Cecomp® 2-Wire Loop Powered Digital Pressure Transmitters with Display Backup

### Output Characteristics
- 4-20 mA current output
- Passive transmitter, requires external loop power
- Passive drive (compliance) determined by power source
- Output updated approximately 16 times per second
- 12.000 counts over sensor range

### Display
- 9 ounces (approx.), shipping wt. 1 pound (approx.)

### Housing
- F16LSC: Extruded aluminum case, epoxy powder coated, ABS/ polycarbonate bezel (aluminum bezel optional), front and rear gasket, polycarbonate label
- F16LSCN: ABS/polycarbonate NEMA 4X case, rear gasket, polycarbonate label

See other side for dimensions

### Connection, Material, Media Compatibility
- 1/4" NPT male fitting, all wetted parts are 316L stainless steel

### Overpressure, Burst, Vacuum
- Overpressure: 2X pressure sensor range
- Over-pressure 3000 psig sensor: 5000 psig
- Over-pressure 5000 psig sensor: 7500 psig
- Burst pressure: 4X sensor rating, or 10,000 psi, whichever is less
- Under-range display (non-vacuum sensors): Error
- Over-range display at 112.5% full scale: Error
- Vacuum service: 15 psia, ±15 psig, 15 psig, 30 psig, 100 psig, 100 psig, 100 psig

### Environment
- 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)

### Quick Link
- cecompass.com/loop

### How to Specify
- **F16LSC** - range - options
  - Standard housing
- **F16LSCN** - range - options
  - NEMA 4X housing

### Range—see table at left
- psi = PSI
- psig = PSIG
- mmHg = MMH2O
- Torr = TORK
- bar = BAR
- oz/in² = ZIN
- kg/cm² = KCMG
- cmH2O = CMH20
- atm = ATM
- mbar = MBAR

### Type
- G = gauge reference pressure
- VAC = gauge reference vacuum
- A = absolute reference

### Options—add to end of model number
- HA = High accuracy, ±0.1% FS ± 1 LS
- See table at left for availability
- MC = Metal front cover instead of plastic, n/a NEMA 4X
- PM = Panel mount, 4.1" x 4.1", n/a NEMA 4X
- CC = Moisture resistant circuit board conformal coating
- CD = Calibration data; 5 test points and date
- NC = NIST traceability documentation, 5 points and date
- SCR41SS = Screen filter fitting keeps debris out of gauge sensor. Use for food vacuum packaging applications. 303 SS body, 100 micron 304 SS screen.

### Sensor Ranges and Engineering Units

<table>
<thead>
<tr>
<th>3 psig</th>
<th>5 psig</th>
<th>15 psig</th>
<th>50 psig</th>
<th>150 psig</th>
<th>300 psig</th>
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<tbody>
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<td>2600</td>
<td>1000</td>
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<td>1000</td>
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</tbody>
</table>

### Display Pressure Even If Loop is Disconnected
- ±0.25% Test Gauge Accuracy
- 316L Stainless Steel Wetted Parts
- Scalable 4-20 mA Analog Output
- Output Test Function
- Selectable Engineering Units
For contaminated media use an appropriate screen or filter to
to earth ground to avoid static elec-

dings or filters.

Non-metallic system installations require connecting gauge sensor to
earth ground to avoid static elec-
tricity damage to gauge.

Good design practice dictates that positive displacement liquid

Installation Precautions

Read these instructions before using the gauge. Configuration may be
easier before installation. Contact the factory for assistance.

These products do not contain user-serviceable parts. Contact us
for repairs, service, or refurbishment.

Gauges must be operated within specified ambient temperature ranges.

Due to the hardness of 316 stainless steel, it is recommended that

Avoid permanent sensor damage! Do not apply vacuum to

Avoid permanent sensor damage! NEVER insert objects into
gauge port or blow out with compressed air.

Gauges are not for oxygen service. Accidental rupture of sensor

NEVER connect the gauge wires directly to 115 VAC or perma-
nent damage will result.

Ranges and Selectable Units

The gauge model range code indicates the default range. Alternate
default engineering units may be ordered.

