

# Programmable Low-Voltage Powered Pressure Transmitters F16DR



## 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

-30.0 inHg/15.0 psig	200.0 inHg abs	1600 mmHg	20.00 bar	2100 g/cm <sup>2</sup>
-30.0 inHg/100.0 psig	200.0 inHg	3200 mmHg	35.00 bar	1.000 kg/cm <sup>2</sup> abs
-30.0 inHg/200.0 psig	50.00 oz/in <sup>2</sup>	760.0 torr abs	70.00 bar	1.000 kg/cm <sup>2</sup> vac
3.000 psig	80.0 oz/in <sup>2</sup>	1600 torr abs	140.0 bar	±1.000 kg/cm <sup>2</sup>
5.000 psig	240.0 oz/in <sup>2</sup> abs	2100 mmH <sub>2</sub> O	200.0 bar	1.000 kg/cm <sup>2</sup>
15.00 psi abs	240.0 oz/in <sup>2</sup> vac	3500 mmH <sub>2</sub> O	350.0 bar	2.000 kg/cm <sup>2</sup> abs
15.00 psig vac	±240.0 oz/in <sup>2</sup>	210.0 cmH <sub>2</sub> O	20.00 kPa	2.000 kg/cm <sup>2</sup>
±15.00 psig	240.0 oz/in <sup>2</sup>	350.0 cmH <sub>2</sub> O	35.00 kPa	4.000 kg/cm <sup>2</sup>
15.00 psig	85.0 inH <sub>2</sub> O	1000 cmH <sub>2</sub> O	100.0 kPa abs	7.000 kg/cm <sup>2</sup> abs
30.00 psi abs	140.0 inH <sub>2</sub> O	2100 cmH <sub>2</sub> O	100.0 kPa vac	7.000 kg/cm <sup>2</sup>
30.00 psig	400.0 inH <sub>2</sub> O abs	200.0 mbar	±100.0 kPa	14.00 kg/cm <sup>2</sup>
60.00 psig	400.0 inH <sub>2</sub> O vac	350.0 mbar	100.0 kPa	20.00 kg/cm <sup>2</sup>
100.0 psi abs	±400 inH <sub>2</sub> O	1000 mbar abs	200.0 kPa abs	35.00 kg/cm <sup>2</sup>
100.0 psig	400.0 inH <sub>2</sub> O	1000 mbar vac	200.0 kPa	70.00 kg/cm <sup>2</sup>
200.0 psig	850 inH <sub>2</sub> O abs	±1000 mbar	400.0 kPa	140.0 kg/cm <sup>2</sup>
300.0 psig	850 inH <sub>2</sub> O	1000 mbar	700.0 kPa abs	200.0 kg/cm <sup>2</sup>
500.0 psig	7.000 ftH <sub>2</sub> O	2000 mbar abs	-100 to 700 kPa	350.0 kg/cm <sup>2</sup>
1000 psig	12.00 ftH <sub>2</sub> O	2000 mbar	700.0 kPa	1.000 atm abs
2000 psig	35.00 ftH <sub>2</sub> O	4000 mbar	1500 kPa	±1.000 atm
3000 psig	70.00 ftH <sub>2</sub> O	1.000 bar abs	2000 kPa	1.000 atm
5000 psig	140.0 ftH <sub>2</sub> O	1.000 bar vac	3500 kPa	2.000 atm
6.000 inHg	230.0 ftH <sub>2</sub> O	±1.000 bar	7000 kPa	4.000 atm
10.00 inHg	480.0 ftH <sub>2</sub> O	1.000 bar	3.500 MPa	7.000 atm
30.00 inHg abs	150.0 mmHg	2.000 bar abs	7.000 MPa	14.00 atm
30.00 inHg vac	260.0 mmHg	2.000 bar	14.00 MPa	20.00 atm
±30.00 inHg	760.0 mmHg abs	4.000 bar	20.00 MPa	35.00 atm
30.00 inHg	760.0 mmHg vac	7.000 bar abs	35.00 MPa	70.00 atm
60.00 inHg abs	±760 mmHg	-1.00 to 7.00 bar	1000 g/cm <sup>2</sup> abs	135.0 atm
60.00 inHg	760.0 mmHg	7.000 bar	1000 g/cm <sup>2</sup>	200.0 atm
120.0 inHg	1600 mmHg abs	14.00 bar	2100 g/cm <sup>2</sup> abs	340.0 atm

## 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  
**BL** models: Red LED backlight on whenever gauge is on

## Controls and Functions

**SEL** Select display for setup  
**TEST** Set output to test level when in test mode  
 ▲ Up: Increase when in test or calibration mode  
 ▼ Down: Decrease when in test or calibration mode

## Calibration

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

## Retransmission Output

Retransmission update rate is approximately 16 times per second  
 Approximately 12,000 counts over sensor range  
**-I** option: 4-20 mA DC output, drive (compliance) determined by power source.  
**-V** option: 0-2 VDC output into 5k ohm or greater  
**-V2** option -2 to 0 to +2 VDC for optional bipolar ranges only

