

MODEL 831 ELECTRONIC PRESSURE TRANSMITTER

INSTRUCTIONS FOR INSTALLATION AND OPERATION



AMETEK

U.S. GAUGE, PMT PRODUCTS
820 PENNSYLVANIA BLVD., FEASTERVILLE, PA 19053

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WARRANTY POLICY

Ametek ["Seller"] warrants these products for a period of one year from the date of shipment that all products manufactured by the seller are free from defects of material and workmanship when used within the service, range, and purpose for which they were manufactured. Seller will, at its option, repair, replace, or refund the purchase price of parts found by Seller to be defective in material or workmanship provided that written notice of such defect requesting instructions for repair, replacement, or refund is received by Seller at the address below within the warranty period and provided that any instructions thereafter given by Seller are complied with.

This warranty shall not apply (i) to the performance of any system of which Seller's products are a component part, (ii) to deterioration by corrosion or any cause of failure other than defect of material or workmanship, or (iii) to any of Seller's products or parts thereof which have been tampered with or altered or repaired by anyone except Seller or someone authorized by Seller, or subjected to misuse, neglect, abuse or improper use or misapplication such as breakage by negligence, accident, vandalism, the elements, shock, vibration, or exposure to any other service, range, or environment of greater severity than that for which the products were designed.

SELLER MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF FITNESS OR OF MERCHANTABILITY WITH RESPECT TO ITS PRODUCTS, OR ANY PART THEREOF, OTHER THAN AS EXPRESSLY SET FORTH ABOVE. NOR SHALL SELLER HAVE INCURRED ANY OTHER OBLIGATIONS OR LIABILITIES OR BE LIABLE FOR ANY ANTICIPATED OR LOST PROFITS, INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, TIME CHARGES, OR ANY OTHER LOSSES INCURRED IN CONNECTION WITH THE PURCHASE, INSTALLATION, REPAIR, OR OPERATION OF ITS PRODUCTS (INCLUDING ANY PARTS REPAIRED OR REPLACED.)

This warranty does not extend to anyone other than the original Buyer from the Seller.

SECTION V

SERVICE

FACTORY SERVICE

Factory or field service is available by contacting the Service Department. Supply the following information:

- 1) Instrument Model Number and Serial Number as shown on the Instrument Data Tag.
- 2) Description of problem being experienced.
- 3) Description and location of the installation.

For service:

TELEPHONE: 215-355-6900

FAX: 215-354-1800

PARTS - ORDERING

When ordering replacement transmitters, supply the following information:

- 1) Part description and model number.
- 2) Quantity of each transmitter required.
- 3) Shipping instructions and address.
- 4) P.O. number and billing address or phone in your credit card information.

Mail, FAX or Email Orders to:

AMETEK U.S. GAUGE, PMT PRODUCTS

820 Pennsylvania Blvd.

Feasterville, PA 19053

TELEPHONE 215-355-6900

FAX 215-354-1801

EMAIL pmt@ametek.com

WEBPAGE www.ametekusg.com

**ISO 9001 REGISTERED
MANUFACTURER**

SECTION IV

OPERATION

INTRODUCTION

OPERATION

PRINCIPLE OF OPERATION

The Model 831 Pressure Transmitter series is designed to continuously measure process pressure. The heart of the Model 831 series pressure transmitter is a silicon piezoresistive sensing chip. This miniature microetched semiconductor gives an 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 amplifier board, enclosed in a sealed chamber, is used to convert the millivolt signal from the sensor to a calibrated 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.

INTRODUCTION

The Model 831 pressure transmitter provides fixed range performance and all 316 stainless steel construction in a durable, accurate and cost effective package. The transmitters provide 4-20 mA or Low Power Voltage output and are designed to meet FM & CSA approvals for explosion proof apparatus for use in hazardous locations.

Model 831 provides as standard a 1/2" NPT female process connection for direct mounting to existing piping systems. It is provided with a 3/4" NPT female conduit connection and a shielded 22AWG cable.

SAFETY SUMMARY

This instrument is designed to prevent an 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 that is essential to the correct operation of the instrument. |
| NOTE - | Specifies supplementary and perhaps essential information in relation to a particular procedure or condition. |

SECTION I

SPECIFICATIONS

MODEL 831T SINGLE PORT PRESSURE TRANSMITTER MODEL NUMBER CODE

831 ELECTRONIC PRESSURE TRANSMITTER

PROCESS CONNECTION

T = 1/2" NPT FEMALE

PRESSURE TYPE

- G = GAUGE
- A = ABSOLUTE
- C = COMPOUND
- V = VACUUM

PRESSURE RANGE (Other ranges available, consult factory)

- 0015 = 0-15 PSI (0-1.0 bar)
- 0030 = 0-30 PSI (0-2.1 bar)
- 0100 = 0-100 PSI (0-6.9 bar)
- 0300 = 0-300 PSI (0-20.7 bar)
- 1000 = 0-1000 PSI (0-69.0 bar)
- 3000 = 0-3000 PSI (0-206.9 bar)
- 5000 = 0-5000PSI (0-344.8 bar)

