5 YEAR WARRANTY

FM APPROVED

OMEGA™

User's Guide

PX881-015GI, flush mount model.

PX881-CPL, 1½ in pipe coupling, sold separately.

PX880-3KGI, ½ NPT female model.

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PX880 Series

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Explosion Proof/Intrinsically Safe

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CONTENTS

INTRODUCTION

The Model PX880 & PX881 is a series of pressure transmitter products featuring zero and span field adjustability, 5:1 pressure range turndown, all 316 stainless steel construction in a durable and cost effective package. The transmitters provide 4-20mA output, .25% accuracy and agency approvals for intrinsically safe operation and explosion proof protection in hazardous locations.

Models PX880 and PX881 carry agency approval from Factory Mutual and Canadian Standards Association for explosion proof operation in hazardous locations. Canadian Standards Association for intrinsically safe approval is also available

SAFETY SUMMARY

This instrument is designed to prevent accidental shock to the operator when properly used. However, no design can ensure the safety of an instrument improperly installed or used negligently. Read this manual carefully and completely before operating the instrument. Failure to read this manual in its entirety could result in damage to the instrument or injury to the operator. Standard safety precautions must be used during installation and operation. Important messages located throughout this manual are as follows:

WARNING – Denotes a hazardous procedure or condition which, if ignored, could result in injury or death to the operator.

CAUTION – Denotes a hazardous procedure or condition which, if ignored, could result in damage or destruction to the instrument.

IMPORTANT – Denotes a procedure or condition which is essential to the correct operation of the instrument.

NOTE – Specifies supplementary and perhaps essential information in relation to a particular procedure or condition.

MODEL PX880 SERIES TRANSMITTER MODEL NUMBER CODE

PX880 **ELECTRONIC PRESSURE TRANSMITTER**

PRESSURE RANGE

	PSI	BAR
150 W =	0-30 to 0-150" WC	0-75 to 0-373 mbar
X15=	3-15 PSI	.2 to 1 bar
015 =	0-3 to 0-15 PSI	0-.2 to 0-1 bar
030 =	0-6 to 0-30 PSI	0-.4 to 0-2 bar
100 =	0-20 to 0-100 PSI	0-1.4 to 0-7 bar
300 =	0-60 to 0-300 PSI	0-4 to 0-20 bar
1K =	0-200 to 0-1000 PSI	0-14 to 0-70 bar
3K =	0-600 to 0-3000 PSI	0-40 to 0-200 bar
5K =	0-1000 to 0-5000 PSI	0-70 to 0-350 bar

OUTPUT

GI = 4-20 mADC

MATERIAL

BASE	DIAPHRAGM	FILL	PROCESS CONN.
316 SS	316L SS	SILICONE	1/2" NPT FEMALE

PX880 100 GI **EXAMPLE**

Model PX880 Pressure Transmitter, 100 psi range, 316 SS base and diaphragm, silicone oil fill, 1/2 female NPT, output at 4-20mADC, approved by FM and CSA.

MODEL PX881 SERIES TRANSMITTER MODEL NUMBER CODE

PX881 **FLUSHMOUNT ELECTRONIC PRESSURE TRANSMITTER**

PRESSURE RANGE

	PSI	BAR
015 =	0-3 to 0-15 PSI	0-.2 to 0-1 bar
030 =	0-6 to 0-30 PSI	0-.4 to 0-2 bar
100 =	0-20 to 0-100 PSI	0-1.4 to 0-7 bar
300 =	0-60 to 0-300 PSI	0-4 to 0-20 bar

OUTPUT

GI = 4-20 mADC

MATERIAL

BASE	DIAPHRAGM	FILL	PROCESS CONN. (REF. FIG. 1-2)
316SS	HASTELLOY "C"	SILICONE	1 1/2" NPT PIPESIZE ADAPTER COUPLING

COUPLING

316 SS COUPLING & TEFLON GASKET FOR MOUNTING

PX881 100 GI **EXAMPLE**

Model PX881 Pressure Transmitter, 100 psi max. range, 316 SS base, Hastelloy "C" diaphragm, silicone oil fill, output at 4-20mADC, 316 SS plug and coupling, approved by FM and CSA.

DESCRIPTION

The Model PX880/PX881 is a durable and cost effective full featured pressure transmitter. A fully adjustable, all stainless steel transmitter, it is designed for years of stable performance in even the toughest environmental and media conditions. Approvals include ratings for CSA, for both intrinsic safety and explosion-proof, and FM for explosion-proof only. The Model PX880/PX881 also meets NACE standards for offshore applications.

The small size and light weight of the Model PX880/PX881 eliminate the need for bulky mounting hardware and mechanical supports. A lightweight mounting bracket may be all that is required for installation. The integral junction box permits simple field wiring without the need for additional hardware, adding to the speed and ease of installation.

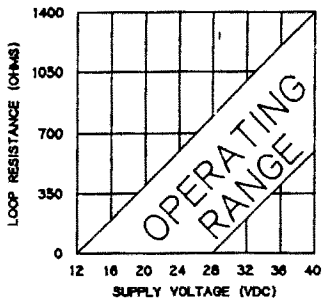
A 4-20mA output is standard with a 12-40VDC power supply. With all 316 stainless steel welded construction, the Model PX880/PX881 is compatible with corrosive media and hazardous environments.

SPECIFICATIONS

FUNCTIONAL SPECIFICATIONS

Service: Liquid, Gas or Vapor
Range Limits:
150 W = 0-30 to 0-150" WC (0-75 to 0-373 mbar)
X15 = 3-15 PSI (.2 to 1 bar)
015 = 0-3 to 0-15 PSI (0-.2 to 0-1 bar)
030 = 0-6 to 0-30 PSI (0-.4 to 0-2 bar)
100 = 0-20 to 0-100 PSI (0-1.4 to 0-7 bar)
300 = 0-60 to 0-300 PSI (0 4 to 0-20 bar)
1K = 0-200 to 0-1000 PSI (0-14 to 0-70 bar) *
3K = 0-600 to 0-3000 PSI (0-40 to 0-200 bar) *
5K = 0-1000 to 0-5000 PSI (0-70 to 0-350 bar) *
* Range not available in flush mount model PX881.
Output: 4-20 mADC, limited to 30 mADC
Power Supply: 12 to 40VDC with reverse polarity protection
Zero Adjustment: ± 10%
Span Adjustment: ± 10%
Turndown: 5:1
Temperature Limits:
Electronics (Ambient) -40°F to 140°F (-40°C to 60°C)
Process Interface -40°F to 212°F (-40°C to 100°C)
Storage -40°F to 212°F (-40°C to 100°C)
Overrange: 300% Upper Range Limit (URL)
Humidity Limits: 0-100% RH

