

# Mid-West Instrument

## Series 700 "Wet/Wet" Installation and Operating Instructions Differential Pressure Transmitter



Model 710



Model 700

# **Mid-West Instrument Series 700 Wet / Wet Differential Pressure Transducer**

## **1.0 General**

Please read through this information before installing and using your device. Each Model 700 /710 /715 has been tested and calibrated before shipment.

## **2.0 Cautions and Warnings**

**Verify the operating pressure is less than or equal to 2900 PSI**

**Verify the maximum differential pressure does not exceed 2X the range of the device when measured from Hi to Lo and 1X the range of the device when measured from Lo to Hi.**

**The Model 700 is calibrated with the pressure ports in the Horizontal position. For use in other orientations adjust the zero / span if necessary by following the calibration procedure in this document.**

**Plumb process connections to the appropriate pressure ports marked + (for Hi) and - (for low).**

**Verify the process is compatible with the materials of construction of the transmitter.**

**Do not poke the diaphragm area with any pointed objects.**

**It is strongly recommended that a 3-valve manifold be used in plumbing your series 700 to your system. Properly used it should insure that your instrument is not over-ranged or damaged by pressure shocks during pressurization. It will facilitate later zeroing, ranging and calibration checking. It is good practice to purge or flush the instrument loop prior to connecting the instrument. When pressurizing the instrument have the bypass valve open. Slowly open the high side and low side isolation valves. When the unit is pressurized close the bypass valve to obtain a DP reading. When removing the instrument open the bypass valve prior to closing the high side and low side isolation valves. Leave the bypass valve open when venting the instrument.**

### 3.0 Specifications

Title	Parameter	Value
<b>1. Pressure</b>	Diff. Pressure Range	0- 5 PSI to 0 -300 PSI
	Overpressure L-H	1X
	Overpressure H-L	2X
	Static	2900 PSI
<b>2. Performance</b>	Input Power	15-28 VDC (Transmitter) 19.0 - 28 VDC (with LCD/ LCD)
	Accuracy (Non-Linearity, Repeatability, Hysteresis)	+/- 0.5%
	Zero Thermal Drift	0 ~ 15 PSID +/- .03 % FS / °C Typ 30 ~ 300 PSID +/- .02% FS / °C Typ.
	FS Thermal Drift	0 ~ 15 PSID +/- .03 % FS / °C Typ 30 ~ 300 PSID +/- .02% FS / °C Typ.
	Stability	DP ≤ 30 PSI .5% / year 30 < DP ≤ 300 .2% / year
	Response (Model 700)	≤1 ms
	Sampling Rate (Displays)	3 x / Sec
	Static Pressure Effect	±.03% FS each 10 PSI
	PS Effect	.1% FS
<b>3. Environmental</b>	Temp	-10° C to + 80 ° C (700 Transducer) -10° C to + 60 ° C (710 LCD) -10° C to + 70 ° C (715 LED)
	Compensated temp	0 to 50 ° C / 32° F to 122° F
	Storage temp	(-)40° C to +100 ° C / -40°F to 212°F (trans only) (-)40° C to +80 ° C / -40°F to 176°F (with display)
	Shock	≤1% at 3g RMS, 30-2000 Hz
	Impact	≤1% at 100g, 10 ms
	Lifetime	1 x 10 <sup>8</sup> pressure cycles
	Weather-proof	IP65
<b>4. Display (Optional)</b>	Digits	3 1/2
	Type	Red LED / LCD
	Numeric Height	.3 inch
<b>5. Construction (Sensing Element)</b>	Housing	321 SS
	Diaphragm	316L
	O-Ring	Viton
	Port (std)	1/4" BSPP female opt. 1/4" FNPT or 1/2" FNPT adapters

## **4.0 Mechanical Installation**

### **4.1 Connections**

The transmitter is supplied standard with **1/4" female BSPP** pipe threads. The ports are individually labeled "+" for Hi and "-" for low. Optionally the transmitter can be purchased with 1/4" BSPP to 1/4" FNPT or 1/4" BSPP to 1/2" FNPT adaptors. When making connections to the adapters please double wrench to protect loosening / over tightening the adaptors.