INPUT/OUTPUT

- B = 12-30 VDC / 4-20 mA
- C = 8-14 VDC / 1-5 VDC (LOW POWER)
- D = 6-14 VDC / 0.8-3.2 VDC (LOW POWER)

MATERIAL

- L = 316L SS
- H = 316L SS

BASE

- = 316L SS
- = 316L SS

DIAPHRAGM

- 316L SS
- HASTELLOY C276

FILL

- S = SILICONE OIL

831 T G 5000 B L S (EXAMPLE)

EXAMPLE: Model 831T Electronic Pressure Transmitter, 1/2" NPT-Female Process Connection, Gauge Pressure Type, 5000 psi Range, 12-30 VDC Input, 4-20 mA DC Output, 316L Stainless Steel Diaphragm, Silicon Oil Fill.

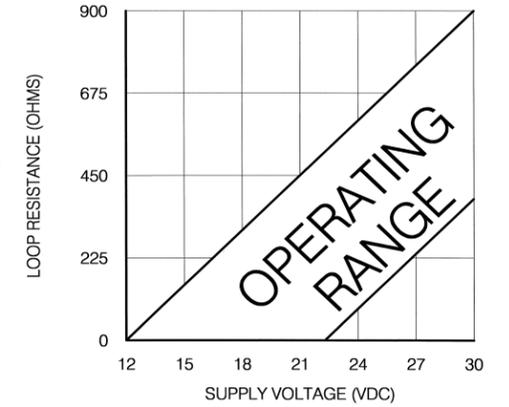
SECTION III

INSTALLATION

WIRING

CAUTION - Power must be off while connections are made to wires.

IMPORTANT - In order to avoid "Ground Loop" conditions, there should be only one ground in a loop. The shield / drain can be used to provide optional noise rejection if required.



4-20 mA Output Supply Voltage vs Loop Resistance.

