

Mid-West Instrument

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



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
1. Pressure	Diff. Pressure Range	0- 5 PSI to 0 -300 PSI
	Overpressure L-H	1X
	Overpressure H-L	2X
	Static	2900 PSI
2. Performance	Input Power	15-28 VDC (Transmitter) 19.2 - 28 VDC (with LCD) 20 - 28 VDC (with LED)
	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	≤1 ms
	Static Pressure Effect	±.03% FS each 10 PSI
	PS Effect	.1% FS
3. Environmental	Temp	(-)10° C to + 80 ° C / 14° F to 176° F
	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 ⁸ pressure cycles
	Weather-proof	IP65
4. Display (Optional)	Digits	3 1/2
	Type	Red LED / LCD
	Height	.56 inch
5. Construction	Housing	321 SS
	Diaphragm	316L
	O-Ring	Viton
	Port (std)	1/4" BSPP female opt. 1/4" FNPT or 1/2" FNPT adapters
5. Misc	Span Adjust	Potentiometer +/- 5% FS
	Zero Adjust	Potentiometer +/- 5% FS

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 14° F to 175° F. Storage temperature is -40° F to 200° F without the display. The storage temperature with the display is limited to 175° F maximum.

The sensor is temperature compensated from 32° F to 122° F

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	18 ~ 28 VDC	$R \leq (V_{\text{Supply}} - 19) / .02$
715	20 ~ 28 VDC	$R \leq (V_{\text{Supply}} - 20) / .02$

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 Ω .

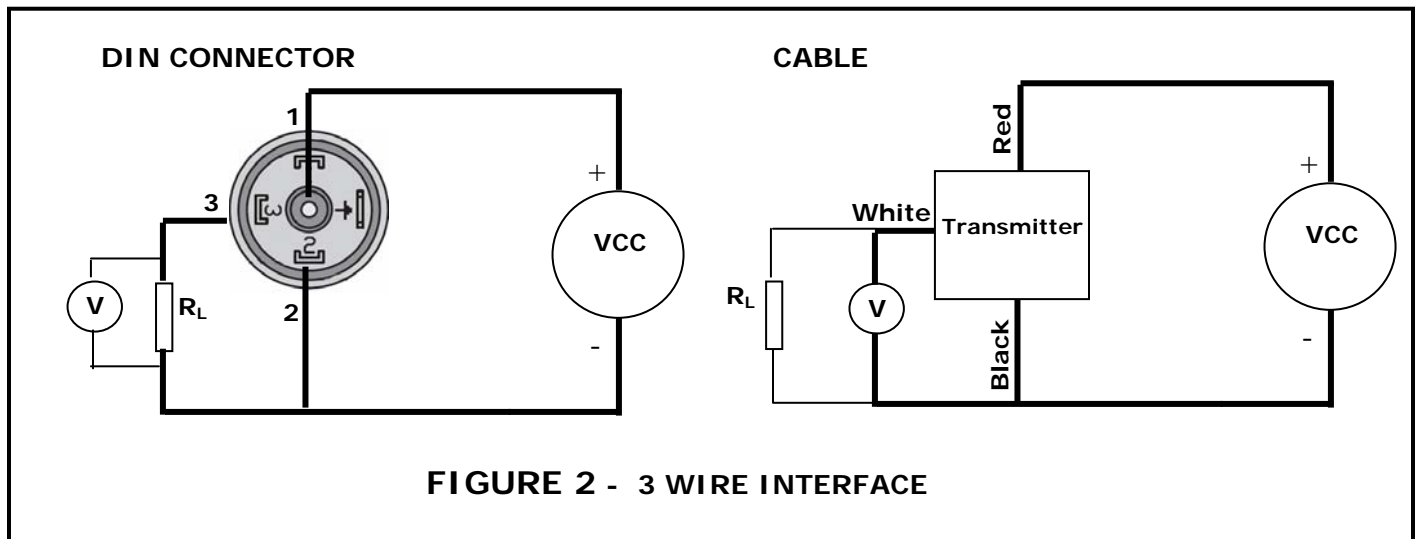
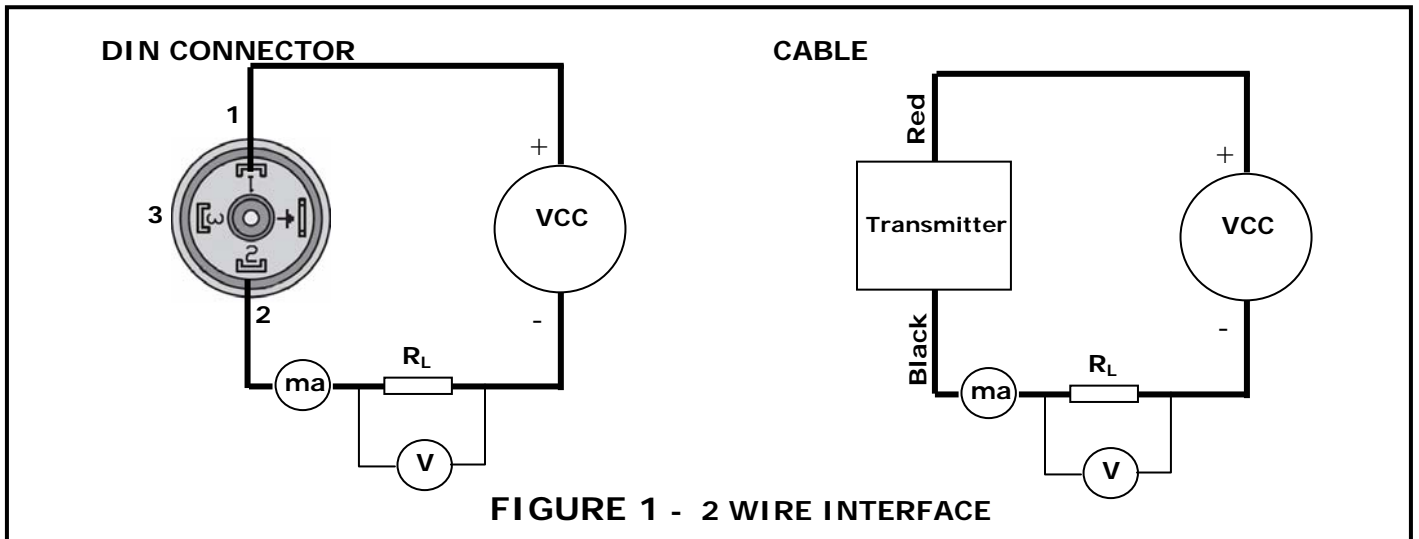
For the 3 wire current outputs (Q & U) , the loop resistance equation is as follows: _____