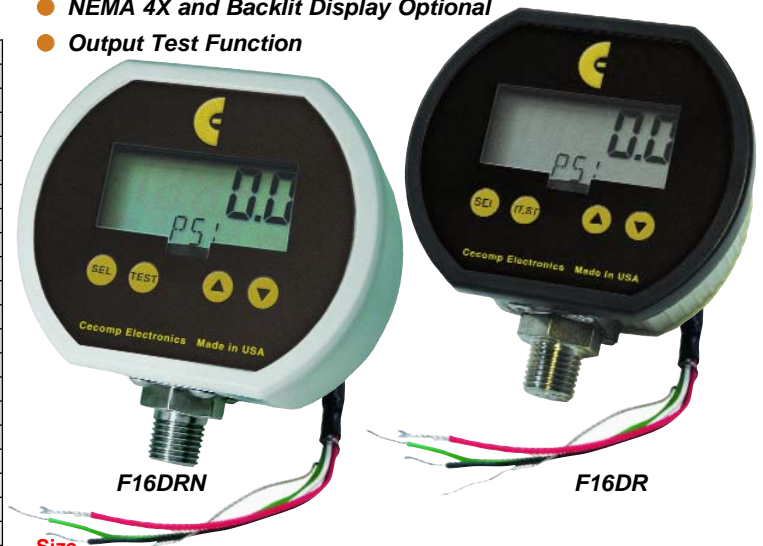
## Power

Gauge is on whenever power is applied. Designed for continuous operation.  
 Any AC source of 8 to 24 VAC 50/60 Hz or any DC source of 9 to 32 VDC  
**DR:** 30 mA maximum  
**DRBL:** Approximately 40 mA maximum  
 3 ft long 4-conductor (power & output) 22 AWG shielded cable, stripped & tinned wire ends  
 Order optional **WMP5K** 12 VDC wall mount power supply kit to operate on 115 VAC

## 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)

- Low Voltage AC/DC Powered
- Powered 4-20 mA or 0-2 V Analog Output
- NEMA 4X and Backlit Display Optional
- Output Test Function



## Size

**F16DR:** 3.38" W x 2.88" H x 1.65" D housing  
**F16DRN:** 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 wt.: 1 pound (approx.)

## Housing

**F16DR:** Extruded aluminum case, light gray epoxy powder coated, black ABS/ polycarbonate bezel (gray aluminum bezel optional), front and rear gaskets, black/gold polycarbonate label  
**F16DRN:** Light gray ABS/polycarbonate NEMA 4X case, rear gasket, black/gold polycarbonate label

## 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 others 2 times sensor pressure  
 112.5% out-of-range display: / --- or / - - - depending on model

## Burst Pressure

4 times sensor pressure rating, or 10,000 psi, whichever is less

## Models and Options

Standard **F16DR** range units ref - output  
 Backlit display **F16DRBL** range units ref - output  
 NEMA 4X **F16DRN** range units ref - output  
 NEMA 4X + Backlit **F16DRNBL** range units ref - output

Pressure/Vacuum Range **G** **A** **VAC**  
 Units  
**G=Gauge, A=Absolute, VAC=Vacuum**

Output Options  
**-I** 4-20 mA  
**-V** 0-2 V  
**-BV** -2 to +2 V with bipolar ranges only

Example: **F16DRBL500PSIG-I**  
 F16DR with BL display backlighting, 500 psig, 4-20 mA output

## Unit Abbreviations

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

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new



# F16DR Series Instructions

## INSTALLATION AND PRECAUTIONS

Install or remove the 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.

**NEVER** connect the gauge wires directly to 115 VAC or permanent damage not covered by warranty will result!

## ELECTRICAL CONNECTIONS

The F16DR can be powered by any 9 to 32 VDC or 8 to 24 VAC 50/60 Hz power source. If the supply voltage falls below 9 VDC or 8 VAC RMS erratic operation or erroneous output may occur. Models with 4-20 mA output power the current loop. Use a power source with sufficient voltage to operate the current loop.

Connection is made with the 4-conductor cable at the gauge rear. This cable accommodates both the gauge power supply and retransmission output. This cable has one RED and one BLACK lead. If using a 9 to 32 VDC power source, connect the (+) supply to the RED lead and the (-) supply to the BLACK lead. There is no polarity consideration if using a 8 to 24 VAC 50/60 Hz power source.

The (+) retransmission output appears on the WHITE lead, and the (-) retransmission output appears on the GREEN lead. **NEVER** connect retransmission output wires together or to an external power source or permanent damage not covered by warranty will result. The power supply (-) lead is tied to the retransmission output ground. Therefore, if a DC supply is used, the power supply (-) lead should be considered common with regard to the retransmission output (-) connection.

Power -	BLACK
Power +	RED
Output -	GREEN
Output +	WHITE

Use of the shield (drain) wire of the retransmission output is optional. It is not generally needed for 4-20 mA current loops unless very long cable lengths are used in electrically noisy environments.