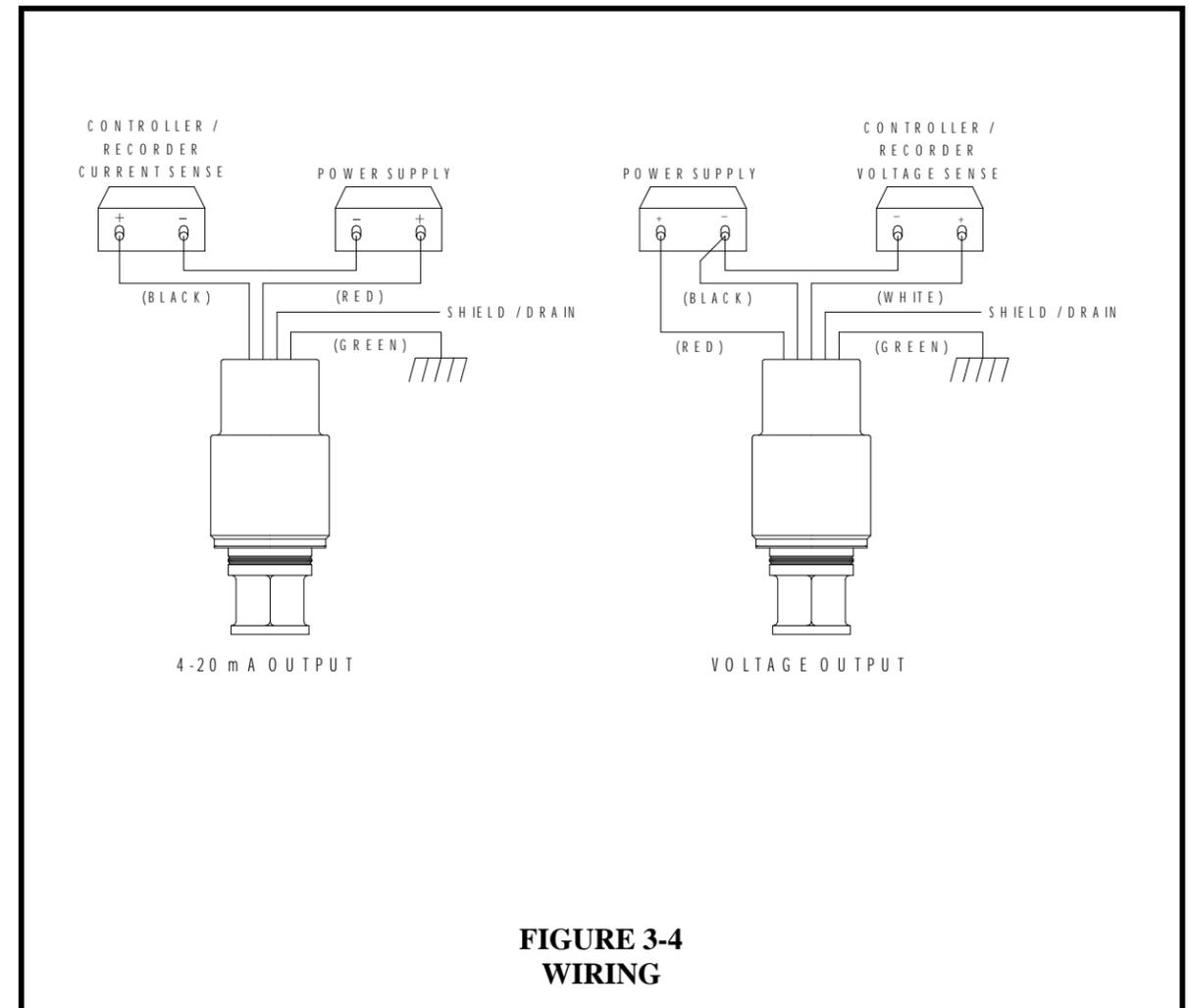


FIGURE 3-4
WIRING

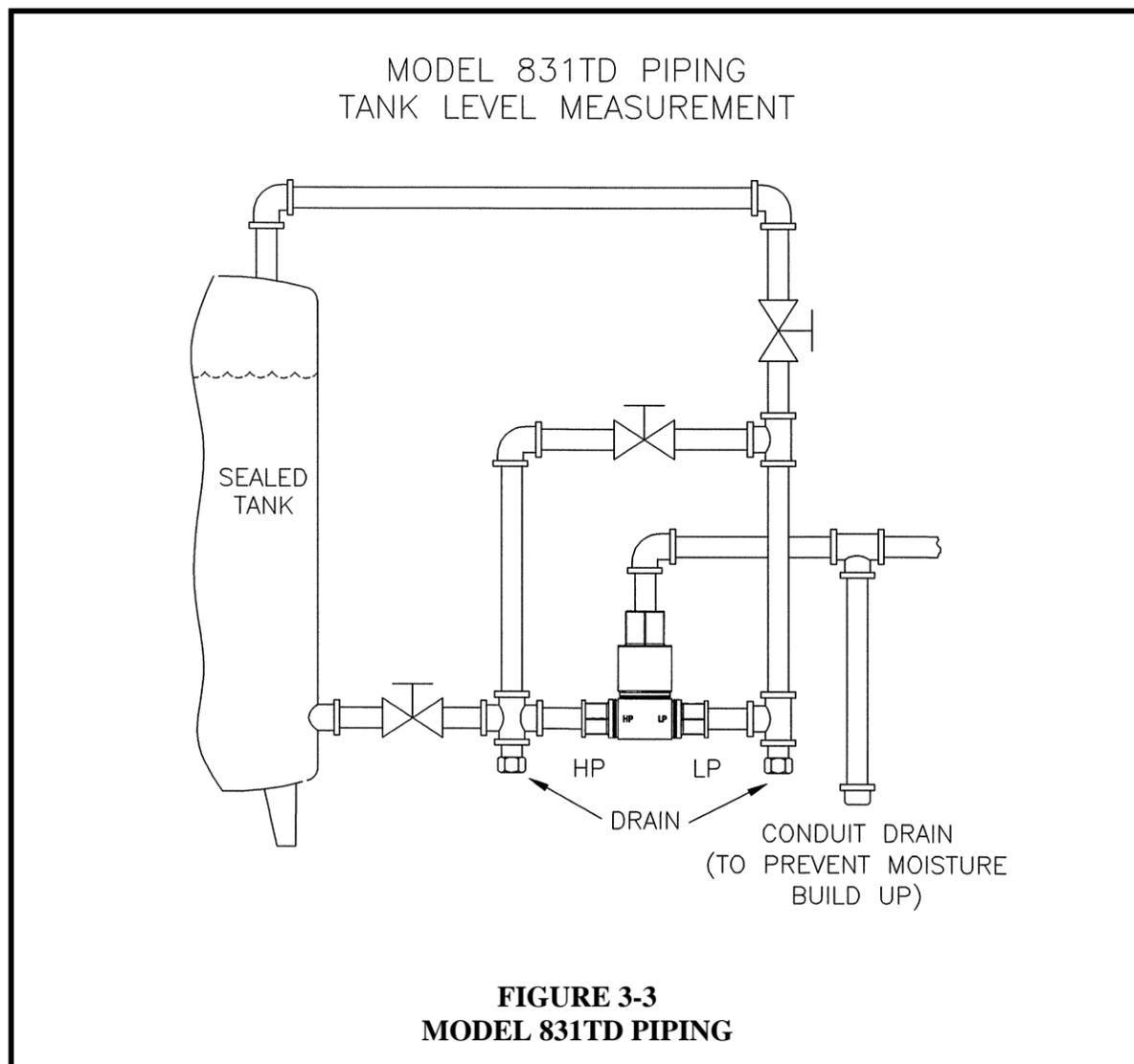
SECTION III

MODEL 831TD DIFFERENTIAL PIPING

WARNING— Pressure in excess of 2,500 psig may result in rupture of the pressure transmitter and release of the media being measured.

