




TX200 Pressure Transmitter





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

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

 **UL** THIS PRODUCT 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°C (-40°F) ≤ Tamb. ≤ 85°C (185°F), ENCLOSURE TYPE 4X.

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

EN 60079-0:2012 +A11:2013, EN 60079-1:2007, EN 60079-31:2009

0539 DEMKO 08 ATEX 0810742X



II 2 G Ex d IIC T6 Gb

II 2 D Ex tb IIIC T85°C Db

IP66

-40°C < Tamb. < +80°C

IEC 60079-0:Ed.6, IEC 60079-1:Ed.7, IEC 60079-31:Ed.2



IECEx UL 14.0107X

Ex d IIC T6 Gb


Ex tb IIIC T85°C Db


IP66


-40°C < Tamb. < +80°C

UE declarations and third-party issued agency certifications are available for download at www.ueonline.com/prod_approval

 PRIOR TO INSTALLATION, CHECK THE WETTED PARTS MATERIAL FOR COMPATIBILITY TO THE PROCESS MEDIA.

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

 THIS PRODUCT DOES NOT HAVE ANY FIELD REPLACEABLE PARTS. ANY SUBSTITUTION OF COMPONENTS WILL INVALIDATE THIRD-PARTY ISSUED APPROVALS AND CERTIFICATIONS, AND MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 1 LOCATION.

 PROOF PRESSURE* LIMITS STATED WITHIN THE LITERATURE AND PRINTED ONTO THE PRODUCT HOUSING MUST NEVER BE EXCEEDED, EVEN BY SURGES IN THE SYSTEM. OCCASIONAL OPERATION OF THE PRODUCT UP TO PROOF 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 product may require re-adjustment after reaching proof pressure.

**Over Range Pressure

The pressure value to which a product may be continuously subjected, without causing a shift in calibration or damage to the sensor.

The TX200 pressure transmitter is available as either a field adjustable (TX200A) or fixed range (TX200B) model. The TX200 is also available with HART output - see IMTX200H. The TX200A is capable of a 5:1 turndown (see Part II – Adjustments). Both models utilize a piezo-resistive (ranges ≤ 500 psi) or bonded foil sensor (ranges ≥ 1000 psi) 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 (0-5, 0-10 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


Date code format on nameplate is “YYWW” for year and week.

Part I - Installation

Tools Needed


Adjustable Wrench

MOUNTING

 ALWAYS LOCATE THE PRODUCT WHERE SHOCK, VIBRATION AND AMBIENT TEMPERATURE FLUCTUATIONS ARE MINIMAL. DO NOT MOUNT IN AMBIENT TEMPERATURE AREAS EXCEEDING 185°F (FOR cULus INSTALLATION) OR 80 °C (FOR ATEX INSTALLATION).

 IF SEVERE PRESSURE SURGES ARE EXPECTED, CONSIDER THE USE OF A PRESSURE SNUBBER.

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


 MODELS WITH AUTOCLAVE PRESSURE CONNECTIONS SHOULD BE INSTALLED AT 25 FT-LB (30 FT-LB MAX.). OVER TORQUEING MAY CAUSE AN OUTPUT SHIFT REQUIRING FACTORY RECALIBRATION.


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


When panel mounting, mount through 7/8" clearance hole in panel. Use 1/2" or M20 conduit nut to secure in place. Always support the product by holding a wrench on the hex.


 TO ATTACH CONDUIT CONNECTION, HOLD ELECTRICAL CONNECTION STEADY WITH WRENCH ON HEX, THEN THREAD ON CONDUIT.


WIRING


 DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING PRODUCT. WIRE IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES. THE WIRES SHOULD BE PROTECTED AGAINST MECHANICAL DAMAGE BY USE OF A CONDUIT OR OTHER SUITABLE MEANS.


 ELECTRICAL RATINGS STATED IN LITERATURE AND PRINTED ONTO THE PRODUCT HOUSING MUST NOT BE EXCEEDED.

 FOR ATEX/IECE_x INSTALLATIONS, AN EXTERNAL GROUNDING SCREW (OPTION M460) IS REQUIRED FOR NON-METALLIC CONDUIT SYSTEMS. (SEE FIGURE 2)

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

 THE PRODUCT ACCEPTS 10-36 VDC FOR 4-20 MA OUTPUT AND 10-30 VDC (1-5V OUTPUT) OR 14-30 VDC (0-10V OUTPUT) FOR VOLTAGE (VDC) OUTPUT. THE SUPPLY VOLTAGE SHALL NOT EXCEED 36 VDC FOR 4-20 MA OUTPUT AND 30 VDC FOR VOLTAGE (VDC) OUTPUT. 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 INSTALLATION, ELECTRICAL SAFETY.

 FOR ATEX/IECE_x INSTALLATION IN HAZARDOUS LOCATIONS, THE WIRING TO THE PRODUCT MUST ONLY BE CONNECTED IN THE SAFE AREA OR BY AN APPROVED TERMINAL BOX CERTIFIED TO EN 60079-0:2012 +A11:2013, EN 60079-1:2007, EN 60079-31:2009, EN 60079-7:2007 / IEC 60079-0:Ed.6, IEC 60079-1:Ed.6, IEC 60079-31:Ed.1, IEC 60079-7:Ed.4 STANDARDS.

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

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 or 0-10V Output

The product may be wired in either a sourcing (see figure 1A) or sinking (see figure 1B) circuit for 4-20 mA output. See Figure 1C for voltage output.