<table>
<thead>
<tr>
<th>Sensor Range and Units</th>
<th>psi</th>
<th>kPa</th>
<th>MPa</th>
<th>mbar</th>
<th>bar</th>
<th>atm</th>
<th>kg/cm²</th>
<th>g/cm²</th>
<th>mmH₂O</th>
<th>cmH₂O</th>
<th>oz/ft²</th>
<th>ftH₂O</th>
<th>inH₂O</th>
<th>inHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>–14.7 to 15.0 psig</td>
<td>150.0</td>
<td>1013.2</td>
<td>1.0132</td>
<td>101300</td>
<td>101.3</td>
<td>1013</td>
<td>10.13</td>
<td>101.3</td>
<td>1013</td>
<td>101300</td>
<td>101300</td>
<td>101300</td>
<td>101300</td>
<td></td>
</tr>
<tr>
<td>–29.9 inHg to 15.0 psig</td>
<td>101 to 1013</td>
<td>689.5</td>
<td>.6895</td>
<td>68950</td>
<td>689</td>
<td>689.5</td>
<td>68.95</td>
<td>689.5</td>
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<td>68950</td>
<td></td>
</tr>
</tbody>
</table>

Conversion

Engineering unit conversions are calculated from the factory default
unit to the newly selected units.

<table>
<thead>
<tr>
<th>oz/ft²</th>
<th>ftH₂O</th>
<th>inH₂O</th>
<th>inHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.0</td>
<td>1600</td>
<td>.1600</td>
<td>.0160</td>
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<td>200.0</td>
<td>3200</td>
<td>.3200</td>
<td>.0320</td>
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<tr>
<td>300.0</td>
<td>4800</td>
<td>.4800</td>
<td>.0480</td>
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<tr>
<td>500.0</td>
<td>8000</td>
<td>.8000</td>
<td>.0800</td>
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Electrical Connection

All operating power is supplied by the 4-20 mA current loop using
the 2-wire cable at the gauge rear. The F16LSC can be used as
an indicating transmitter in any 4-20 mA current loop or as a DC
gauged powered gauge. Reversing the connections will not harm the gauge
but it will not operate with incorrect polarity.

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 10 VDC
at its terminals but not over 32 VDC.

Warning: The F16LSC is designed for continuous operation. Warm-up time is
necessary. When loop power is applied, the gauge will power-up automatically.
All active display segments are turned on for approximately
1 second. After initialization, the gauge will begin operating in the Normal Mode.
The display will show the applied pressure. The loop current and the Loop-Tracker LED brightness will correspond to the applied pressure.

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.

Zero Tare, Push-To-Test, Configuration and Calibration modes are
accessible from the Normal Mode.

The power supply for the Backup Power mode recharges during Normal Mode operation.

It takes approximately two hours of operation in the Normal Mode to fully charge the backup power supply from the loop supply.

If loop power is lost, the gauge will automatically switch to the Backup Power mode and continue to display the applied pressure for
15 seconds. Below are the 4-20 mA output values for various types of sensors,
assuming the output scale has not been adjusted.

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Normal Operation

To use the transmitter as a low loop

mode. The display will show the applied pressure. The loop cur-
rent and the Loop-Tracker LED brightness will correspond to the
applied pressure.

After initialization, the gauge will begin operating in the Normal Mode.
The display will show the applied pressure. The loop current and the Loop-Tracker LED brightness will correspond to the applied pressure.

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To use the transmitter as a low loop
gauged powered gauge connect it
to any 10-32 VDC power supply.
Backup Power Mode Operation
The power supply for the Backup Power mode takes approximately two hours of operation in the Normal Mode to fully charge the backup power supply from the loop supply.

If loop power is lost, the gauge will automatically switch to the Backup Power mode.

The low power indicator will flash, and the Loop-Tracker LED will be off. The pressure will display for 15 seconds, then the gauge will shut off.

To power up the gauge, press and release the SEL button.

After initialization, the gauge will indicate the applied pressure for 15 seconds.

To power-up the gauge for a longer period of time and override the auto shut off, press and hold the SEL button until the display indicates On.

The gauge will indicate the pressure until the backup power is depleted. A fully charged backup supply will last up to 40 minutes.