CAUTION— Pressure in excess of 3 times full scale may result in damage to the pressure transmitter.

IMPORTANT—To avoid measurement errors do to a liquid “head” the pipe connection to the top of the vessel must be kept free of liquid.



SECTION I

DESCRIPTION

The Model 831 is the most durable and cost effective pressure transmitter presently available. A fixed range, all stainless steel transmitter, it is designed to continuously measure process pressure for years of stable performance in even the toughest environmental and media conditions. The silicon piezoresistive sensing element consists of four ion implanted strain gauges forming a Wheatstone bridge circuit which will vary its resistance when subjected to process pressure. The Model 831 meets FM & CSA approval for explosion-proof rating in hazardous locations.

The small size and light weight of the Model 831 transmitter eliminates the need for complicated mounting hardware and mechanical supports, thereby reducing installation time substantially. The inline connection permits simple field wiring without the need for additional hardware, adding to the speed and ease of installation. Its profile allows for mounting in places too tight for other transmitters.

With all 316 stainless steel welded construction, the Model 831 is compatible with corrosive media and hazardous environments. The transmitter is weather proof and capable of withstanding direct spray. The Model 831 also meets NACE standards for offshore applications.

SPECIFICATIONS (SINGLE PORT)

FUNCTIONAL SPECIFICATIONS

Service: Liquid, Gas or Vapor

Pressure Range Limits:

-14.7 to 5000 PSI (-1.0 to 345 BAR)

Input (Power Supply) / Output:

B Option = 12-30 VDC / 4-20 mADC,
Limited to 30 mADC

C Option = 8-14 VDC / 1-5 VDC

D Option = 6-14 VDC / 0.8 to 3.2 VDC

Offset

B Option = 4.0 mA \pm 2% Span

C Option = 1.0 VDC \pm 2% Span

D Option = 0.8 VDC \pm 2% Span

Span

B Option = 16.0 mA \pm 1 % Span

C Option = 4.0 VDC \pm 1% Span

D Option = 2.4 VDC \pm 1% Span

Loop Resistance: 900 ohms max @ 30 VDC
(B Output Option Only)

SPECIFICATIONS

Temperature Range:

Ambient Operating: -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)

Overpressure: 3X Upper Range Limit

Humidity Limits: 0-100% RH

PERFORMANCE SPECIFICATIONS

Accuracy: \pm 0.30% of Span (BFSL) including linearity, Hysteresis and repeatability at 25°C and 12 VDC supply voltage

Stability: \pm 0.5 % of Span for six months

Temperature Effect: (includes zero & span)

Compensated: -20 to 140°F (-29 to 60°C)

\pm 2.0% of Span / 50°F (28°C)

Vibration Effect: \pm 0.1% of Span for 3g to 200 Hz

PHYSICAL SPECIFICATIONS

Materials of Construction

Process Wetted Parts: 316L SS or Hastelloy C276

Non Wetted Parts: 316 SS

Fill Fluid: Silicone (DC200)

Process Connection: 1/2" NPT-Female

Electrical Connection: 3/4" NPT-Female / Cable
Weight 0.83 lb. (374 grams)

Cable: 24 inches (61 cm), 22 AWG Shielded

CLASSIFICATIONS FOR HAZARDOUS LOCATIONS

Factory Mutual

Explosion-proof* for Class I, Division 1, Groups B, C & D Class II Groups E, F & G; and Class III Hazardous Locations and Indoor and Outdoor NEMA Type 4 Enclosure.