Loop Resistance: 1400 ohms max @ 40 volts



PERFORMANCE SPECIFICATIONS

Accuracy: ± 0.25% of calibrated span including linearity, hysteresis and repeatability.
Response Time: Time constant of 20 milliseconds
Stability: ±0.5% for six months
Temperature Effect:(includes zero & span)
Compensated -20°F to 180°F (-29°C to 82°C)
Between 30°F and 130°F (-1°C & 54°C): ±1% of URL per 50°F (28°C)
Between -20°F and 180°F (-29°C & 82°C): ±1.6% of URL per 50°F (28°C)
Power Supply Effect: ± 0.005% FS per volt
Surge Protection: Standard
Vibration Effect: ±0.1% of URL for 3g to 200 Hz.
Position Effect: 0.05%/90° tilt.
Overrange Effect: ± 0.15% FS per 300% of max. range

PHYSICAL SPECIFICATIONS

Materials of Construction Model PX880
Process Wetted Parts: 316L SS
Non Wetted Parts: 316 SS
Cast Head: CF-8M (316 Cast SS)
"O" Ring: Buna N
Fill Fluid: DC 200 Silicone (Standard)
Process Connection: 1/2 NPT female
Electrical Connection: 1/2 NPT female
Weight: 1.67 Lbs. (.76 KG)
Materials of Construction Model PX881
Process Wetted Parts:
Base: 316 SS
Diaphragm: Hastelloy "C"
Non Wetted Parts: 316 SS
Cast Head: CF-8M (316 Cast SS)
"O" Ring: Buna N
Fill Fluid: DC 200 Silicone (Standard)
Process Connection (Ref. Fig. 1-2):
1 1/2" Pipesize Adapter Coupling
Electrical Connection: 1/2" NPT female
Weight:
Transmitter: 1.52 Lbs. (0.69 KG)
Coupling: 0.34Lbs. (0.15KG)

