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

<table>
<thead>
<tr>
<th>Title</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Pressure</strong></td>
<td>Diff. Pressure Range</td>
<td>0-5 PSI to 0-300 PSI</td>
</tr>
<tr>
<td></td>
<td>Overpressure L-H</td>
<td>1X</td>
</tr>
<tr>
<td></td>
<td>Overpressure H-L</td>
<td>2X</td>
</tr>
<tr>
<td></td>
<td>Static</td>
<td>2900 PSI</td>
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</tbody>
</table>

| **2. Performance** | 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 PSI ±/-.03 % FS / °C Typ 30 ~ 300 PSI ±/.02% FS / °C Typ. |
| | FS Thermal Drift | 0 ~ 15 PSI ±/.03 % FS / °C Typ 30 ~ 300 PSI ±/.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 |

| **3. Environmental** | 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 10⁸ pressure cycles |
| | Weather-proof | IP65 |

| **4. Display (Optional)** | Digits | 3 1/2 |
| | Type | Red LED / LCD |
| | Numeric Height | .3 inch |

| **5. Construction (Sensing Element)** | Housing | 321 SS |
| | Diaphragm | 316L |
| | O-Ring | Viton |
| | Port (std) | 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).

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>LOOP RESISTOR EQUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>15 ~ 28 VDC</td>
<td>( R \leq \frac{(V_{Supply} - 15)}{.02} )</td>
</tr>
<tr>
<td>710 / 715</td>
<td>19 ~ 28 VDC</td>
<td>( R \leq \frac{(V_{Supply} - 19)}{.02} )</td>
</tr>
</tbody>
</table>

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 KΩ .

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

Assembly is CE marked for compliance with the EMC directive 2004/108/EC & RoHS2 directive
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).

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.

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
3. 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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