



## TX200™ Pressure Transmitter





UNITED ELECTRIC  
CONTROLS



## 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, DIVISION 1, GROUPS A, B, C AND D; CLASS II, DIVISION 1, GROUPS E, F AND G; CLASS III; OR NON-HAZARDOUS LOCATIONS ONLY.  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ )  $\leq T_{\text{amb.}} \leq 85^{\circ}\text{C}$  ( $185^{\circ}\text{F}$ ), 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.

 0539 DEMKO 08 ATEX 0810742X


 II 2 G Ex d IIC T5

 II 2 D Ex tD A21 IP66 T+90°C

$-40^{\circ}\text{C} \leq T_{\text{amb.}} \leq +80^{\circ}\text{C}$


The TX200™ pressure transmitter is available as either a field adjustable (TX200A) or fixed range (TX200B) model. The TX200A is capable of a 5:1 turndown (see Part II – Adjustments). Both models utilize a piezo-resistive or bonded foil sensor technology to continuously monitor pressure in a system. Changes in system pressure change the resistance in the sensor translating to either a 4-20 mA or voltage (VDC) output to a digital meter, gage, PLC (programmable logic controller) or other device.

Please refer to product bulletin for product specifications. Product bulletin may be found at [www.ueonline.com](http://www.ueonline.com)

 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.

### Panel Mounting via 1/2" NPTM or M20 Electrical Connection

When panel mounting, mount through 7/8" clearance hole in panel. Hold in place with serrated 1/2" or M20 conduit nut. Always support the unit by holding a wrench on the hex.

### WIRING



DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING UNIT. ELECTRICAL RATINGS STATED IN LITERATURE AND ON THE TRANSMITTER MUST NOT BE EXCEEDED. FOR AMBIENT TEMPERATURES BELOW  $-10^{\circ}\text{C}$  AND ABOVE  $+60^{\circ}\text{C}$ , USE FIELD WIRING SUITABLE FOR BOTH MINIMUM AND MAXIMUM AMBIENT TEMPERATURE.



EXTERNAL GROUNDING SCREW (OPTION M460) IS REQUIRED FOR NON-METALLIC CONDUIT SYSTEMS. (ATEX REQUIREMENT ONLY— SEE FIGURE 2).



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 VOLTAGE (VDC) OUTPUT UNITS. THE SUPPLY VOLTAGE SHALL NOT EXCEED 36 VDC FOR 4-20 MA OUTPUT UNITS AND 30 VDC FOR VOLTAGE (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 60079-1 OR EN 60079-7 FOR HAZARDOUS LOCATIONS/FLAMEPROOF ATMOSPHERES. (ATEX REQUIREMENTS ONLY)

A 1/2" NPT (male) or M20 conduit connection is provided on top of the transmitter with 18 AWG, 72" leadwires. External grounding screw and clamp is provided with option M460. The leadwires are color coded as follows:

**4-20 mA Output**

Red: + signal  
Black: - signal  
Green: Earth Ground

**Voltage (VDC) Output**

Red: + VDC signal  
Black: - VDC signal  
Green: Earth Ground  
Blue: 1-5 V Output

The transmitter may be wired in either a sourcing (see figure 1A) or sinking (see figure 1B) circuit.

**4-20 mA Output**

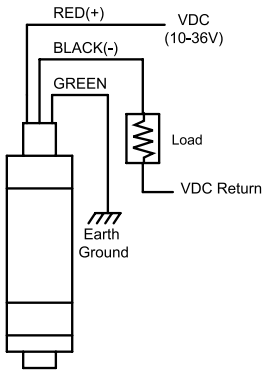


Figure 1A

Sourcing Circuit

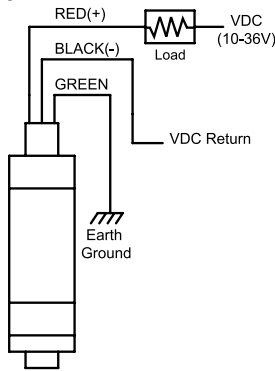


Figure 1B

Sinking Circuit

**Voltage Output**

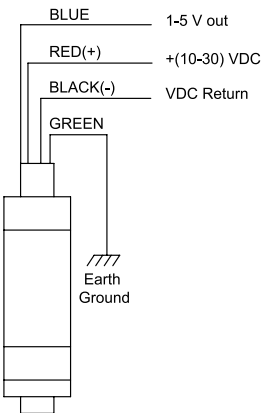


Figure 1C

**LOAD IMPEDANCE**

- 4-20mA output:
- 1300 ohms max at 36 VDC
  - 700 ohms max at 24VDC
- Voltage (VDC) output:
- 2000 ohms min

**OPTION M460 EXTERNAL GROUNDING SCREW**

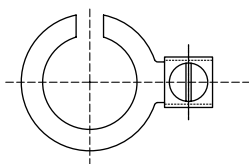


Figure 2

**Part II - Adjustments**

**SPANNING THE TX200A™ TRANSMITTER USING THE SHUNT CAL. FEATURE**

The range of the TX200A can be adjusted by a ratio of 5:1 using the shunt calibration feature (see figure 3). No pressure source is required for this process.

*Example: A 1,000 psi range TX200A can be adjusted for any range between 0 to 200 psi and 0 to 1,000 psi.*

Use the formula below to calculate  $I_{cal}$  or  $V_{cal}$ . This number represents the output current or voltage that the user will set with the shunt cal. on in order to achieve the desired range.