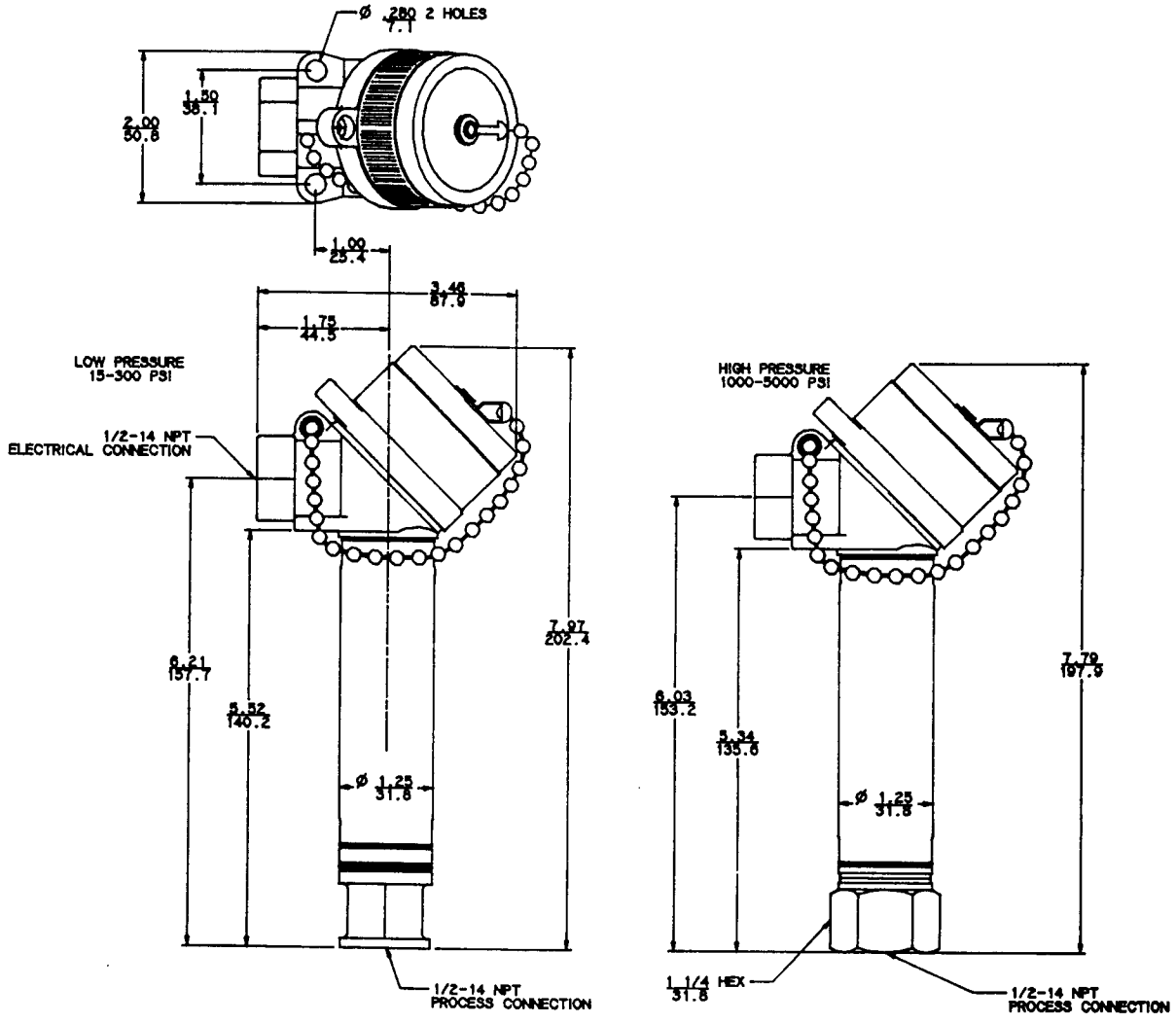


FIGURE 1-1
OUTLINE DIMENSIONS MODEL PX880 SERIES

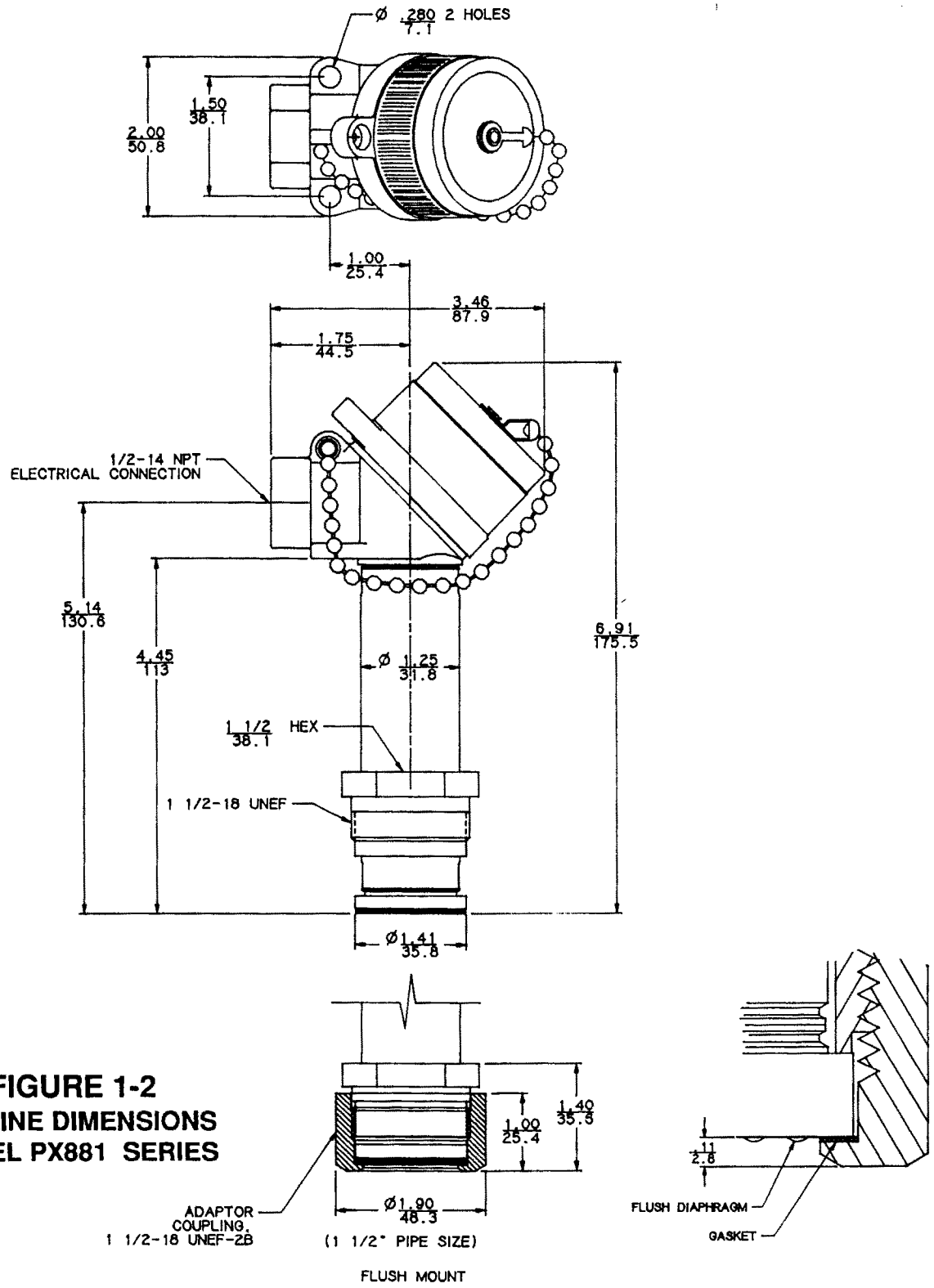


FIGURE 1-2
OUTLINE DIMENSIONS
MODEL PX881 SERIES

CLASSIFICATION (FM & CSA)

FACTORY MUTUAL APPROVALS:

All models are FM approved as Explosion-proof for Class I, Div 1, Groups B,C,D: Dust-ignition proof for Class II, Div 1, Groups E & G and suitable for Class III, Div 1; Hazardous Locations, Nema 4 enclosure. Conduit seal must be within 18 inches of transmitter.

CANADIAN STANDARDS ASSOCIATION (CSA) APPROVALS:

All models meet CSA requirements for intrinsically safe operation in Hazardous Locations as designated by Class I, Div. 1&2, Groups A,B,C, & D and Class II, Groups E,F, & G. Temperature code T3C. Refer to Barrier List Figure 2-6.

All models meet CSA requirements for Explosion-proof in Hazardous Locations as designated by Class I, Div 1, Groups B,C, & D, Class II, Groups E,F, &.G and Class III. The enclosure meets CSA requirements for Enclosure 4.

NOTE: "Exia" is defined as Intrinsically Safe Securite Intrinseque.

BARRIER REMARKS:

A. Installation of barrier should be in accordance with the manufacturer's instructions.

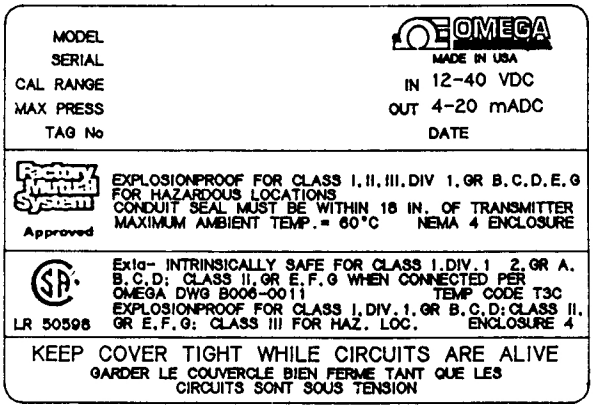
CSA – Figure 2-6.

B. Barrier output terminals should not be exposed without de-energizing all system input power.

C. Resistance from barrier to ground should not exceed one ohm, and non-hazardous location equipment associated with this system shall not employ or generate in excess of 250 Vrms (360 volts peak).

D. Barrier Entity requirements:

CSA - Vmax = 28 VDC, I max = 104 mA, R min = 290 ohms.



PIPING FOR THE MODEL PX880

Transmitter mounting is shown in Figure 2-1A and 2-1B of Figure 2-1 below.

Conduit drain should be provided to prevent moisture buildup in the conduit compartment.

Figure 2-1C shows a transmitter mounting with an elbow used to prevent sediment in process from clogging the line.

Figure 2-1D shows a transmitter mounting with an elbow used to eliminate trapped vapor.

Figure 2-1E shows a tee which can be used for calibration.

Figure 2-2 shows steam piping diagrams.