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 

Assembly is CE marked for compliance with the EMC directive 2004/108/EC

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.

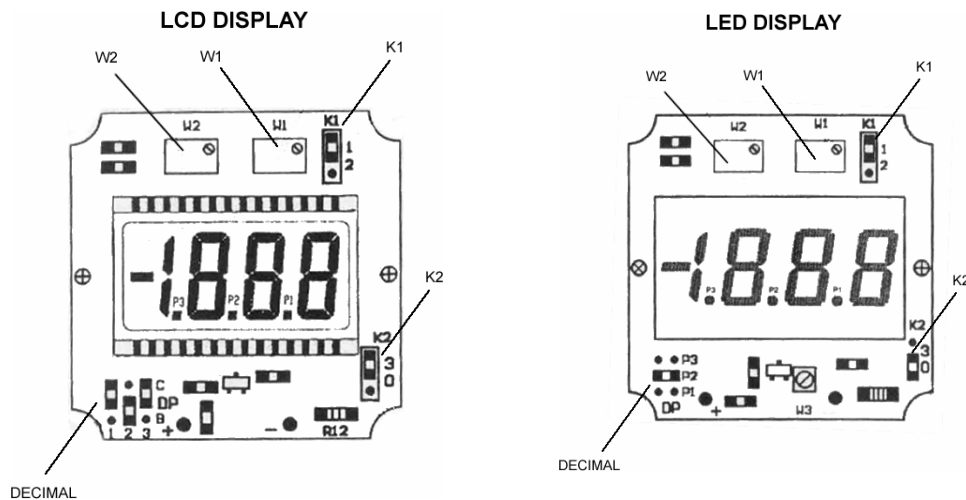
When making adjustments adjust the zero potentiometer prior to making span adjustments. When making span adjustments, pressurize the High side to the rated differential, and monitor the electrical output with the appropriate equipment (ie; current meter (for current outputs) or volt meter (for Voltage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



FIGURE 3.