Press SEL to manually power OFF the gauge.

The gauge will return to Normal Mode when loop power is restored.

Out-of-Range Indications
If excessive vacuum is applied to a pressure-only gauge, the display will indicate an out-of-range indication of –Err. Applying vacuum to a pressure-only gauge can damage the sensor.

If excessive vacuum is applied to a vacuum-pressure gauge, the display will indicate an out-of-range indication of –I—— or –I—— will be displayed depending on model.

If 112.5% over-pressure is applied, an out-of-range indication of 1—–— will be displayed depending on model.

Enter Configuration Pass Code
When a pass code is required, the upper display will indicate ____________ and the lower display will indicate CFGPC, CRLPC, or TSTPC depending on the feature being accessed.

To cancel, press the SEL button without entering any numbers. If no buttons are pressed, the gauge will revert to normal operation after 15 seconds. To proceed, enter the user-defined pass code. 3510 is the factory default, but it is user-modifiable.

The first position will be blinking.

Use the ▲ or ▼ buttons to set the left-most digit to 3.

Press and release the SEL button to index to the next position.

The 3 will remain, and the second position will be blinking.

Use the ▲ or ▼ buttons to select 5.

Press and release the SEL button to index to the next position.

3 5 will remain, and the third position will be blinking.

Use the ▲ or ▼ buttons to select 1.

Press and release the SEL button to index to the next position.

3 5 1 will remain, and the fourth position will be blinking.

Use the ▲ or ▼ buttons to select 0.

Press and release the SEL button to proceed with configuration procedures.

Zero/Tare Mode
Zero/Tare applies to gauge reference models only. Absolute reference gauges do not use the zero feature since they read atmospheric pressure under normal conditions.

This feature can be enabled or disabled in Gauge Configuration.

The gauge must be in the Normal Mode with the gauge port exposed to normal atmospheric pressure.

While in the Zero Tare mode, the gauge will not respond to any changes in pressure. The loop current will maintain its last value.

Press and hold both the ▲ and ▼ buttons.

Then press the SEL button.

Release all buttons when 0000 is displayed.

The display will indicate a new zero tare value with Z OFF (zero offset) on the lower display.

To exit with no changes, press SEL.

If not within approximately 3% full scale of zero, Ern will be displayed and no changes are allowed. Pressure must be removed from the gauge, or it must be recalibrated.

To remove the existing zero tare value, press and release the ▼ button. The display changes to zero.

The Normal Mode may indicate a non-zero value since zero correction has been removed.

To restore the newly calculated zero tare value, press and release the ▲ button.

Test Function
The Test Mode will allow setup and testing of the current loop without having to alter the system pressure.

From the Normal Mode with applied pressure being displayed, press and hold the TEST button.

While holding the TEST button, press the SEL button.

When the display indicates ———, release both buttons.

If a pass code is required, the upper display will indicate ____________, with the left-most position blinking, and the lower section will indicate TSTPC (Test Pass Code). See the “Enter Configuration Pass Code” section of this manual to enter the pass code and continue.

Next, the upper display will indicate the applied pressure and the units display will display zero.

While the TEST button is pressed, the display and loop current are switched, independent of the actual pressure, to a level determined by the test setting. TEST is indicated on the lower display.

Note: The gauge will not respond to changes in applied pressure while the TEST button is held.

Pressing the ▲ or ▼ buttons while pressing the TEST button will raise or lower the test value.

When the TEST button is released, the setting is stored in non-volatile memory and the gauge will operate normally.

Press SEL to exit the Test Mode and return to the Normal Mode.

Gauge Configuration
The gauge must be powered by a loop supply during configuration.

Press and hold the TEST and ▲ buttons, then press the SEL button.

Release all buttons when the display indicates CFG. The gauge firmware version is also displayed.

The display prompts for entry of the configuration pass code (CFGPC), with the first underscore blinking. To enter the 4 digit pass code, see the Enter Configuration Pass Code section.

Factory/User Configuration
Upon successful pass code entry, the upper display will be blank, and the lower will display USER. Use the ▲ or ▼ buttons to select USER or FACTRY.

With USER selected, the gauge configuration can be modified as described below.

