be inputted to seller, is limited to the "limited warranty" of repair and/or replacement as so stated in our warranty of product. In no event shall the Seller be liable for any special, indirect, consequential or other damages of a like general nature, including, without limitation, loss of profits or production, or loss or expenses of any nature incurred by the buyer or any third party.

UE specifications subject to change without notice.

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