6.2 Series 710 /715

The display is factory calibrated to match the range and units specified on the order. The units are identified via a decal attached to the front of the display. In the event it is necessary to change the units / span of the display, this can be easily achieved by removing the four bezel screws attaching the cover to the display enclosure. Once the cover is removed the, the adjustment potentiometers and the course adjustment jumpers will be visible.

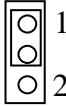
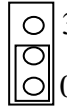

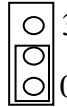




6.2.1 Span and Zero Settings

The LCD and LED display adjustment procedures are identical, except for the orientation of the Decimal point jumpers.

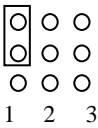
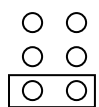
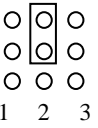
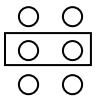
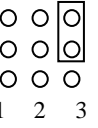
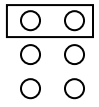
The position of the K1 and K2 jumpers determine the rough range that the W1 span adjustment potentiometer will cover. In all cases, adjust the zero (W2 potentiometer with output of transmitter at 4 ma) prior to making the span fine adjustments (W1) with the output of the transmitter at 20 ma.

The rough span settings are determined by the jumper positions of K1 and K2. These are shown in the table below.

Range	Display Range	On - Off Jumper Location		W2 Transmitter Out = 4ma
		K1	K2	
1	1300 ~ 1999	1 	0 	000
2	500 ~ 1300	2 	0 	000
3	190 ~ 500	2 	3 	000

6.2.2 Decimal Point

Position the jumpers as shown in the table below to light the desired decimal point. If the jumper is removed, none of the decimal points would be lit.

Decimal	LCD	LED
P1		
P2		
P3		

6.3 Example

Assume the transmitter range you received is 30 PSID and the display has been set to read out 30.0 PSID. For 30.0, the jumpers would be set in the Range 3 settings with the P1 decimal point set.

If you wanted the display to read in bar, the equivalent full scale range is 2.06 bar. The steps to calibrate the display is as follows: (assuming the cover has been removed)

1. 2.06 maximum reading would equate to the Range 3 settings for K1 and K2 (You would not have to change the jumpers).
2. With a 0 PSI input adjust the W2 potentiometer until the display reads 000.
3. Input 30 PSI (2.06 bar) and adjust the W1 potentiometer until the display reads 206.
4. For the display to read 2.06 move the decimal point jumper from the P1 location to the P2 location.
5. Decrease the pressure to 0 and verify the display reads 0.00.
6. Remove the PSID decal from the display cover.

7.0 Returning products for repair

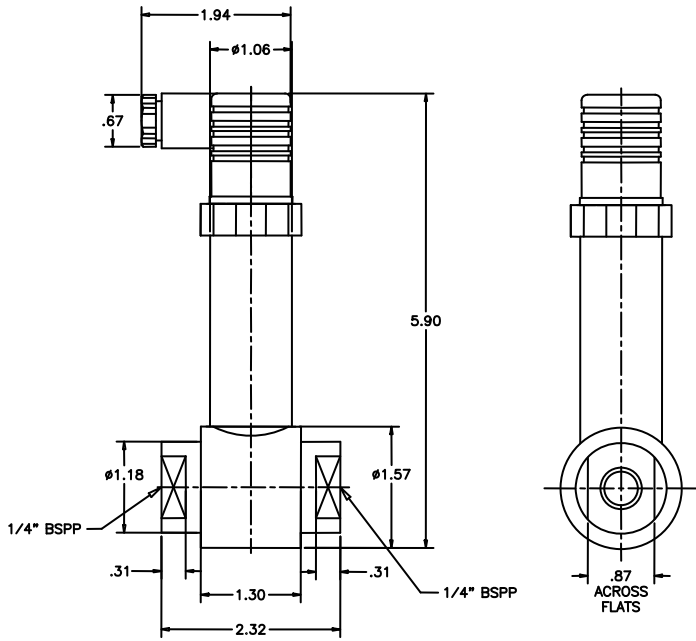
Please do not tamper with the product other than the adjustments identified within this manual. If technical assistance is needed please contact the factory.

