

## Electrical Specifications

### 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

|   |                            |                          |                            |                              |
|---|----------------------------|--------------------------|----------------------------|------------------------------|
| Contact factory for other engineering units | 120.0 inHg                 | 1600 mmHg                | 35.0 bar                   | 1.000 kg/cm <sup>2</sup> abs |
|   | 199.9 inHg abs             | 760 torr abs             | 70.0 bar                   | 1.000 kg/cm <sup>2</sup> vac |
|   | 199.9 inHg                 | 1600 torr abs            | 140.0 bar                  | ±1.000 kg/cm <sup>2</sup>    |
| 3.00 psig                                   | 50.0 oz/in <sup>2</sup>    | 2100 mmH <sub>2</sub> O  | 199.9 bar                  | 1.000 kg/cm <sup>2</sup>     |
| 5.00 psig                                   | 80.0 oz/in <sup>2</sup>    | 3500 mmH <sub>2</sub> O  | 350 bar                    | 1.999 kg/cm <sup>2</sup> abs |
| 15.00 psi abs                               | 240 oz/in <sup>2</sup> abs | 199.9 cmH <sub>2</sub> O | 19.99 kPa                  | 1.999 kg/cm <sup>2</sup>     |
| 15.00 psig vac                              | 240 oz/in <sup>2</sup> vac | 350 cmH <sub>2</sub> O   | 35.0 kPa                   | 4.00 kg/cm <sup>2</sup>      |
| ±15.0 psig                                  | ±240 oz/in <sup>2</sup>    | 1000 cmH <sub>2</sub> O  | 100.0 kPa abs              | 7.00 kg/cm <sup>2</sup> abs  |
| 15.00 psig                                  | 240 oz/in <sup>2</sup>     | 2100 cmH <sub>2</sub> O  | 100.0 kPa vac              | 7.00 kg/cm <sup>2</sup>      |
| 30.0 psi abs                                | 85.0 inH <sub>2</sub> O    | 199.9 mbar               | ±100.0 kPa                 | 14.00 kg/cm <sup>2</sup>     |
| 30.0 psig                                   | 140.0 inH <sub>2</sub> O   | 350 mbar                 | 100.0 kPa                  | 19.99 kg/cm <sup>2</sup>     |
| 60.0 psig                                   | 400 inH <sub>2</sub> O abs | 1000 mbar abs            | 199.9 kPa abs              | 35.0 kg/cm <sup>2</sup>      |
| 100.0 psi abs                               | 400 inH <sub>2</sub> O vac | 1000 mbar vac            | 199.9 kPa                  | 70.0 kg/cm <sup>2</sup>      |
| 100.0 psig                                  | ±400 inH <sub>2</sub> O    | ±1000 mbar               | 400 kPa                    | 140.0 kg/cm <sup>2</sup>     |
| 199.9 psig                                  | 400 inH <sub>2</sub> O     | 1000 mbar                | 700 kPa abs                | 199.9 kg/cm <sup>2</sup>     |
| 300 psig                                    | 850 inH <sub>2</sub> O     | 1999 mbar abs            | 700 kPa                    | 350 kg/cm <sup>2</sup>       |
| 500 psig                                    | 7.00 ftH <sub>2</sub> O    | 1999 mbar                | 1500 kPa                   | 1.000 atm abs                |
| 1000 psig                                   | 12.00 ftH <sub>2</sub> O   | 4000 mbar                | 1999 kPa                   | ±1.000 atm                   |
| 1999 psig                                   | 35.0 ftH <sub>2</sub> O    | 1.000 bar abs            | 3500 kPa                   | 1.000 atm                    |
| 3000 psig                                   | 70.0 ftH <sub>2</sub> O    | 1.000 bar vac            | 5000 kPa                   | 4.00 atm                     |
| 5000 psig                                   | 140.0 ftH <sub>2</sub> O   | ±1.000 bar               | 3.50 MPa                   | 7.00 atm                     |
| 6.00 inHg                                   | 230 ftH <sub>2</sub> O     | 1.000 bar                | 7.00 MPa                   | 14.00 atm                    |
| 10.00 inHg                                  | 480 ftH <sub>2</sub> O     | 1.999 bar abs            | 14.00 MPa                  | 19.99 atm                    |
| 30.0 inHg abs                               | 150.0 mmHg                 | 1.999 bar                | 19.99 MPa                  | 35.0 atm                     |
| 30.0 inHg vac                               | 260 mmHg                   | 4.00 bar                 | 35.0 MPa                   | 70.0 atm                     |
| ±30.0 inHg                                  | 760 mmHg abs               | 7.00 bar abs             | 1000 g/cm <sup>2</sup> abs | 135.0 atm                    |
| 30.0 inHg                                   | 760 mmHg vac               | 7.00 bar                 | 1000 g/cm <sup>2</sup>     | 199.9 atm                    |
| 60.0 inHg abs                               | 760 mmHg                   | 14.00 bar                | 2100 g/cm <sup>2</sup> abs | 340 atm                      |
| 60.0 inHg                                   | 1600 mmHg abs              | 19.99 bar                | 2100 g/cm <sup>2</sup>     | 3-15 psig                    |