### **4.2 Instrument Location**

On liquid service the instrument should be mounted below the process to facilitate self-bleeding. On gas service it should be located above the process connections to promote self-draining. If the process contains particulates, a "pigtail" loop or drop leg ("U-tube" configuration) in the tubing will minimize the possibility of particulates migrating into the instrument.

### **4.3 Media Compatibility**

The series 700 differential pressure transducers are designed to be used with any gas or liquid compatible with 300 series stainless steel and Viton® O-rings.

### **4.4 Environment**

#### **4.4.1 Temperature:**

The operating temperature limits are -10° C to 60° C(710), -10° C to 70° C (LED) or -10° C to 80° C (Transducer) . Storage temperature is -40° C to 70 C (710), -40° C to 85 C (715), or -40° C to 120 C (Transducer).

The sensor is temperature compensated from 0° C to 50° C

#### **4.4.2 Moisture**

The Series 700 are moisture protected to IP65 provided the electrical mating connectors are attached and a suitable jacketed cable is selected for a proper compression seal.

## 5.0 Electrical

### 5.1 2 Wire / 4-20 ma (Option E Power Supply Input / Output)

The Input operating voltages and Load resistance equation for the Series 700 are defined below for 2-wire / 4-20 ma option E (Power Supply Input / Output option code).

MODEL	INPUT VOLTAGE	LOOP RESISTOR EQUATION
700	15 ~ 28 VDC	$R \leq (V_{\text{Supply}} - 15) / .02$
710 /715	19 ~ 28 VDC	$R \leq (V_{\text{Supply}} - 19) / .02$

Connection for the 2 wire interface is as follows:

**Connector:** Pin 1 - + Vcc ; Pin 2 - Gnd / Signal Out

**Cable:** Red - + Vcc; Black - Gnd / Signal Out

See **Figure 1** for 2 wire interface

### 5.2 3 Wire / 1~5 VDC, 0~5 VDC, 0~10 VDC, 0~10 mA, 0 ~ 20 mA (Options F, J, Q, U, or V)

The 3 wire interfaces are only available for the Model 700 (without the display). The input operating voltage for these options is 15 ~ 28 VDC.

For the voltage output units (F, J & V) the minimum load resistance is 5 K $\Omega$  .