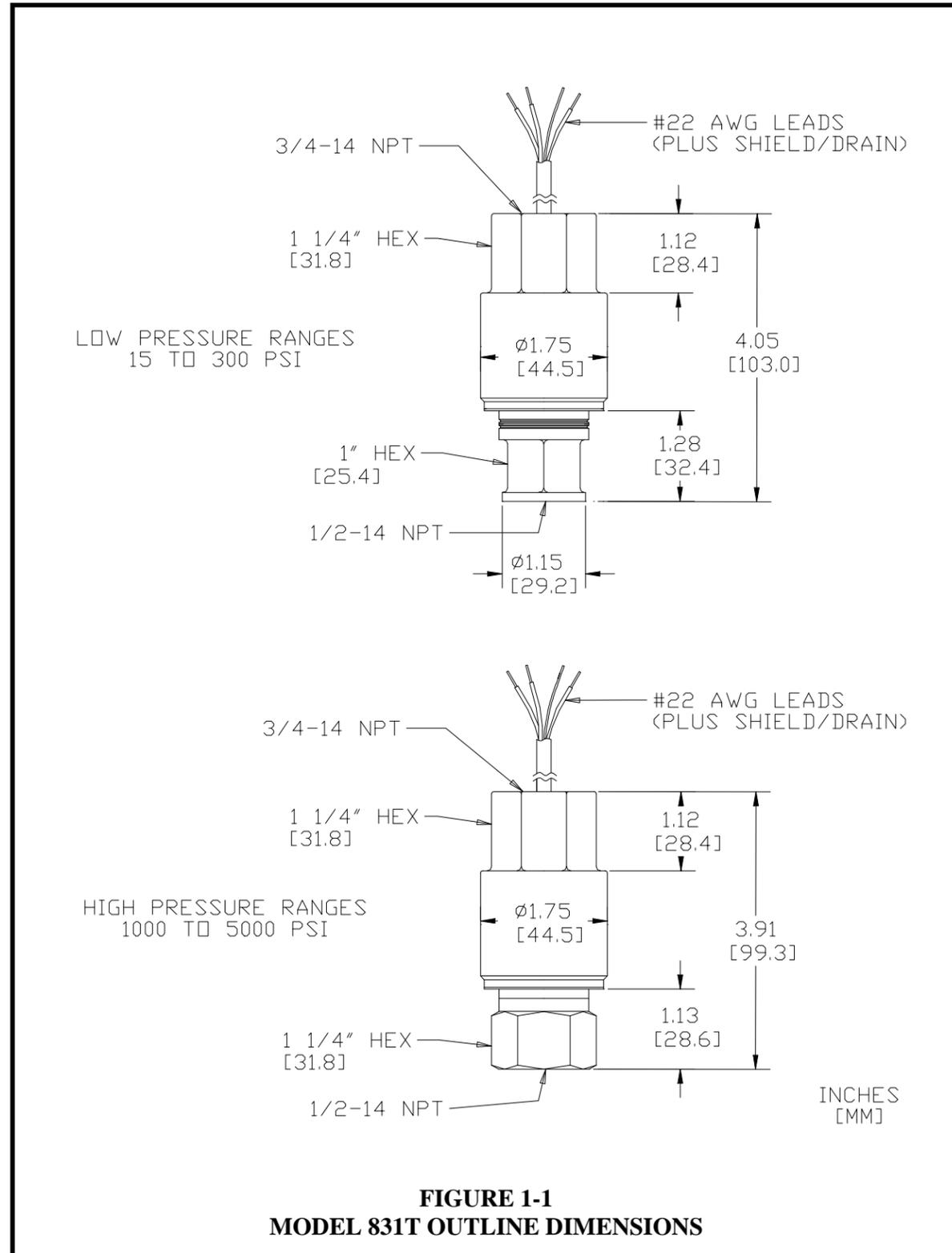
Canadian Standards Association

Explosion-proof* for Class I, Division 1, Groups B, C & D, Class II, E, F & G and Class III Hazardous Locations and meets CSA requirements for Enclosure 4.

* Conduit seal must be within 18" of transmitter.