### Accuracy (linearity, hysteresis, repeatability)

Standard: ±0.25% of full scale ±1 least significant digit  
 Optional: **-HA** ±0.1% FS ±1LSD (most ranges)  
**CD** Factory calibration data  
**NC** NIST traceable test report and calibration data

### Display

3 readings per second nominal display update rate  
 Ranges up to 1999: 3½ digit LCD, ½" digit height  
 3000 and 5000 psi ranges: 4 digit LCD, 0.4" digit height

### Controls

Non-interactive zero and span, ±10% range  
 Test calibration level: 0-100% range  
 Retransmission zero and span: Internal potentiometers

### Loop Supply Voltage

Any DC supply/loop resistance that maintains 8 to 32 VDC at gauge terminals.  
 Gauge is reverse polarity protected.  
 3 ft long, 2-conductor 22 AWG cable  
 Order optional **9046-24-008** loop power supply

### Low Loop Indication

Below approximately 7.8 VDC  
 Ranges up to 1999: None  
 3000 and 5000 psi ranges: All decimal points flash

### Output Characteristics

True analog output, 50 millisecond typical response time  
 If gauge terminal voltage falls below approx. 7.8 VDC erratic operation may occur

### Test Function

Front panel TEST button, when depressed sets loop current and display to test calibration level, independent of pressure input, to allow testing of system operation.  
 Test Cal level is set by multiturn potentiometer to any value from 0 to 100% of FSO.

### 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)

- ±0.25% Test Gauge Accuracy
- 316 Stainless Steel Wetted Parts
- 4-20 mA Analog Output
- Pressure, Vacuum, Absolute
- Output Test Function



F4L2000PSIG with 1999 psig range

## Mechanical Specifications

### Size

3.5" W x 3.0" H x 2.0" D housing  
 Add approximately 0.75" to height for pressure fitting  
 Add approximately 1" to depth for strain relief and wire clearance

### Weight

Gauge: 9 ounces (approx)  
 Shipping weight: 1 pound (approx)

### Housing

NEMA 4X  
 UV stabilized polycarbonate/ABS case, light gray color  
 Clear polycarbonate window to protect display  
 Gasketed rear cover, six captive stainless steel screws

### Pressure/Vacuum Connection and Material

¼" NPT male, 316 stainless steel

### Media Compatibility

All wetted parts are 316 SS  
 Compatible with most liquids and gases

### Overpressure

3000 psig range and metric equivalents: 5000 psig  
 5000 psig range and metric equivalents: 7500 psig  
 All others 2x rated pressure minimum

### Burst Pressure

4x rated pressure minimum or 10,000 psi, whichever is less



## DESCRIPTION

The **F4L** series is a versatile family of industrial pressure and vacuum gauges featuring a rugged NEMA 4X case. This type of enclosure, when properly installed, is suitable for indoor or outdoor non-hazardous locations and provides a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water, corrosion and ice formation.

The **F4L** is a two-wire 4-20 mA loop-powered pressure transmitter with indication. All operating power is supplied by the 4-20 mA current loop. The 2-wire connection allows the **F4L** to be used as a pressure transmitter in any 4-20 mA current loop application where local indication is desirable.

## INSTALLATION AND PRECAUTIONS

Install or remove gauge using wrench on hex fitting only. Do not 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 **F4L** is made with the 2-wire cable at the gauge rear. Connect the loop positive (+) supply to the RED lead and the loop negative (-) supply to the BLACK lead. Reversing the connections will not harm the gauge but the **F4L** will not operate with incorrect polarity. **NEVER** connect the gauge wires to voltage greater than 32 VDC or damage not covered by warranty will result.