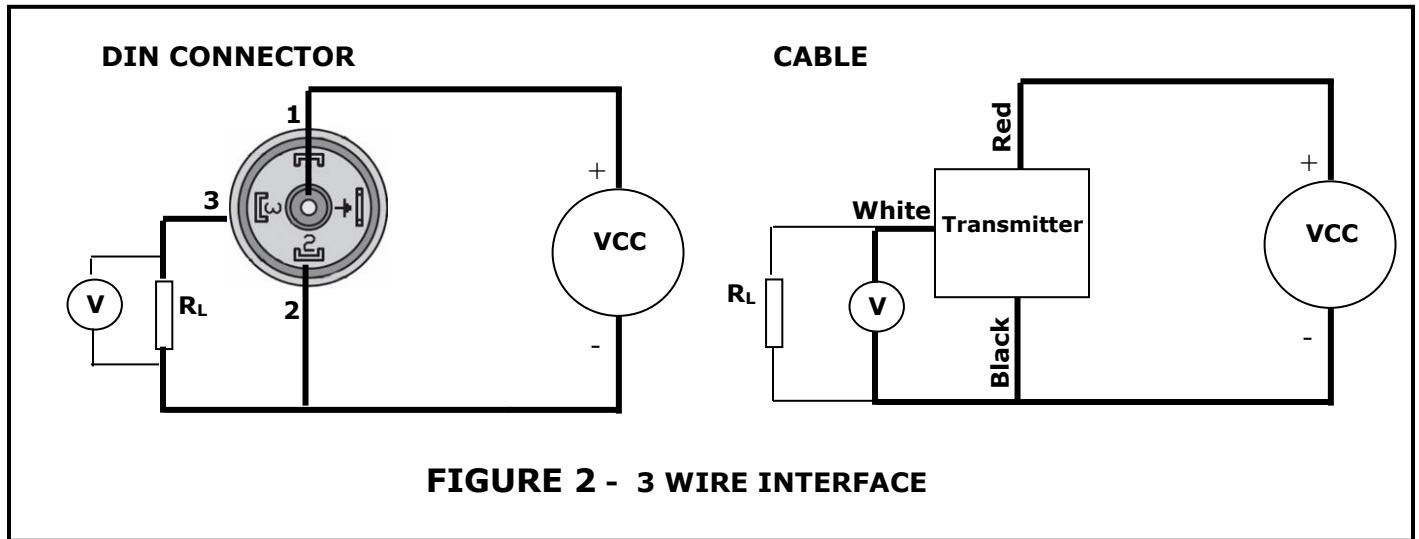
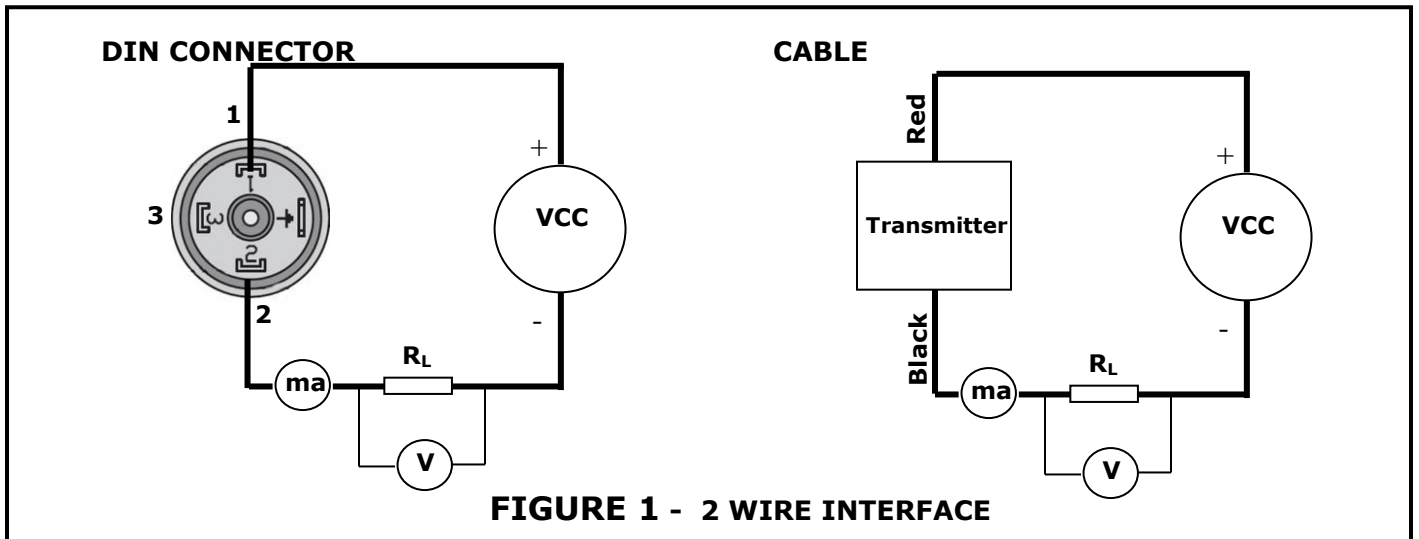
For the 3 wire current outputs (Q & U) , the loop resistance equation is TBD.