SECTION I

SPECIFICATIONS



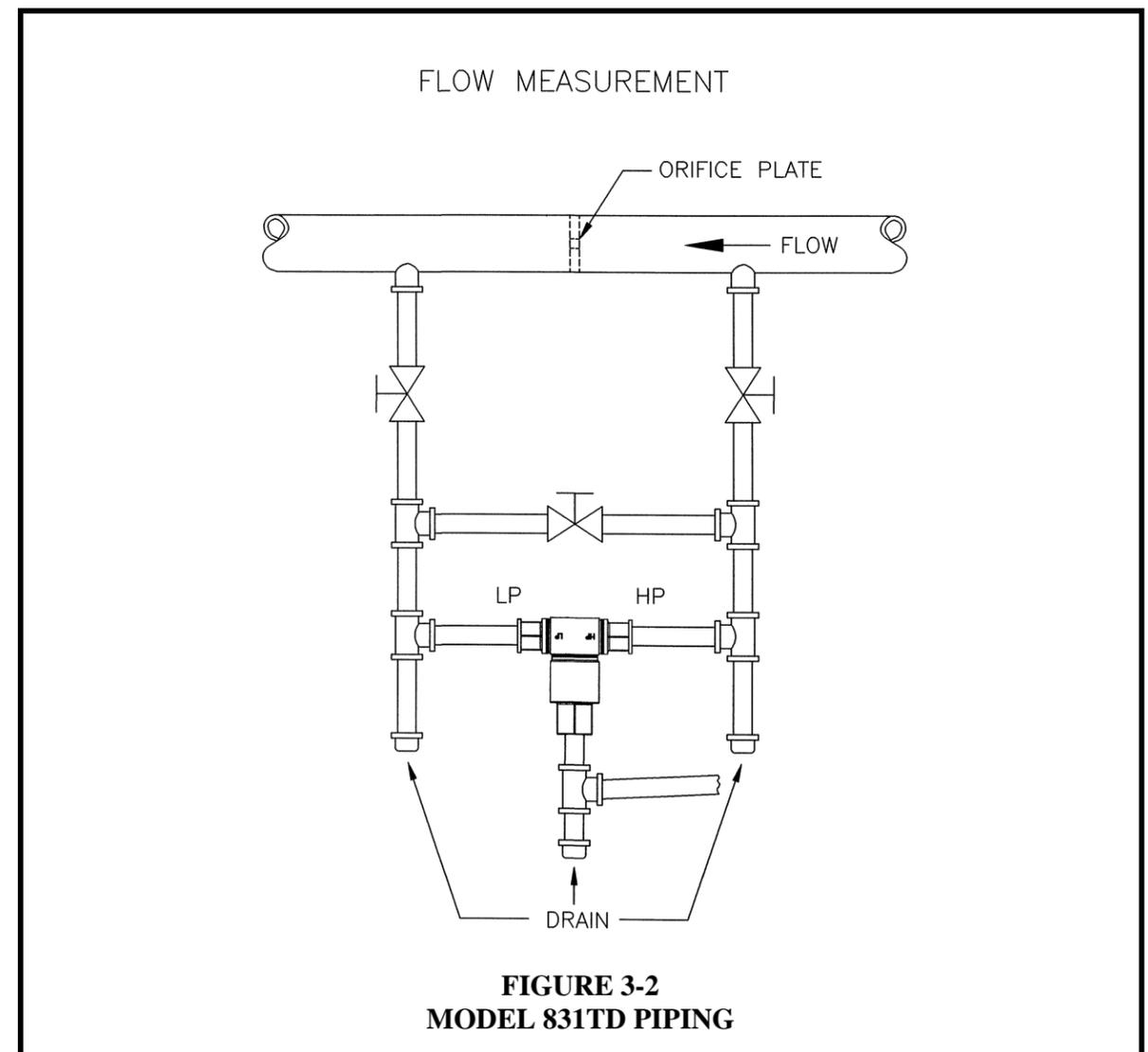
SECTION III

INSTALLATION

MODEL 831TD DIFFERENTIAL PIPING

WARNING — Pressure in excess of 2,500 psig may result in rupture of the pressure transmitter and release of the media being measured.

CAUTION — Pressure in excess of 3 times full scale may result in damage to the pressure transmitter.