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:

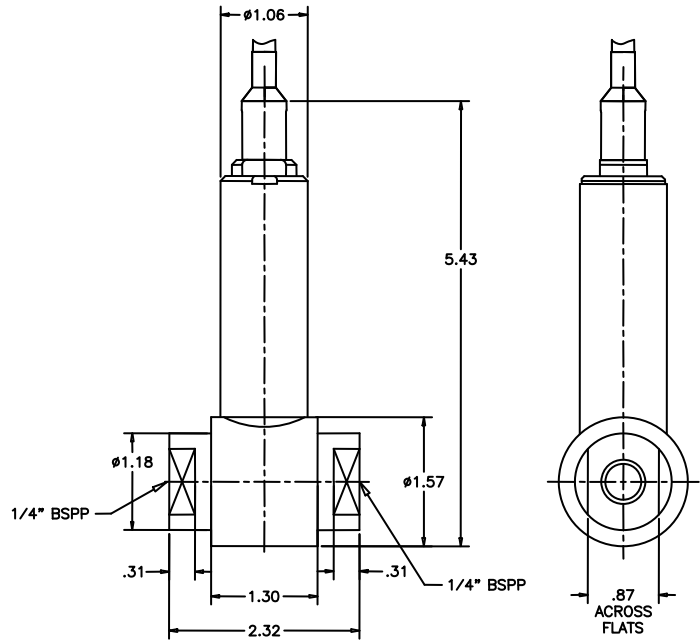
1. Name and phone / email of person to contact
2. Shipping and billing information
2. Description of the malfunction
4. Identification of any hazardous material used with the product.