Connection for the **3 wire** interface is as follows:

**Connector:** Pin 1 - + Vcc ; Pin 2 - Gnd; Pin 3 - Out

**Cable:** Red - + Vcc; Black - Gnd White - Signal Out;

See **Figure 2** for the 3 wire interfaces



**5.3 Reverse Polarity Protection:**

Both the 2 wire and 3 wire units are reverse polarity protected at the power supply inputs. The 3 wire Output signal is not protected. **Use caution when connecting to your system.**

**5.4 CE marking**

N/A

## 6.0 Calibration

### 6.1 Series 700

The Series 700 is factory calibrated and should require no field adjustment. If necessary zero and span adjustments can be made by removing the threaded DIN connector at the top of the sensor (See Figure 3). The unit will be required to be powered and will require an accurate pressure standard in order to calibrate the span. It is recommended that a pressure standard of at least 4X better accuracy be used. Calibration should be performed with the pressure ports in the horizontal position. Otherwise calibrate with the unit mounted in the expected installation orientation. The span and zero potentiometers can adjust span and zero approximately +/-5% of the full scale range.

When making adjustments adjust the zero potentiometer prior to making span adjustments. When making span adjustments, pressurize the High side to the rated differential, and monitor the electrical output with the appropriate equipment (ie; current meter (for current outputs) or volt meter (for Voltage outputs)).



**FIGURE 3.**

### 6.2 Series 710 /715

**Caution: No user serviceable parts- Do not remove the display cover!**

The display is factory calibrated to match the range and units specified on the order. The units are imprinted on the front of the display. The following parameters can be modified via the pushbuttons on the display.

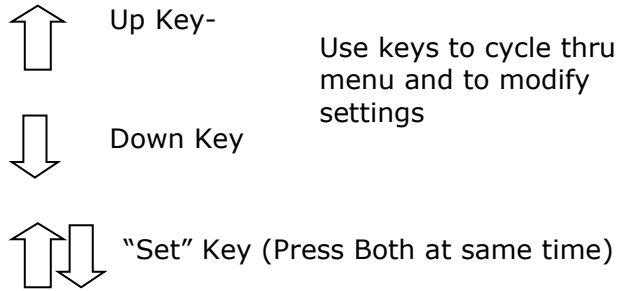
Decimal Point  
Zero Display  
Max. Display  
Zero Offset (Do not Change)  
Linear Correction (Do not change)  
Filtering Coefficient



Press Both = "Set"

### 6.2.1 Menu Function

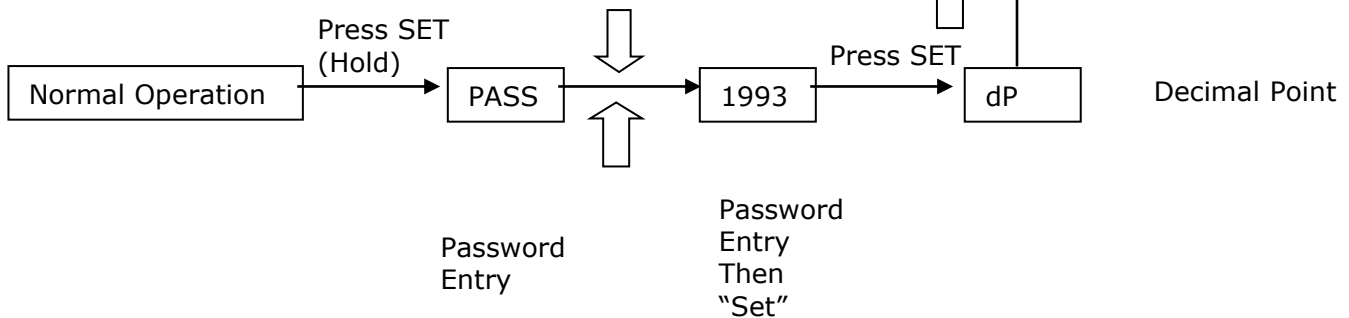
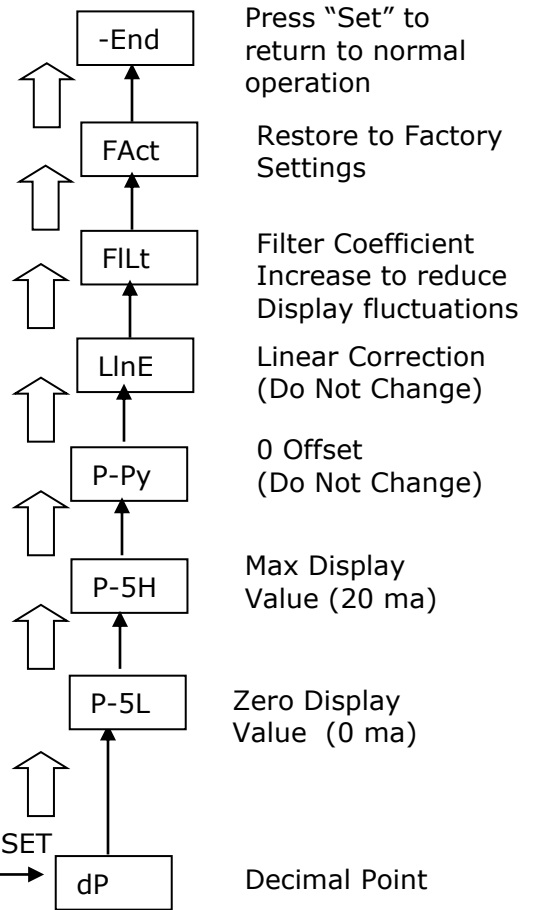
**Caution:** We recommend not changing any settings as there is risk of incorrect settings resulting in unwanted errors or performance.