SECTION III

INSTALLATION

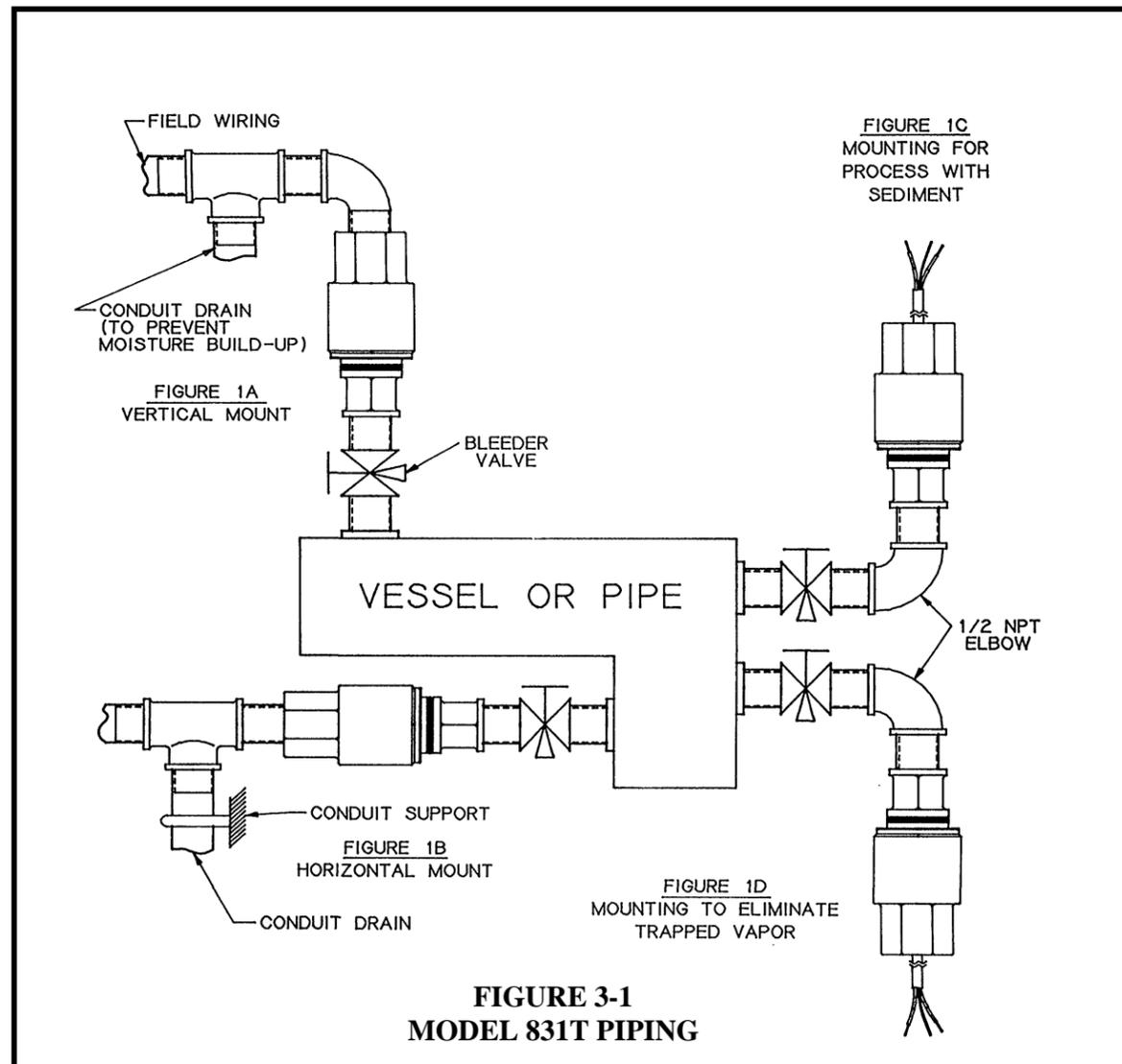
MODEL 831T SINGLE PORT PIPING

Transmitter mounting and conduit piping is shown in Figure 1A and 1B of Figure 3-1, below.

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

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

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



**FIGURE 3-1
MODEL 831T PIPING**

SECTION II

SPECIFICATIONS

MODEL 831TD DIFFERENTIAL PRESSURE TRANSMITTER MODEL NUMBER CODE

831 ELECTRONIC PRESSURE TRANSMITTER

PROCESS CONNECTION
T = 1/2" NPT FEMALE

PRESSURE TYPE
D= DIFFERENTIAL

PRESSURE RANGE (Other ranges available, consult factory)

- 0006 = 0-6 psid (0-0.41 bar)
- 0015 = 0-15 psid (0-1.0 bar)
- 0030 = 0-30 psid (0-2.1 bar)
- 0060 = 0-60 psid (0-4.1 bar)
- 0100 = 0-100 psid (0-6.9 bar)
- 0150 = 0-150 psid (0-10.3 bar)
- 0200 = 0-250 psid (0-13.8 bar)
- 0300 = 0-300 psid (0-20.7 bar)
- 0500 = 0-500 psid (0-34.5 bar)

INPUT/OUTPUT
B = 12-30 VDC / 4-20 mA

MATERIAL BASE **DIAPHRAGM**
L = 316L SS 316L SS

FILL
S = SILICONE OIL

831 T D 200 B L S (EXAMPLE)

EXAMPLE: Model 831TD Electronic Pressure Transmitter, 1/2" NPT-Female Process Connection, Differential Pressure Type, 200 psid Range, 12-30 VDC Input, 4-20 mA DC Output, 316L Stainless Steel Diaphragm, Silicon Oil Fill.

SECTION II

DESCRIPTION

The Model 831TD is a fixed range, all stainless steel differential transmitter, it is designed to continuously measure process pressure for years of stable performance in even the toughest environmental and media conditions. The silicon piezoresistive sensing element consists of four ion implanted strain gauges forming a Wheatstone bridge circuit which will vary its resistance when subjected to process pressure. The Model 831TD is designed and constructed to meet CSA explosion-proof rating in hazardous locations. The small size and light weight of the Model 831TD differential transmitter eliminates the need for complicated mounting hardware and mechanical supports, thereby reducing installation time substantially. The inline connection permits simple field wiring without the need for additional hardware, adding to the speed and ease of installation. Its profile allows for mounting in places too tight for other transmitters.

With all 316 stainless steel welded construction, the Model 831TD is compatible with corrosive media and hazardous environments. The transmitter is weather proof and capable of withstanding direct spray. It meets indoor and outdoor rating for NEMA 4 type enclosures. The Model 831TD also meets NACE standards for offshore applications.

SPECIFICATIONS (DIFFERENTIAL PRESSURE)

FUNCTIONAL SPECIFICATIONS

Service: Liquid, Gas or Vapor

Pressure Range Limits:

0-6 to 0-500 psid (0.41 to 34.5 bar differential)

Input (Power Supply) / Output:

B Option = 12-30 VDC / 4-20 mA DC,
Limited to 30 mA DC

Null Offset

B Option = 4.0 mA ±1% Span

Span

B Option = 16.0 mA ±1 % Span

Loop Resistance: 900 ohms max @ 30 VDC

SPECIFICATIONS

Temperature Range:

Ambient Operating: -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)

Maximum Pressure: 3X Full Scale Pressure
(Either Port)

Burst Pressure: 2500 psig

Humidity Limits: 0-100%RH

PERFORMANCE SPECIFICATIONS

Accuracy: ±0.5% Span (BFSL) including linearity, hysteresis and repeatability at 25°C and 12 VDC supply voltage (±1.0% Span for 0-6 psid pressure range)

Stability: 0.5% Span for six months (1.0% Span for 6 psid pressure range)