To reset the gauge to the factory configuration, press while FACTRY is displayed. The gauge will restart with the factory configuration restored.

Gauge Type Configuration
This applies to gauge reference vacuum-pressure models only.

Use the ▲ or ▼ buttons to select:–EU Vacuum is indicated as a negative number in the selected engineering units.

Use the ▲ or ▼ buttons to select: —-PSIG Vacuum is displayed as negative inHg and pressure in PSIG.

Press and release the SEL button to move to the next parameter.

Engineering Unit Selection
This is skipped if CMPD was selected.

Use the ▲ or ▼ buttons to select the engineer-

ing units available for the range of the gauge.

Press and release the SEL button to move to the next parameter.

Zero Tare Enable/Disable
This is not used for absolute reference gauges.

Use the ▲ or ▼ buttons to select:

ZTARE Zero Tare function enabled.

NOZTR Zero Tare function disabled.

Press and release the SEL button to move to the next parameter.

Test Function Pass Code Enable/Disable
Use the ▲ or ▼ buttons to select:

TSTPC Pass code required for Test Mode.

NODTP No pass code required for Test Mode.

Press and release the SEL button to move to the next parameter.

Range Lower Limit Adjust
The upper display will indicate the pressure value corresponding to 4 mA loop current. The lower section will display RNGLO.

Use the ▲ or ▼ buttons to display the desired pressure equal to a 4 mA output.

Press and release the SEL button to move to the next parameter.

Range Upper Limit Adjust
The upper display will indicate the pressure value corresponding to 20 mA loop current. The lower section will display RNGHI.

Use the ▲ or ▼ buttons to display the desired pressure equal to a 20 mA output.

Press and release the SEL button to save the user configuration and restart the gauge.

The configuration parameters will not be saved if the procedure is interrupted before completion.
Instructions

Calibration Preparation

Gauges are calibrated at the factory using equipment traceable to NIST. There is no need to calibrate the gauge before putting it into service. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures. Gauges can be returned to factory for certified recalibration and repairs. NIST traceability is available. Calibration intervals depend on your quality control program requirements and as-found data. Many customers calibrate their equipment annually.

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 and/or vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 100 microinches (0.1 torr or 100 millitorr) or lower is required for vacuum and absolute gauges. Use a stable DC power supply and an accurate mA meter to calibrate loop powered transmitters. Allow the gauge to equalize to normal room temperature for at least 20 minutes before calibration.

Enter Calibration Pass Code

The gauge must be powered by a 10-32 VDC power supply during calibration.

With the gauge powered up, press and hold the <CALPC> and <TEST> buttons. Then press the <SEL> button to enter the Calibration Mode.

Release all buttons when the display indicates CAL. The firmware version is also displayed.

The display prompts for entry of the calibration pass code (CALPC), with the first underscore blinking. To enter the 4 digit pass code, see the Enter Configuration Pass Code section. Note that it is possible to change the default 3510 value.

Calibration Mode

The gauge enters and remains in the Calibration Mode until restarted manually or power is removed. The display will then indicate the currently applied pressure in the engineering units selected in gauge configuration.

Button Operation

Each time the ▲ or ▼ button is pressed and released quickly, a small change is made to the digitized pressure signal. It may take more than one of these small changes to result in a single digit change on the display. To make larger changes, press and hold the appropriate button. After about one second, the display will begin to change continuously. Release the button to stop.

Then make fine adjustments by pressing and quickly releasing the ▲ or ▼ buttons as previously described.

The SEL button is used to select LCAL (4 mA calibration), HCAL (20 mA calibration), or CR (pressure calibration). If the SEL button is depressed for longer than 2 seconds, the display will change to indicate – – – – , and the gauge will exit the Calibration Mode when the button is released.

Pressure Calibration

The pressure calibration procedure simultaneously adjusts both the display indication and the loop current to correspond to the actual applied pressure.

Press and release the SEL button until the display briefly indicates CAL.

Then make fine adjustments by pressing and quickly releasing the ▲ or ▼ buttons to adjust the actual loop current to 4 mA.

Zero Calibration

Apply zero pressure. The lower display segments will alternate between CAL and ZERO.