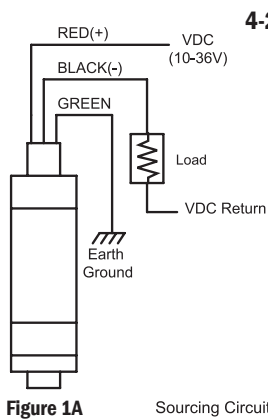


Figure 1A

Sourcing Circuit

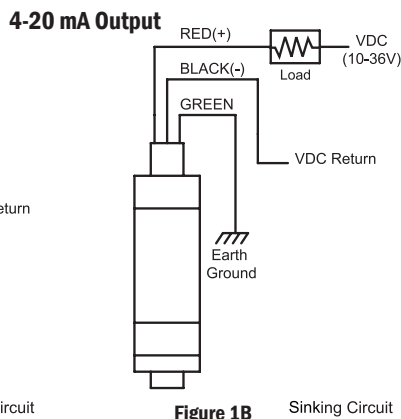


Figure 1B

Sinking Circuit

Voltage Output

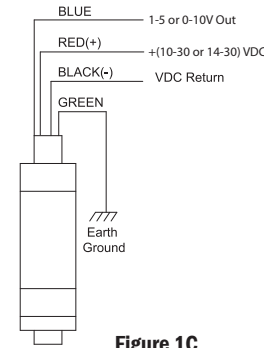


Figure 1C

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

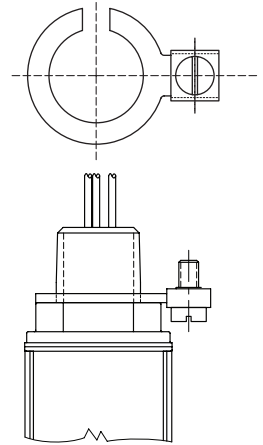


Figure 2

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.

Formulas:

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

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

Key:

- 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.

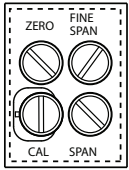


Figure 3

Scan this QR code to watch a video on spanning the TX200 or visit <http://www.youtube.com/watch?v=StYWwOiQU0I>



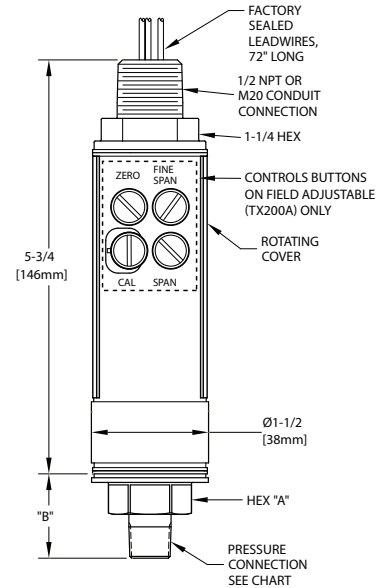
Example: End-user has a UE transmitter P/N TX200A10S1 (0 to 2500 psig / 0 to 172,4 bar range). For a particular application, a 0-1500 psig (0 to 103,4 bar) range is desired using this transmitter - this is the P_{cal} . The **Cal#** engraved on the transmitter housing is 424 psi (29,2 bar). Using the 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).

Zone Hazardous Locations Flameproof Gap and Joint Details

Electrical conduit fitting threaded connection: M20 x 1.5, 7 threads minimum engagement

Dimensions

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



Wire Coloring Code

	4-20 mA output	TX200A & B 1-5 or 0-10 VDC output
Red	+ VDC	+VDC
Black	- VDC	-VDC
Green	Earth Ground	Earth Ground
Blue	NA	Voltage Output

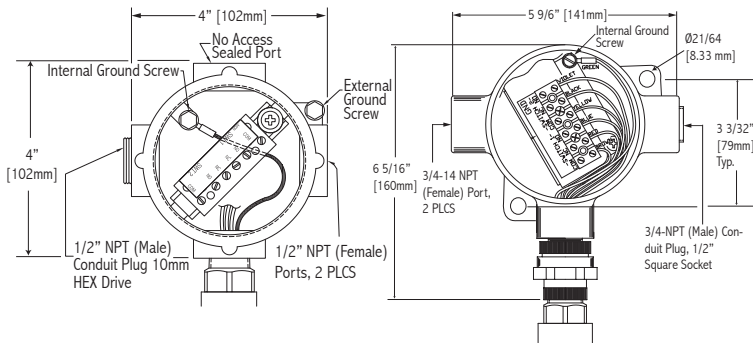
Pressure Connection Chart

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	HF6 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 psig
04	=	0 to 30 psig
05	=	0 to 50 psig
06	=	0 to 100 psig
07	=	0 to 250 psig
08	=	0 to 500 psig
09	=	0 to 1000 psig
17	=	0 to 1500 psig
18	=	0 to 2000 psig
10	=	0 to 2500 psig
19	=	0 to 3000 psig
11	=	0 to 5000 psig
20	=	0 to 6000 psig
12	=	0 to 7500 psig
13	=	0 to 10,000 psig
14	=	0 to 15,000 psig
15	=	0 to 20,000 psig
16	=	0 to 25,000 psig
15929	=	0 to 300 psig

Option M423 & M513 Junction Boxes



M423 ATEX Flameproof Compliant
(Not UL or cUL approved.)
Cover not shown

M513 UL/CSA Approved
(Enclosure Type 4 requirements only.
Not ATEX compliant.)
Cover not shown

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.

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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