For 4-20 mA output models, be sure to observe the output compliance (voltage drive) capabilities of the gauge. The maximum loop resistance the output can drive, is a function of the supply voltage to the gauge. Too large a loop resistance will cause the gauge output to "limit" or saturate before reaching its full 20 mA output.

For voltage output models, do not allow the resistive load on the output to fall below 5K ohms. Avoid large capacitive loads (greater than 1000 pF) such as those caused by long runs of shielded cable. For long cable runs, 4-20 mA output is preferred.

## POWER-UP AND NORMAL OPERATION

When power is first applied, the gauge startup sequence is as follows.

1. All active display segments are turned on for approximately 1 second.
2. The full scale pressure is indicated for approximately 1 second, while
  - a. engineering units are displayed for 1/2 second on the character segments,
  - b. FS is displayed for 1/2 second on the character segments,
  - c. all active display segments are again turned on for approximately 1 second.

During the startup sequence, the retransmission output is low (-2.5 VDC or 0 mA).

The display initially indicates the applied pressure with engineering units on the character segments. The retransmission output corresponds to the applied pressure.

## TEST RETRANSMISSION OUTPUT MODE

From the Normal mode with applied pressure being displayed, press and hold the TEST button and press the SEL (select) button. Release both buttons when the display indicates - - - - .

While in the Test Retransmission Output mode with no buttons pressed, the display will indicate the applied pressure with engineering units blinking at a slow rate on the character segments, and the retransmission output will correspond to the applied pressure.

When the TEST button is pressed and held, the display will indicate the preset test value with TEST on the character segments, and the retransmission output will correspond to the test value displayed.

Pressing the ▲ or the ▼ button while holding the TEST button will raise or lower the test value. The gauge will not respond to changes in applied pressure while the TEST button is held pressed.

To exit the Test Retransmission Output mode and return to Normal mode, press and release the SEL button.

## CALIBRATION MODE

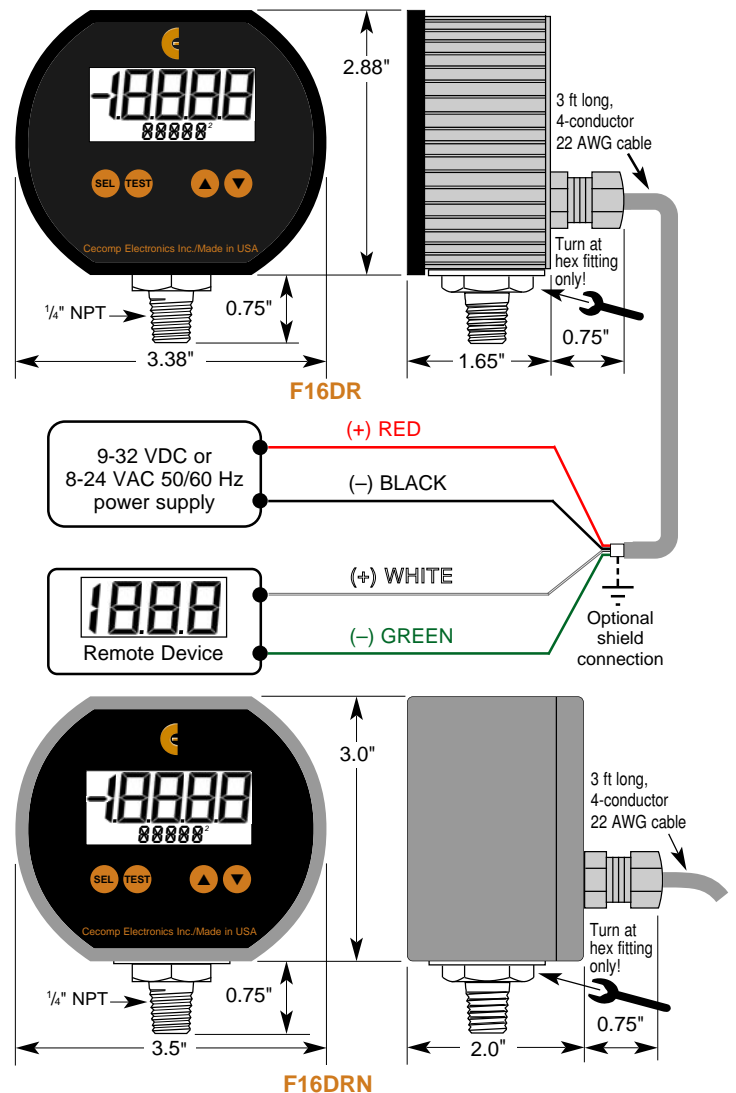
The gauge is calibrated at the factory using equipment traceable to NIST. There is no need to calibrate the gauge before putting it in service. Complete calibration instructions can be downloaded from [www.cecomp.com](http://www.cecomp.com).

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 retransmission output coordinates the retransmission output to the display indication, and is performed independently of applied pressure. It requires a direct physical measurement of the retransmission output. The pressure calibration procedure simultaneously adjusts both the display indication and the retransmission output to correspond to the actual applied pressure.

## WIRING EXAMPLE AND DIMENSIONS



Cecomp maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. Consult factory for your specific requirements.