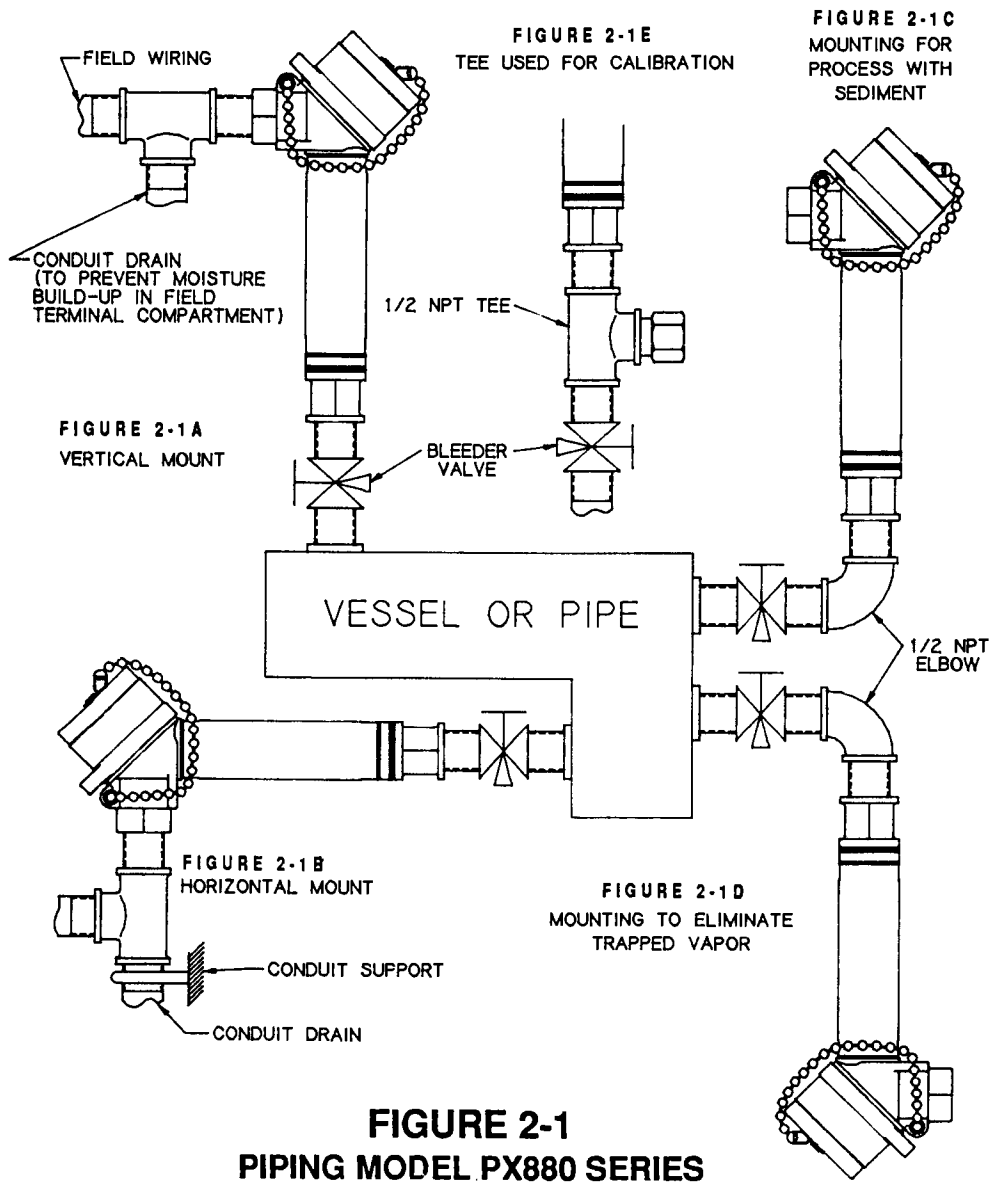


FIGURE 2-1
PIPING MODEL PX880 SERIES

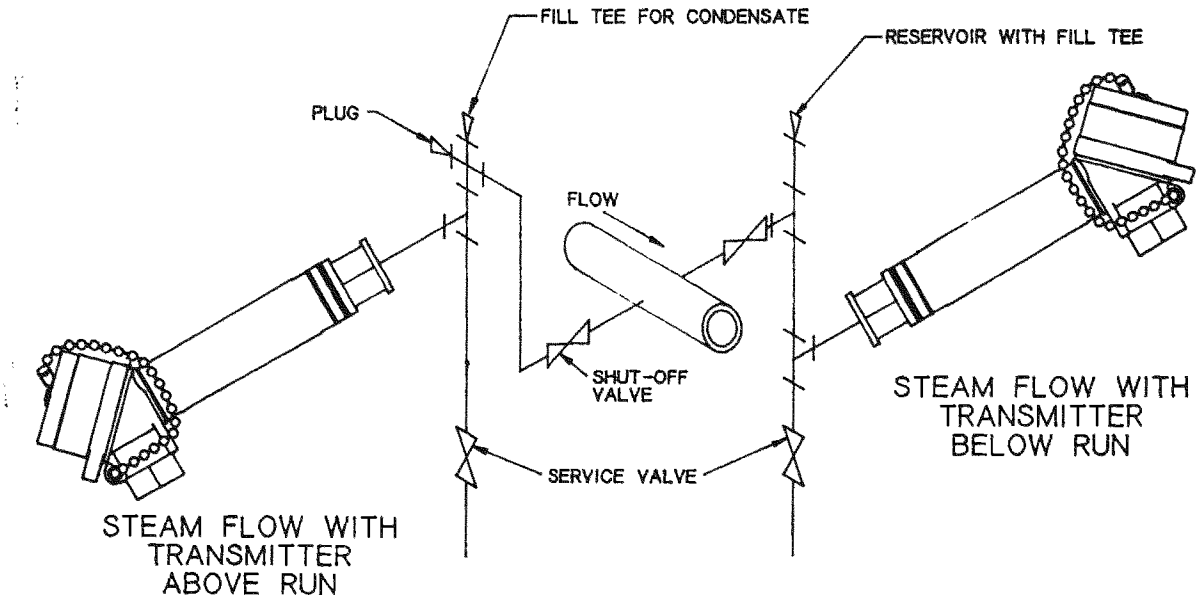


FIGURE 2-2
STEAM PIPING FOR MODEL PX880

PIPING FOR THE MODEL PX881

CAUTION – The Model PX881 is shipped with a protective cover over the flush diaphragm. Do not damage the diaphragm after removing the cover.

To install the Model PX881, the adapter coupling must be welded to the customer's pipe, tank, pipe flange, or other fitting. Figure 2-3 shows some suggested installations and lists suggested pipe sizes, wall and flange thicknesses and hole sizes. The installation procedure is as follows:

1. Cut hole for adaptor coupling.

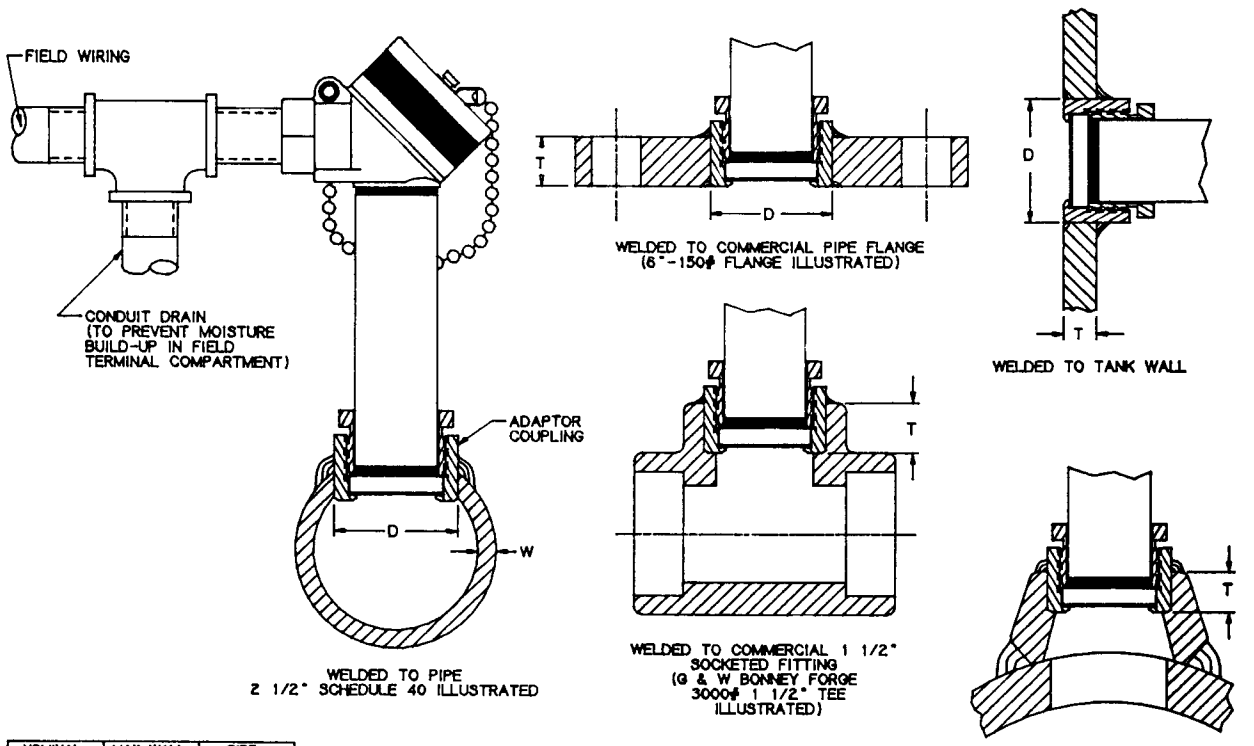
2. Thread plug into the coupling (Figure 2-3) until it bottoms. Do not use the gasket. Use of a high temperature anti-seize material is recommended on the plug during welding.