## 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:

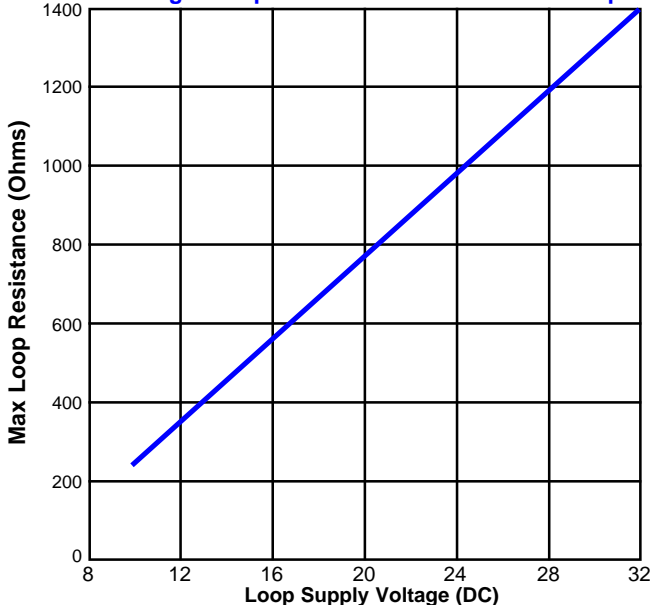
$$V_{\min} = 8V + (20mA \times \text{Total loop resistance})$$

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 **F4L** is designed for continuous operation. Warm-up time is negligible. The display indication and the loop current will be proportional to the system pressure/vacuum; 4 mA = Zero or low end, 20 mA = Span, full-scale or high end. The output is a continuous analog signal based on the transducer output rather than the display. The output is filtered to improve noise immunity and has a response time of about 50 milliseconds.

Voltage Compliance for 4-20 mA Current Loop



## TEST BUTTON

The TEST pushbutton on the front of the gauge, when depressed, switches the display and output loop to a preset level determined by the setting of a Test potentiometer. 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, see gauge label for location of Test potentiometer. Press and hold the front-panel TEST button and adjust the Test potentiometer to set the display and loop current to the desired test level.

## CALIBRATION

See gauge label for location of individual controls to adjust the zero and span of the display.

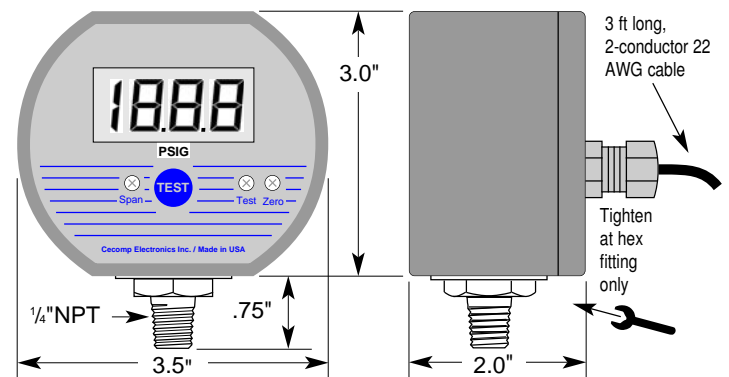
GAUGE reference units may be re-zeroed without affecting the span calibration. The gauge port must be open to the ambient with no pressure or vacuum applied. Adjust the Zero control until the gauge reads zero with the minus (-) sign occasionally flashing.

Span calibration should only be attempted if the user has access to a pressure reference of known accuracy. The quality of the calibration is only as good as the accuracy of the calibration equipment and ideally should be at least four times the gauge accuracy. Zero calibration must be done before span calibration. Record readings at three to five points over the range of gauge and adjust span control to minimize error and meet specifications.

ABSOLUTE reference gauges require vacuum generation and atmospheric pressure measurement equipment for accurate calibration and thus are more difficult to calibrate in the field. Gauges may be returned to Cecom Electronics for factory certified recalibration. NIST traceability is available.

The **F4L** has internal controls to adjust the agreement between the displayed value and the 4-20 mA loop current. These are set at the factory and should not normally be adjusted. If adjustment is necessary, consult factory. Accurate pressure generation and measurement and current measurement equipment are required to successfully complete this calibration.

## DIMENSIONS



## PART NUMBERS

Model Range Units Ref-Options

**Model** → F4L  
**Range** → See table on other side  
**Units** → See table at right  
**Reference** → See table on other side for availability  
**G**=Gauge, **A**=Absolute, **VAC**=Vacuum  
**Options** → See price list for available options

**Example:** F4L30INHGVAC = Falcon NEMA 4X, Loop powered, inches Hg vacuum

### Unit Abbreviations

- psi = PSI
- inHg = INHG
- oz/in<sup>2</sup> = ZIN
- inH<sub>2</sub>O = INH2O
- ftH<sub>2</sub>O = FTH2O
- mmHg = MMHG
- torr = TORR
- mmH<sub>2</sub>O = MMH2O
- kg/cm<sup>2</sup> = KGCM
- g/cm<sup>2</sup> = GCM
- kPa = KPA
- MPa = MPA
- mbar = MBAR
- bar = BAR
- cmH<sub>2</sub>O = CMH2O
- atm = ATM

Pressure