Use keys to cycle thru menu and to modify settings

After you see your parameter setting function displayed Press "Set" to enter the function and make changes.

To exit parameter setting function, Press "Set"



### 6.2.2 Decimal Point

To change the decimal point enter the dP function. You will see 0 0 0 0 with your existing decimal point shown. Use the arrow keys to shift the decimal left and right. Press both keys ("Set") to save.

### 6.2.3 Zero Display

This is the value you want displayed at 4 ma. In most cases it will be 0. To change enter the P-5L parameter setting and modify using the arrow keys. Enter "set" to store the change.



#### **6.2.4 Max Value**

This is the value you want displayed at 20 ma. This will be equivalent to your maximum displayed units.

To change enter the P-5H parameter setting and modify using the arrow keys. Enter "set" to store the change.

#### **6.2.5 Zero Offset**

*Do not modify this parameter!!*

#### **6.2.6 Linear Correction**

*Do not modify this parameter!!*

#### **6.2.7 Filter Coefficient**

This parameter allows the user to reduce the display fluctuations due to rapidly changing /unstable input pressures. The greater the value the more stable the display will be. However a reduction in accuracy will occur.

To change the decimal point enter the FILt function.

You will see the factory default of 0 0 0 1 displayed. Use the up arrow key to increase the filter coefficient. Press both keys ("Set") to save.

#### **6.2.8 Restore to factory Settings**

This parameter allows you to restore all parameter settings back to the factory set.

To change the decimal point enter the FAct function.

You will see the no displayed. Use the arrow key to increase to change to "Yes". Press both keys ("Set") to save.

### **7.0 Returning products for repair**

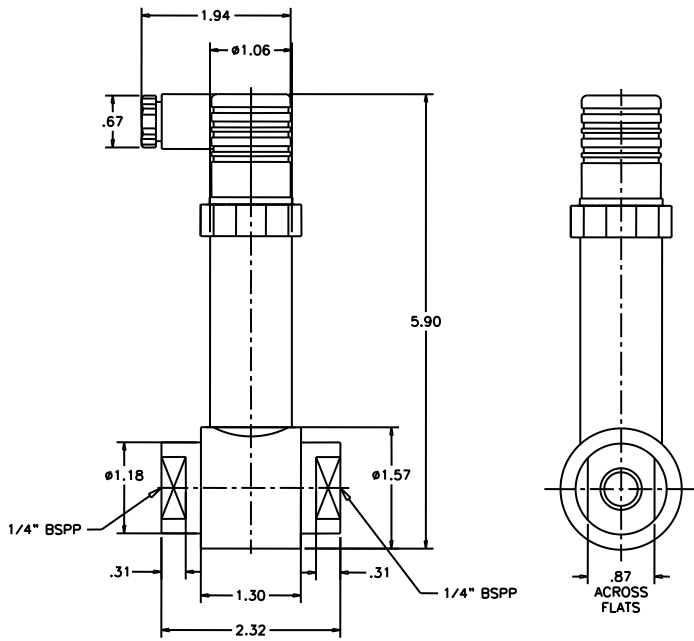
Please do not tamper with the product other than the adjustments identified within this manual. If technical assistance is needed please contact the factory.