3. Position the coupling so that the inside face is approximately flush with the inside surface of the customer's pressure vessel and tack weld the coupling to hold in place.

4. With the plug still in the coupling, weld all around the coupling. The plug minimizes the distortion of the coupling due to the welding operation.

5. Remove the plug.

6. Install the gasket into the coupling (Figure 2-3). Insert the Model PX881 into the coupling by screwing the threaded retainer (part of the Model PX881) into the coupling until the gasket just starts to compress. Tighten the retainer another 1/6 revolution (one hex flat).



NOMINAL PIPE SIZE	MAX WALL "W"	PIPE SCHEDULE
2	.154	40
2 1/2	.276	80
3	.300	80
3 1/2	.318	80
4	.437	120
5	.500	120
6	.562	120
8	.718	120
10	.718	100
12	.750	———
14	.750	60
16	.750	———
18	.750	60
20	.750	———
24	.750	———
30	.750	———

FIGURE 2-3
PIPING (FLUSH MOUNT PX881)

WIRING

CAUTION - Power must be off while connections are made to the field terminals.

There are two field terminals (+ signal & - signal) located on the terminal board in the field terminal compartment. (The circuit is protected from reversing polarity)

To wire the transmitter to receiver and power supply.

1. Install wire between the positive terminal of the transmitter and the positive terminal of the power supply, see Figure 2-4.
2. Install wire between the negative terminal of the transmitter and the positive terminal of the receiver, see Figure 2-4.
3. The field terminals will accept a stripped wire lead from No. 14 AWG to No.22 AWG.
4. The transmitter housing is normally grounded. If the signal circuit must be grounded, use the ground position on terminal provided for this purpose, see Figure 2-4.

NOTE: In order to avoid "Ground Loop" conditions, there should be only one earth ground in a loop.

5. Seal wires entering the housing with sealing compound to prevent water from entering the field terminal compartment.

There are two test terminals (TP+ & TP-) located on the terminal board in the field terminal compartment.

Test terminals have the same output signal (4 to 20 mADC) as the signal terminals and are provided as an in-circuit monitor, see Figure 2-4.

NOTE: The cover must be closed tightly to ensure explosion-proof design.

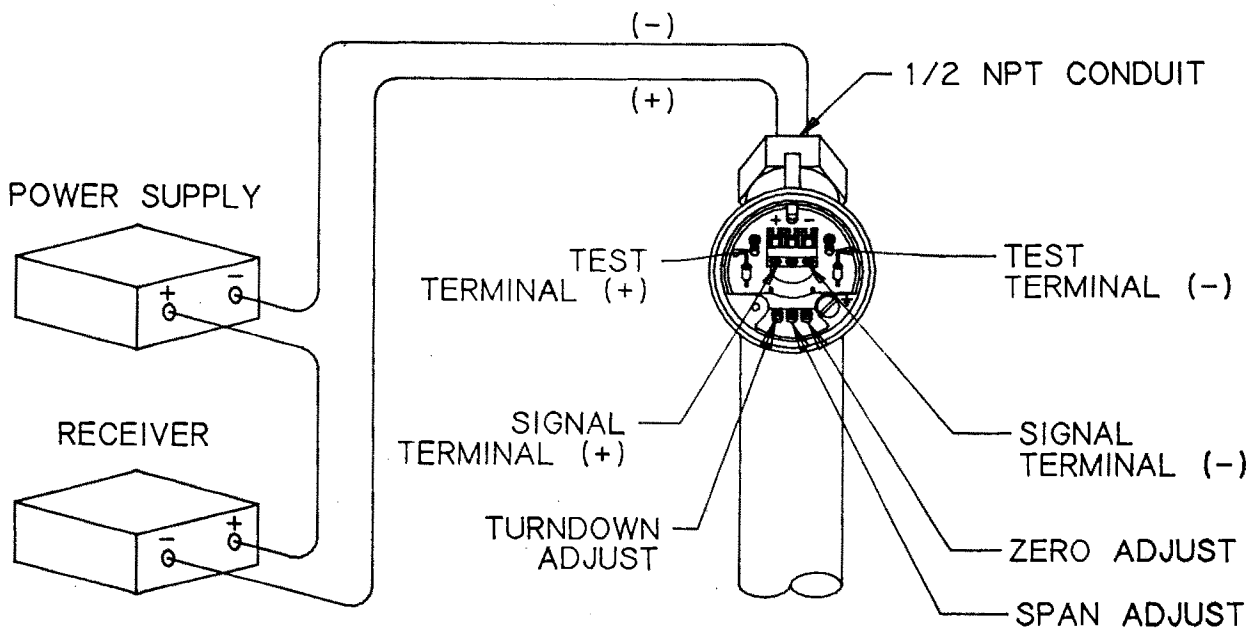
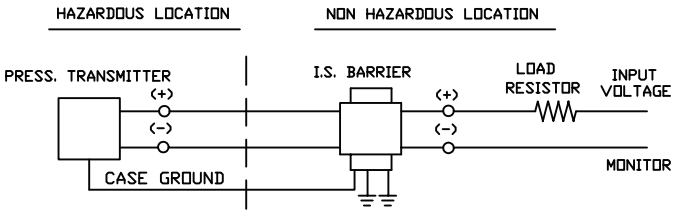


FIGURE 2-4
WIRING

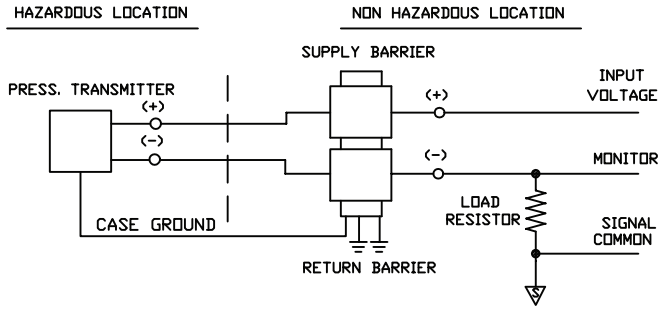
BASIC INSTALLATION CIRCUIT DIAGRAM



SINGLE BARRIER CONFIGURATION

SUGGESTED LIST OF CSA APPROVED BARRIERS:

MANUFACTURER	MODEL NO.	PUBLICATION NO.
STAHL	8901/31-280/100/70	8901603310
STAHL	8903/31-315/050/70	8903601310
HONEYWELL	38545-0000-0110-113-F585	S-385-22
MTL	728+	PS700-10
MTL	708	PS700-10



TWO BARRIER CONFIGURATION

SUGGESTED LIST OF CSA APPROVED BARRIERS:

MANUFACTURER	MODEL NO.	PUBLICATION NO.
STAHL	8901/31-280/100/70 (SUPPLY)	8901603310
STAHL	8901/33-086/000/00 (RETURN)	8901603310
STAHL	8903/31-315/050/70 (SUPPLY)	8903601310
STAHL	8901/33-086/000/00 (RETURN)	8901603310
MTL	787 OR 787S (SUPPLY + RETURN)	PS700-10

NOTES :

1) USE ANY CSA CERTIFIED SINGLE CHANNEL ZENER DIODE BARRIER, HAVING SAFETY PARAMETERS OF 28 V MAX/290 OHM MIN.,FOR THE SINGLE BARRIER CONFIGURATION OR FOR THE SUPPLY BARRIER IN THE 2 BARRIER CONFIGURATION.
   FOR THE RETURN BARRIER,IN THE 2 BARRIER CONFIGURATION,USE ANY CSA CERTIFIED DIODE-RETURN BARRIER.
2) TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS.
3) INTRINSICALLY SAFE FOR HAZARDOUS LOCATIONS,CLASS I; GROUPS A,B,C,D, CLASS II;GROUPS E,F,G, AND CLASS III

FIGURE 2-6
ENTRINSICALLY SAFE BARRIER LIST (EST)

OPERATION

PRINCIPLE OF OPERATION

The Model PX880/PX881 Pressure Transmitter series is designed to continuously measure process pressure. The heart of the Model PX880/PX881 series pressure transmitter is a silicon piezoresistive sensing chip. This miniature microetched semiconductor gives a voltage output proportional to the applied pressure. This chip is isolated from the process media by a stainless steel diaphragm. A silicone oil or other specified fill fluid is used to transmit the process pressure to the sensor.

A Surface Mount (SMT) amplifier board, enclosed in a sealed chamber, is used to convert the millivolt signal from the sensor to a calibrated 4-20mA transmitter output. Transmitter electronics are completely surge protected.

Each transmitter is tested over both pressure and temperature ranges. A thick film compensator circuit is used to bring the output of the sensor into specification. After compensation, every transmitter is tested a second time for pressure and temperature effects to ensure that it meets performance specifications.

ADJUSTMENTS

There are three adjustments which are located in the Field Terminal compartment; zero, span and turndown.

Zero Adjustment (Z)
Offsets due to elevation or suppression of approximately 10% full scale can be adjusted using the zero adjustment terminal (pot).

Span Adjustment (S)
Span can be adjusted approximately 10% full scale using the span adjustment terminal (pot).

The span adjustment terminal (pot) is used as a fine span adjustment.

Turndown Adjustment (T) 5:1
Range turndown of approximately 80% full scale can be reached using the turndown(T) adjustment terminal. For example a transmitter with a full scale pressure range of 100psi can be "turned down" to 20psi and still maintain a 4-20mA output.

The turndown adjustment terminal (pot) can be used as a coarse span adjustment.

CALIBRATION

FACTORY CALIBRATION

The Model PX880/PX881 Transmitters are factory calibrated at maximum range and ambient temperatures unless otherwise specified.

CAUTION - Power must be off while connections are made to the field terminals,

PIPING FOR CALIBRATION

The Model PX880/PX881 Transmitter can be calibrated in-system or out-of-system.

Figure 4-1 shows an out-of-system piping diagram.

Figure 4-2 shows an in-system piping (includes a tee for calibration). The bleeder valve should block the process.

CALIBRATION INSTRUMENTATION

NOTE: Calibration equipment should be accurate to five times the accuracy of the transmitter.

The Model PX880/PX881 Transmitter can be calibrated using an ammeter or voltmeter (Figure 4-2).

Use an ammeter with internal shunt impedance less than 10 ohms. An impedance greater than 10 ohms will give erroneous readings.

Use a voltmeter with a 10 ohm precision resistor connected as shown in Figure 4-2.

CALIBRATION PROCEDURE

The Model PX880/PX881 Transmitter can be calibrated using the test terminals or field terminals.

Outputs using an ammeter are in mA with a resolution of 0.01 mA.

Outputs using a voltmeter and a 10 ohm resistor are in mV with a resolution of 0.1 mV.

Calibration procedure using the Test Terminals, as shown in Figure 4-3, is as follows:

With the calibration set up as show in either Figure 4-2 or 4-3.

1. Apply 0 psi pressure to input.
2. Adjust "Zero" pot to obtain 4mA (40mV)* output.
3. Apply pressure which corresponds to "full scale" pressure to input.
4. Adjust "span" pot to obtain 20 mA (200mV)* output.
5. Repeat steps 1 thru 4 until output values are achieved.
6. If "span" required differs from previous span by more than 10%, adjust "turndown" pot prior to "span" pot and proceed to step 4.

* Using 10 ohm resister as shown in Figure 4-2.

