### Loop-Powered Pressure Transmitters

#### F16L

- **2-Wire Loop Powered**
- **NEMA 4X Models Available**
- **4-20 mA Output**
- **Output Test Function**

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**Ranges and Resolution**
- abs: absolute reference (atmospheric pressure to zero at full vacuum)
- vac: vacuum gauge, minus sign not used unless specified
- Resolution is fixed as indicated in table below

**Contact factory for engineering units not listed**

<table>
<thead>
<tr>
<th>Pressure Unit</th>
<th>Ref Range (psig)</th>
<th>Main Display Unit</th>
<th>Bar, atm, kPa</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>psi</td>
<td>200.0 inHg abs</td>
<td>1600 mV/mHg</td>
<td>20.0 bar</td>
<td>±0.25% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>300.0 inHg</td>
<td>3200 mV/mHg</td>
<td>35.0 bar</td>
<td>±0.1% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>300.0 inHg</td>
<td>3200 mV/mHg</td>
<td>100.0 bar</td>
<td>±0.25% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>-15.00 psi</td>
<td>-100 mV/mHg</td>
<td>0.0 mbar</td>
<td>±0.25% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>20.00 psi</td>
<td>100 mV/mHg</td>
<td>100.0 mbar</td>
<td>±0.1% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>15.00 psi</td>
<td>50 mV/mHg</td>
<td>150.0 mbar</td>
<td>±0.25% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>30.00 psi</td>
<td>100 mV/mHg</td>
<td>200.0 mbar</td>
<td>±0.1% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>30.00 psi</td>
<td>100 mV/mHg</td>
<td>300.0 mbar</td>
<td>±0.25% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>60.00 psi</td>
<td>100 mV/mHg</td>
<td>500.0 mbar</td>
<td>±0.1% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>60.00 psi</td>
<td>100 mV/mHg</td>
<td>1000 mbar</td>
<td>±0.25% FS ±1 LSD</td>
</tr>
<tr>
<td>psi</td>
<td>120.0 psi</td>
<td>100 mV/mHg</td>
<td>2000 mbar</td>
<td>±0.1% FS ±1 LSD</td>
</tr>
</tbody>
</table>

### Accuracy
- Includes linearity, hysteresis, repeatability
- **Standard**: ±0.25% of full scale ±1 least significant digit
- Optional: -HA ±0.1% FS ±1LSD (most ranges)
- CD Factory 5-point calibration data
- NC NIST traceable test report and 5-point calibration data

### Display
- 4 readings per second nominal display update rate
- 4½ digit LCD, 0.5” H main display
- 5 character 0.25” H alphanumeric lower display for units, functions, and setup

#### Controls & Functions
- **TEST** When held sets loop current and display to test level, independent of pressure, to allow testing of system operation
- Up: set test, passcode, and calibration values
- Down: set test, passcode, and calibration values

#### Calibration
- User settable passcode required to enter calibration mode
- All pressure and absolute models: zero, midpoint, span
- All vacuum models: —span, —midpoint, zero
- Calibration/pressure models: —span, zero, midpoint, +span
- ±15 psi models: —span, —midpoint, zero, +midpoint, +span

### Loop Supply and Voltage
- Any DC supply/loop resistance that maintains 8 to 32 VDC at gauge terminals
- Gauge is reverse polarity protected
- Voltage and current limits: 24 VDC, 20 mA
- Burst Pressure: 4 times sensor pressure rating, or 10,000 psi, whichever is less

### Pressure/Vacuum Connection Size and Material
- 1/4 NPT male
- All wetted parts are 316 stainless steel

#### Overpressure
- 3000 psig range and metric equivalents: 5000 psig
- 5000 psig range and metric equivalents: 7500 psig
- All other 2 times sensor pressure
- 112.5% out-of-range display: I — — — or I — — — — — depending on model

#### Burst Pressure
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**Pressures and Units**
- psi = Pressure
- inHg = Inch of Mercury
- mmHg = Millimeter of Mercury
- mBar = Millibar
- Torr = Torr

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**Size**
- F16L: 3.38” W x 2.88” H x 0.70” D housing
- F16LN: 3.5” W x 3.0” H x 0.9” D housing

#### Weight
- Gauge: 9 ounces (approx.)
- Shipping weight: 1 pound (approx.)

#### Housing
- F16L: Extruded aluminum case, light gray epoxy powder coated, black ABS/polycarbonate bezel (gray aluminum bezel optional), front and rear gaskets, black/gold polycarbonate label
- F16LN: Light gray ABS/polycarbonate NEMA 4X case, rear gasket, black/gold polycarbonate label

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**Environmental**
- Storage temperature: -40 to 203°F (-40 to 95°C)
- Operating temperature: -4 to 185°F (-20 to 85°C)
- Compensated temperature: 32 to 158°F (0 to 70°C)

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**DESCRIPTION**

All operating power for the F16L series is supplied by the 4-20 mA current loop. The 2-wire connection allows the F16L to be used as a digital indicating transmitter in any 4-20 mA current loop application. The output is a 12,000 count analog 4-20 mA signal. The output is filtered to improve noise immunity and is updated approximately 16 times per second. The temperature compensated piezoresistive transducer features 316 stainless steel wetted parts.