if you feel that it is necessary to return the product please contact Mid-West Instrument and request a Return Goods Authorization Number (RGA). When returning a product to Mid-West Instrument, the product should be carefully packaged and the following information should be included inside the package:

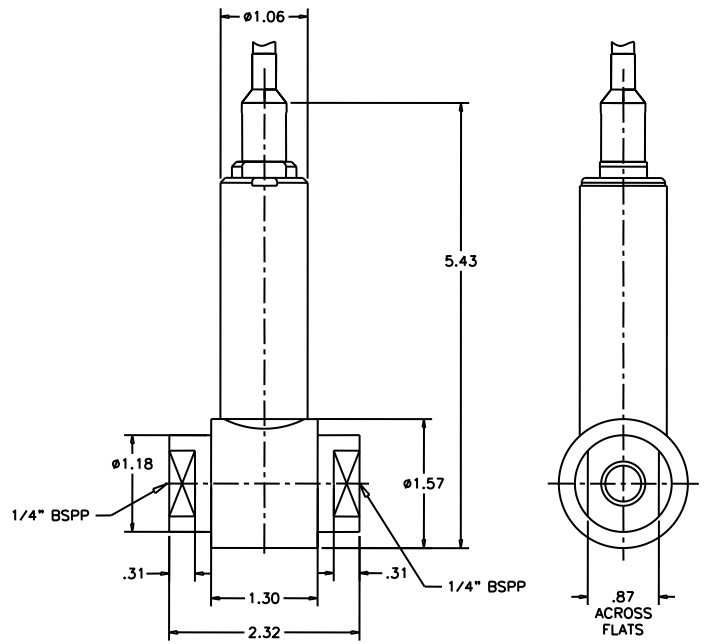
1. Name and phone / email of person to contact
2. Shipping and billing information
2. Description of the malfunction
4. Identification of any hazardous material used with the product.

## 8.0 Dimensional Information

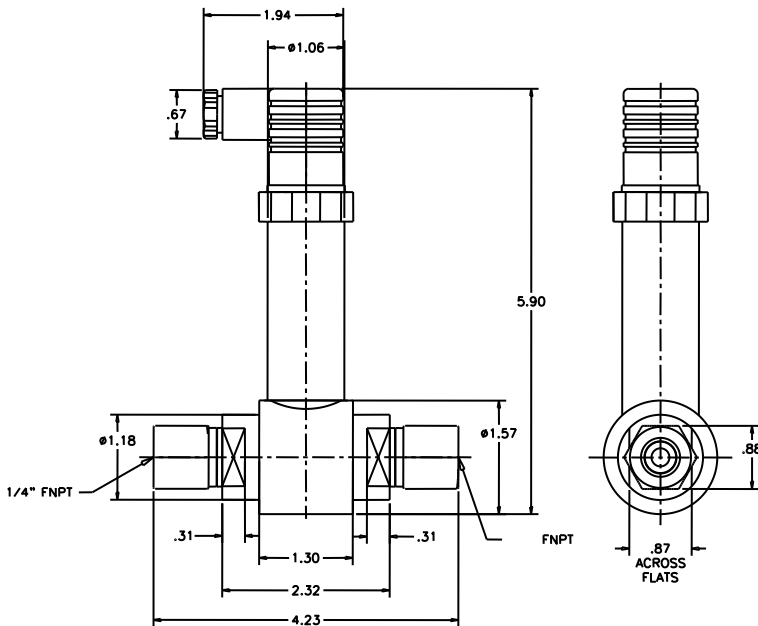
### Model 700 with DIN, 1/4" BSPP Process