Temperature Effect: (includes zero & span)

Compensated: 23 to 131°F (-5 to 55°C)
±2.0% Span / 50°F (28°C)

Vibration Effect: ±0.1% of Span for 3g to 200 Hz

PHYSICAL SPECIFICATIONS

Materials of Construction

Process Wetted Parts: 316L

Housing Material: 316 SS

Fill Fluid: Silicone (DC200)

Process Connection: 1/2" NPT-Female

Electrical Connection: 3/4" NPT-Female / Cable

Weight 1.8 lb. (grams)

Cable: 24 inches (61 cm), 22 AWG shielded

HAZARDOUS LOCATIONS

CLASSIFICATION

Canadian Standards Association

Explosion-proof* for Class I, Division 1, Groups B, C & D, Class II, E, F & G and Class III Hazardous Locations and meets CSA requirements for Enclosure 4.

* Conduit seal must be within 18" of transmitter.

SECTION II

SPECIFICATIONS

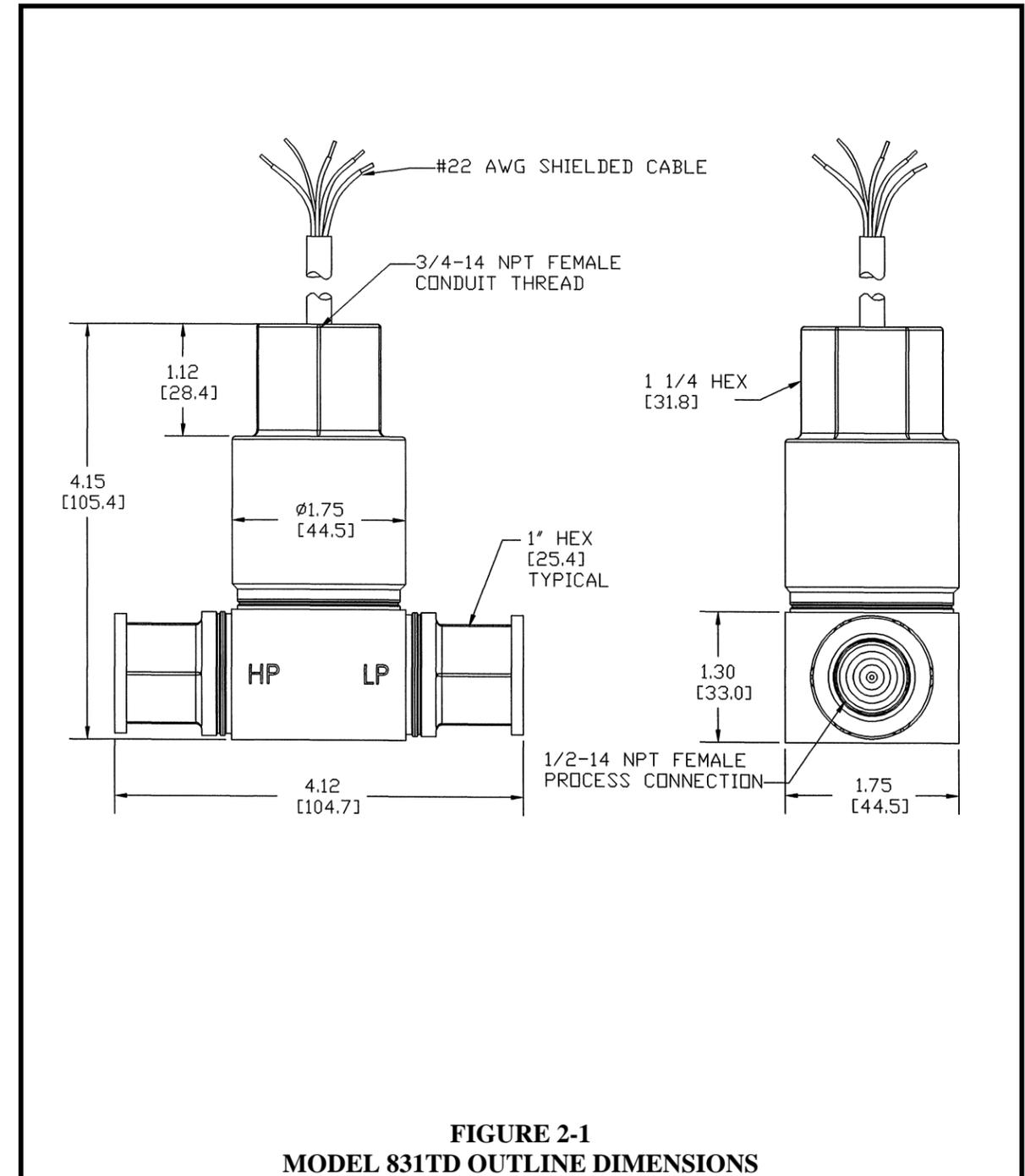


FIGURE 2-1
MODEL 831TD OUTLINE DIMENSIONS