The TEST pushbutton, when depressed, switches the display and output loop to a preset level determined by the keypad setting of the test value.

**INSTALLATION AND PRECAUTIONS**

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten by turning housing or any other part of the gauge. Use fittings appropriate for the pressure range of the gauge. Do not apply vacuum to gauges not designed for vacuum operation. Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.

NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

**ELECTRICAL CONNECTION**

Connection to the F16L is made with the 2-wire cable at the gauge rear. Connect the loop (+) supply to the RED lead and the loop (–) supply to the BLACK lead. Reversing the connections will not harm the gauge but the F16L will not operate with incorrect polarity.

**LOOP VOLTAGE**

Select a loop power supply voltage and total loop resistance so that when the loop current is 20 mA, the gauge will have at least 8 VDC at its terminals. For correct operation and to avoid erratic or erroneous readings, the gauge terminal voltage must not fall below 8 VDC. Too large a loop resistance will cause the gauge output to "limit" or saturate before reaching its full 20 mA output.

The minimum loop supply voltage may be calculated from the formula:

\[ V_{\text{min}} = 8V + (20mA \times \text{Total loop resistance}) \]

If the terminal voltage of the gauge falls below about 7.8 VDC, erratic operation may occur. This is an indication that the loop supply/resistance may not allow adequate headroom for reliable operation. This should never occur in normal use. If it does, examine the loop supply/resistance.

**OPERATION**

The F16L is designed for continuous operation. Warm-up time is negligible. When power is first applied, the F16L will set the loop current to maximum and check the voltage available. If there is sufficient voltage available to power the unit, all active segments will be displayed briefly. Then the full scale pressure range and engineering units are displayed. All active segments will again displayed briefly. Then the display will show the system pressure, and the loop current will also be proportional to the pressure/vacuum. The output is a 12,000 count analog 4-20 mA signal.

At power-up, if the voltage available is not sufficient, only the low power segment will be displayed. This is an indication that the loop impedance is too high or the loop power supply voltage is too low. After successful power-up, if the loop voltage falls below the minimum required for reliable operation, the F16L will continue to indicate pressure with the low power segment blinking at a slow rate.

**TEST BUTTON**

When the front-panel TEST button is held depressed, the display and loop current are switched, independent of the system pressure, to a test level determined by the test setting. This test mode will allow setup and testing of the current loop by switching to this test level whenever desired without having to alter the system pressure.

To set the test output level, press and hold the front-panel TEST button and press the up or down arrow buttons to adjust the test output to the desired pressure setting. This setting is stored in non-volatile memory.

When the TEST button is held depressed, the display and loop current are switched, independent of the actual pressure, to a level determined by the test setting. When the button is released, normal operation is resumed.

**CALIBRATION**

The gauge is calibrated at the factory using equipment traceable to NIST. There is no need to calibrate the gauge before putting it in service. Complete calibration instructions can be downloaded from www.cecomp.com.

Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 10 microns (0.01 torr or 10 millitorr) or lower is required for vacuum and absolute gauges.

The F16 series uses a user-modifiable calibration passcode to enter the calibration mode. In the calibration mode, the gauge automatically recognizes the calibration region corresponding to the applied pressure. There are 3, 4, or 5 calibration regions depending upon the pressure range of the gauge. All gauges have Zero, +Midpoint, and +Span regions. Gauges that measure vacuum as well as pressure will also have a -Span region, and if the sensor is 15 psig or less, the gauge will have a –Midpoint region as well.

Calibration of the loop output coordinates the 4-20 mA output to the display indication, and is performed independently of applied pressure. It requires a direct physical measurement of the output. Calibration of the output coordinates the loop output to the display indication, and normally does not need to be adjusted. This calibration procedure can be downloaded from www.cecomp.com.

**DIMENSIONS**

[Diagram of dimensions]

<table>
<thead>
<tr>
<th>F16L</th>
<th>F16LN</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0&quot;</td>
<td>2.0&quot;</td>
</tr>
<tr>
<td>2.88&quot;</td>
<td>3.36&quot;</td>
</tr>
<tr>
<td>0.75&quot;</td>
<td>1.65&quot;</td>
</tr>
<tr>
<td>1/8&quot; NPT</td>
<td>3/16&quot; NPT</td>
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(Cecomp maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. Consult factory for your specific requirements.)