8.0 Dimensional Information

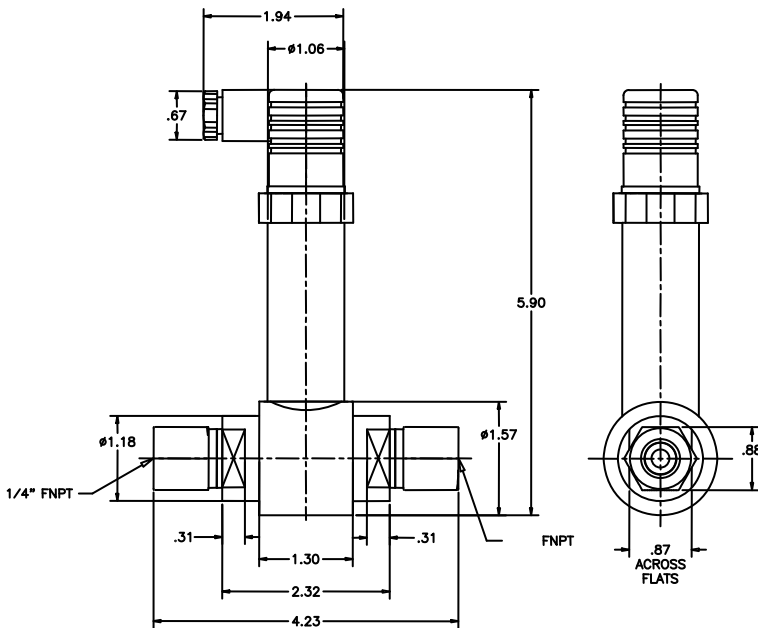
Model 700 with DIN, 1/4" BSPP Process



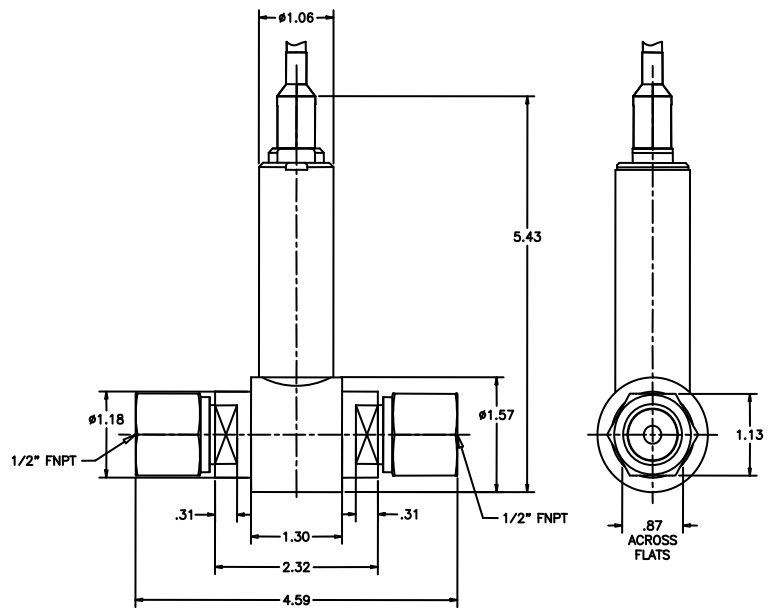
Model 700 with Cable, 1/4" BSPP Process



Model 700 with DIN, 1/4" FNPT Process

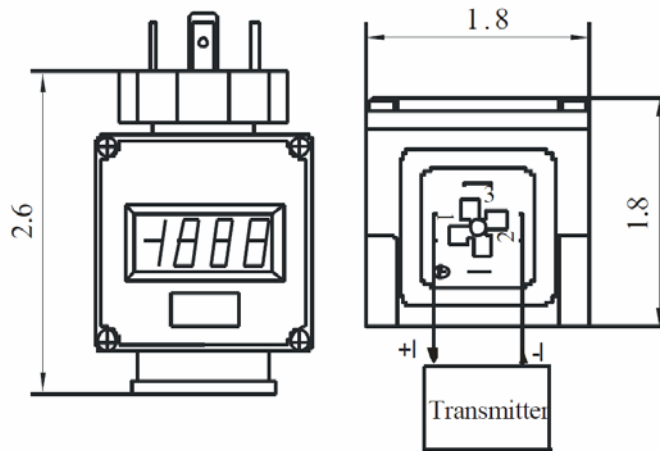


Model 700 with Cable, 1/2" FNPT Process



8.0 Dimensional Information (cont.)

Series 710 \ 715 LCD \ LED Display



**Mid-West[®]
Instrument**

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E-Mail: sales@midwestinstrument.com

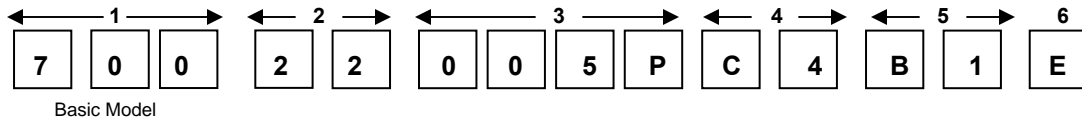
Web Page: www.midwestinstrument.com

Standard Model Specification: 700-22-005P-C4-B1-E

321 Stainless Steel Pressure Port & Housing, 316 Stainless Steel Diaphragm
 Viton O'Rings, 1/4" Female BSPP Connections, DIN 43650/IP65 Plug-In Type Connector
 Electrical Input & Output: 2-wire 15~28VDC / 4~20mADC
 Accuracy ±0.5% Full Scale

Mid-West Instrument
 1-800-648-5778

Range: 0-5 PSID (0-0.35 Bar) to 0-300 PSID (0-20 Bar)



1	Description
700	Differential Pressure Transmitter
710	Differential Pressure Transmitter W/LCD Readout (Available with DIN Connector & 4-20mA Output only)
715	Differential Pressure Transmitter W/LED Readout (Available with DIN Connector & 4-20mA Output only)
2	Materials of Construction
22	Pressure Port & Housing = 321 S.S. / Diaphragm = 316L S.S.
3	Differential Pressure Range
PSID= P	5, 10, 15, 30, 50, 100, 150, & 300 PSID
Bar= B	.35, .70, 1, 2, 3.5, 7, 10, 20
kPa= K	35, 70, 100, 200, 350, 700
4	Process Connection
C4	1/4" Female BSPP (STD)
5	Electrical Connection
B1	DIN 43650/IP65 Plug-In Type
B2	Cable Connection / Standard Length 1.5m
6	Power Supply Input / Output Signal
E	2-wire 15~28VDC / 4~20mADC / LCD or LED Display 20-28VDC
F	3-wire 15~28VDC / 1~5VDC
J	3-wire 15~28VDC / 0~5VDC
Q	3-wire 15~28VDC / 0~10mADC
U	3-wire 15~28VDC / 0~20mADC
V	3-wire 15~28VDC / 0~10VDC
316 S.S. Adapters (includes Viton O'ring)	
113319	1/4" MALE BSPP to 1/4" FNPT 316 S.S. Adapter
113320	1/4" MALE BSPP to 1/2" FNPT 316 S.S. Adapter