**4-20 mA models formula:**  $I_{cal} = (Cal\# \times 16mA/P_{cal}) + 4mA$

**Voltage out (VDC) models formula:**  $V_{cal} = (Cal\# \times V_{FSO}/P_{cal}) + V_{zero}$

- $I_{cal}$  is the output current that the user will set, with the shunt cal on to achieve the desired full scale pressure range ( $P_{cal}$ )
- $V_{cal}$  is the output voltage that the user will set, with the shunt cal on to achieve the desired full scale pressure range ( $P_{cal}$ )
- Cal# is the amount of pressure simulated by turning the shunt cal on. The Cal# is engraved on the TX200A housing and written on the Certificate of Calibration.
- $P_{cal}$  is the full scale pressure range the user is adjusting to.
- $V_{zero}$  is the output of the voltage (VDC) out model with no pressure applied.
- $V_{FSO}$  is the full scale output, in volts, of a voltage (VDC) out model.

*Example: For a TX200A with a 1-5 Volt output:  $V_{zero} = 1$  volt and  $V_{FSO} = 4$  volts*

**Procedure:**

1. Determine the desired pressure range
2. Calculate  $I_{cal}$  for 4-20mA models or  $V_{cal}$  for voltage (VDC) models using the formulae above.
3. Power the TX200 with a suitable power supply.
  - a. **4-20mA** models can be powered with a 24VDC power supply and 100Ω resistor in series. The voltage across the resistor represents the current in the loop. 100mV = 1mA.
  - b. **Voltage (VDC)** out models can be connected directly to a 24V power supply. The output voltage is measured between the Blue (+) and Black (-) wires.

*Please refer to figure 3 for steps 4-7.*
4. Adjust the Zero as necessary.
5. Turn the Cal Switch clockwise to the on position.
6. Adjust the Span and Fine Span controls until the output reaches the  $I_{cal}$  or  $V_{cal}$  number calculated in step 2.
7. Turn the Cal Switch counter-clockwise to the off position.
8. The transmitter should now be adjusted to the desired pressure range.

**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  $P_{cal}$ . The Cal# engraved on the transmitter housing is 424 psi (29,2 bar). Using the formula above,  $I_{cal} = (424 \times 16/1500) + 4$ , the  $I_{cal}$  calculated is 8.52. When all steps above 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).

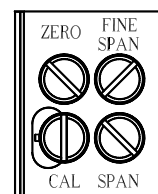
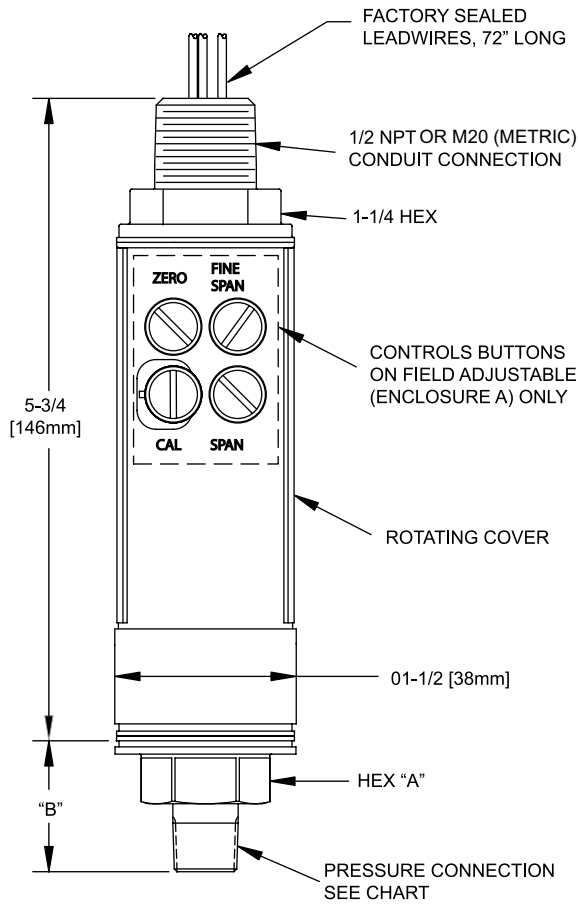


Figure 3

## Dimensions

Dimensional drawings for all models may be found at [www.ueonline.com](http://www.ueonline.com)



Wire Color Coding	
Red	+ VDC
Black	- VDC
Green	Earth Ground
Blue	Voltage (VDC) Output

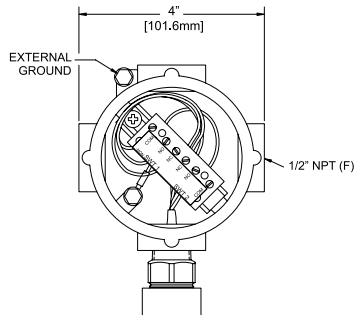
### Pressure Connection Chart

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]

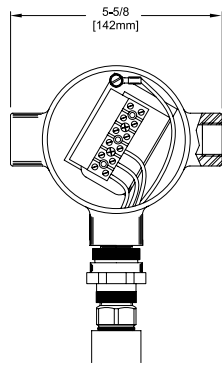
### Pressure Ranges

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

## Option M423 & M513 Junction Boxes



**M423**  
Not UL or cUL approved.



**M513**  
Does not meet ATEX or Enclosure Type 4X requirements.

## 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 pressure or temperature is acceptable on a limited basis (e.g., start-up, testing) but continuous operation must be restricted to the designated adjustable range. Excessive cycling at maximum pressure or 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. When applicable, 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.
- 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 36 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.

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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.*



UNITED ELECTRIC  
CONTROLS

180 Dexter Avenue, P.O. Box 9143  
Watertown, MA 02471-9143 USA  
Telephone: 617 926-1000 Fax: 617 926-2568  
<http://www.ueonline.com>