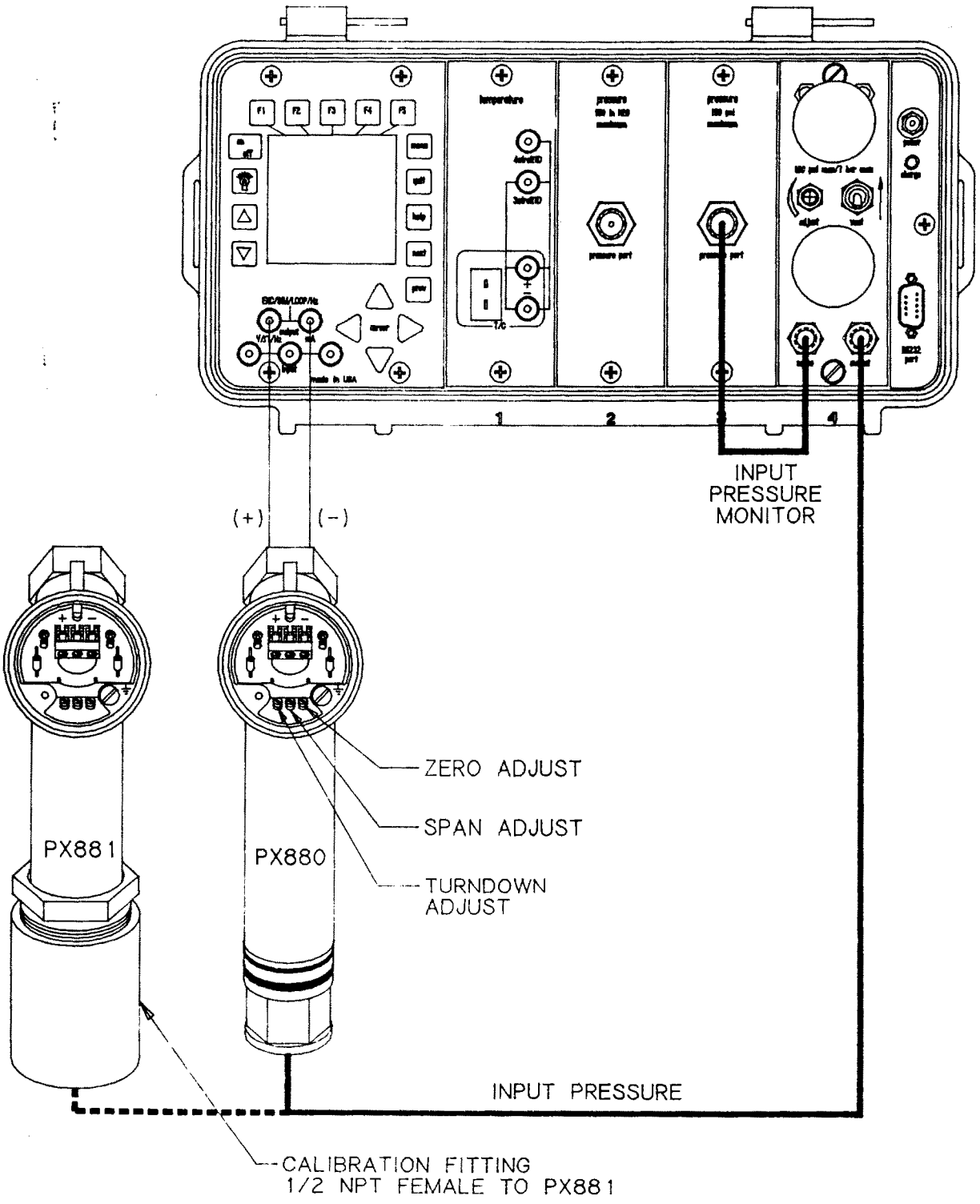


FIGURE 4-1
OUT OF SYSTEM PIPING/CALIBRATION

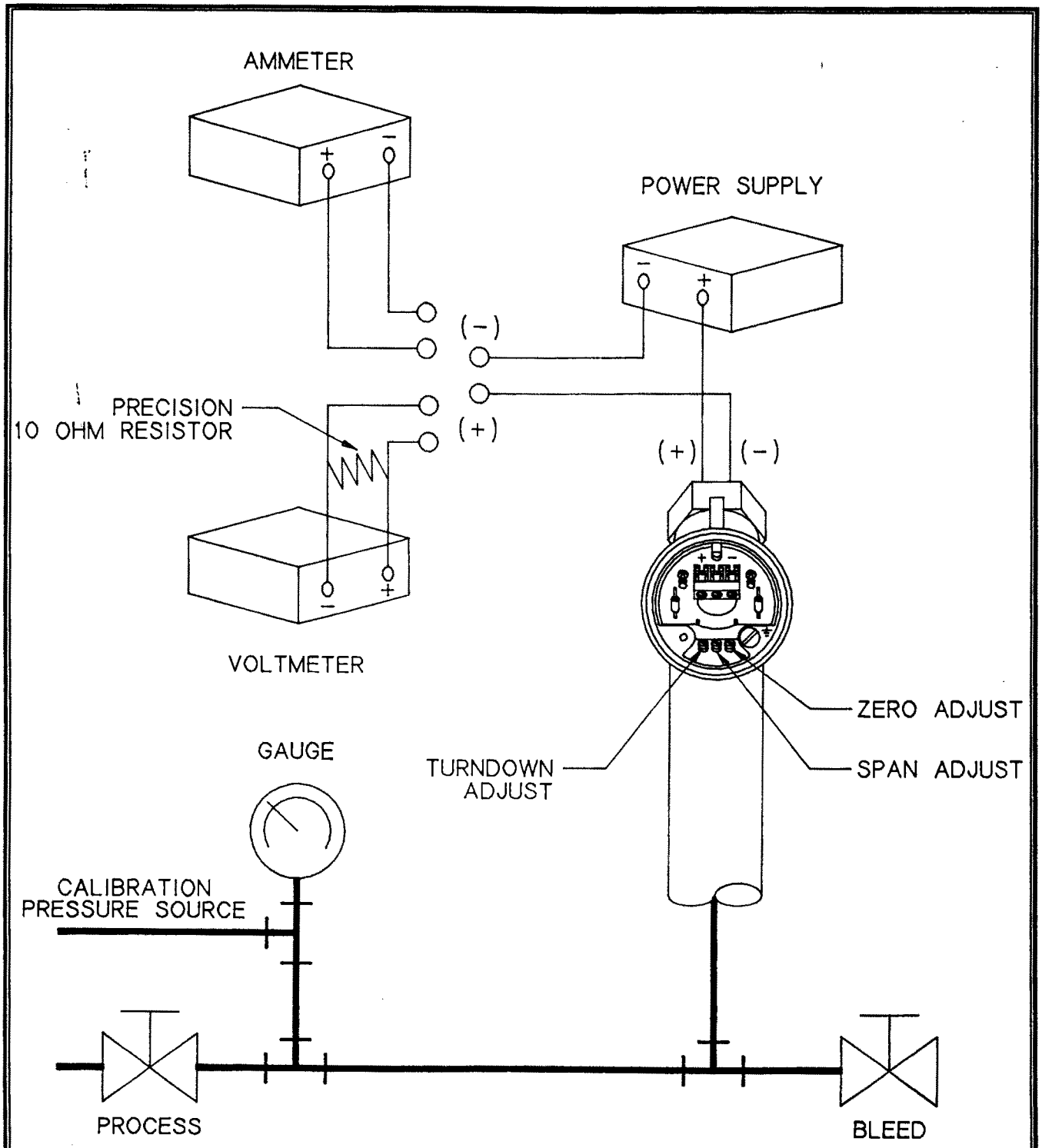


FIGURE 4-2
IN SYSTEM PIPING/CALIBRATION

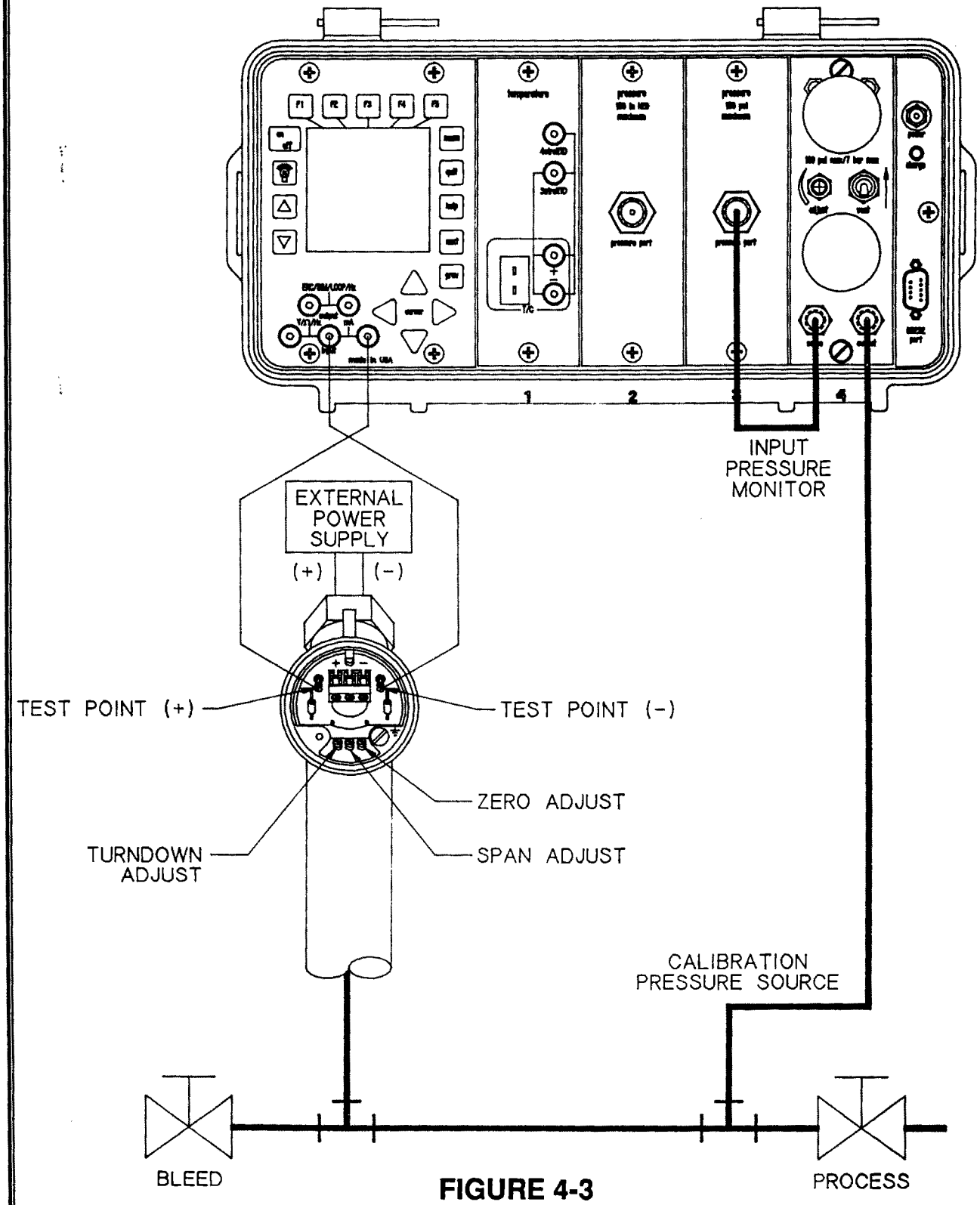


FIGURE 4-3
IN SYSTEM PIPING/CALIBRATION USING TEST TERMINALS

TROUBLESHOOTING

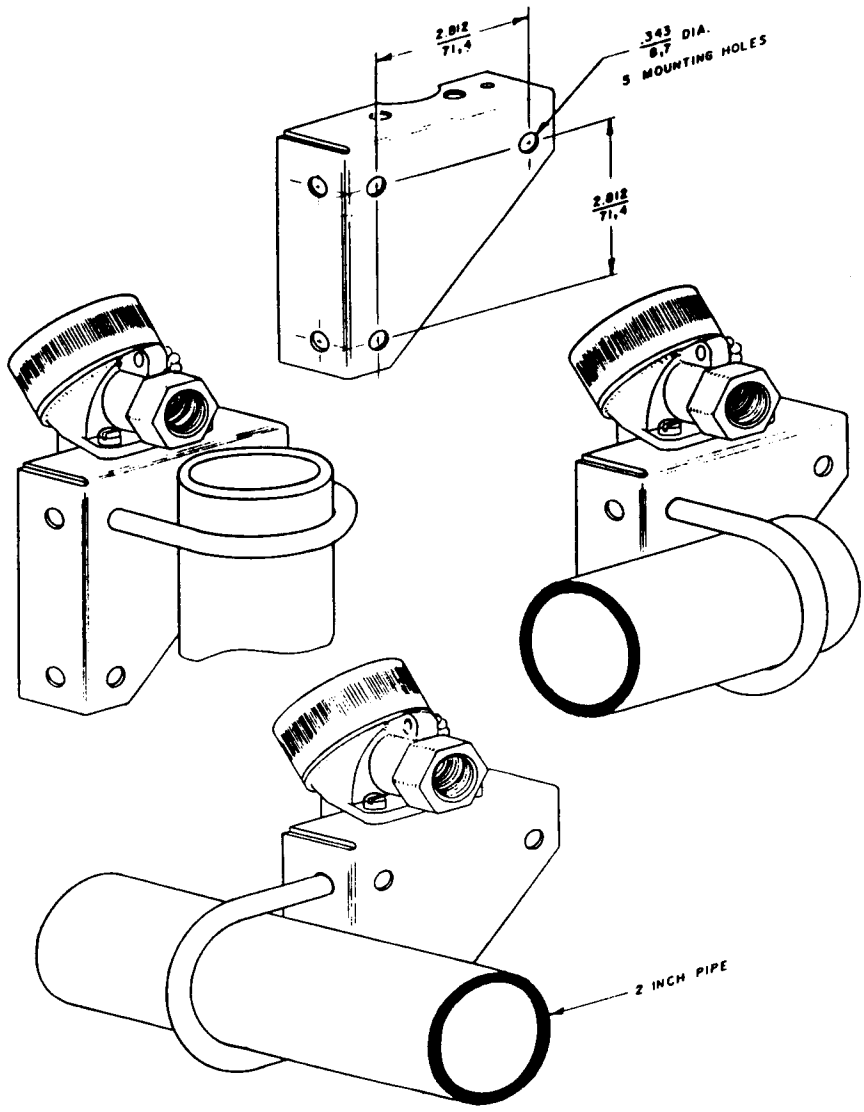
The Model PX880/PX881 Pressure Transmitter is an all welded unit. There is no access to the electronic circuitry.

The zero, span and turndown potentiometers are connected to shafts which are sealed by "O" rings.

If turning shafts in either direction does not change output, proceed as follows:

> With a small screwdriver under the head of the shaft, pry shaft upward slightly. Turn shaft with a slight downward pressure to re-engage into potentiometer.

If no output: check wires in terminal strip.



QUAN.	DESCRIPTION
1	MOUNTING BRACKET
1	5/16-18 "U" BOLT
2	5/16 HEX NUTS
2	1/4-20 x 5/8 SCREWS
2	1/4-20 HEX NUTS

FIGURE 6-1
MOUNTING BRACKET OPTION

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **61 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **five (5) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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