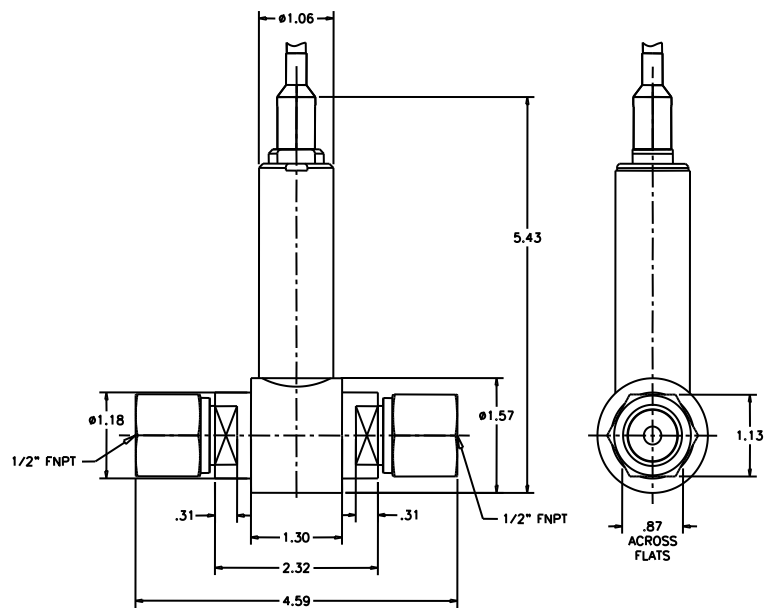
### Model 700 with Cable, 1/4" BSPP Process



### Model 700 with DIN, 1/4" FNPT Process

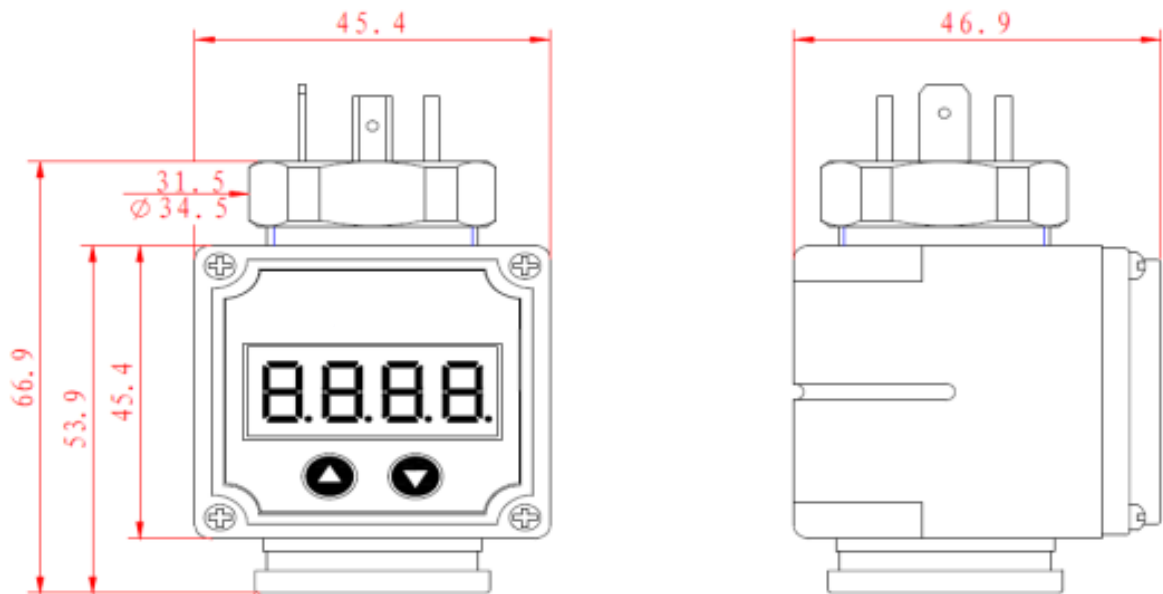


### Model 700 with Cable, 1/2" FNPT Process



## 8.0 Dimensional Information (cont.)

### Series 710 \ 715 LCD \ LED Display



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