Use the ▲ or ▼ buttons to adjust the display to zero.

Span Calibration

Apply full scale pressure.

The lower display segments will alternate between CAL and 100.

Use the ▲ or ▼ buttons to adjust the display to match the calibrator’s pressure reading.

Mid Point Calibration

Apply 50% of full scale pressure.

The lower display segments will alternate between CAL and ±MID.

Use the ▲ or ▼ buttons to adjust the display to match the calibrator’s pressure reading.

Negative Span Calibration

This applies to bipolar and compound ranges only. Apply full scale negative pressure (full vacuum).

The lower display segments will alternate between CAL and -SPAN.

Use the ▲ or ▼ buttons to adjust the display to match the calibrator’s pressure reading.

Negative Mid Point Calibration

This applies only to bipolar ranges that use the ±15 psig sensor.

Apply 50% full scale negative pressure (50% vacuum).

The lower display segments will alternate between CAL and ±MID.

Use the ▲ or ▼ buttons to adjust the display to match the calibrator’s pressure reading.

To store the parameters and exit the Calibration Mode, press and hold the SEL button until the display indicates – – – – . The gauge will restart.

Verify output at 0%, 25%, 50%, 75% and 100% of full range of the gauge.

Loop Current Calibration

Loop current calibration coordinates the loop current to the display indication, and is performed independently of applied pressure. It requires a direct physical measurement of the loop current. See wiring diagrams on page 2.

4 mA Loop Current

Press and release the SEL button until the display briefly indicates LCAL.

Note: If the SEL button is depressed for longer than 2 seconds, the gauge will exit the Calibration Mode.

The upper display will indicate the pre-configured pressure corresponding to a 4 mA loop current.

The lower display segments will alternate between CAL and 4 MA.

Use the ▲ or ▼ buttons to adjust the actual loop current to 4 mA.

Loop Current Calibration—continued

20 mA Loop Current

Press and release the SEL button until the display briefly indicates HCAL.

Note: If the SEL button is depressed for longer than 2 seconds, the gauge will exit the Calibration Mode.

The upper display will indicate the pre-configured pressure corresponding to a 20 mA loop current.

The lower display segments will alternate between CAL and 20 MA.

Use the ▲ or ▼ buttons to adjust the actual loop current to 20 mA.

To store the calibration parameters and exit the Calibration Mode, press and hold the SEL button until the display indicates – – – – . The gauge will restart.

Verify output at 0%, 25%, 50%, 75% and 100% of full range of the gauge.

User-Defined Pass Code Configuration

The factory default 3510 pass code may be changed to a different value.

Configuration Pass Code

With the unit on, press and hold the ▲ and TEST buttons and then press the SEL button. Release all buttons when the display indicates CFG.

Calibration Pass Code

With the unit on, press and hold the ▼ and TEST buttons and then press the SEL button. Release all buttons when the display indicates CAL.

Test Function Pass Code (if enabled)

With the unit on, press and hold the TEST button and press the SEL button. Release both buttons when the upper display indicates – – – – .

Change Pass Code Mode

Before the unit enters the view or change pass code mode, the display initially indicates _ _ _ _ with the first underscore blinking, and with CFGPC, CRALPC, or TSTPC on the lower display.

The gauge will revert to normal operation if no buttons are operated for approximately 15 seconds. Press and release the SEL button without entering any pass code characters to exit.

Enter access code 1220:

Use the ▲ and ▼ buttons to set the left-most digit to 1.

Press and release the SEL button to index to the next position. The 1 will remain, and the second position will be blinking.

Use the ▲ and ▼ buttons to select 2.

Press and release the SEL button to index to the next position. 1 2 will remain, and the third position will be blinking.

Use the ▲ and ▼ buttons to select 2.

Press and release the SEL button to index to the next position. 1 2 2 will remain, and the fourth position will be blinking.

Use the ▲ and ▼ buttons to select 0.

Press and release the SEL button to proceed. Note: If an incorrect access code was entered, the gauge will return to the start of the access code entry sequence.

Change Pass Code

Once the access code has been entered correctly, the display will indicate the existing user-defined pass code with CFGPC, CRALPC, or TSTPC on the lower display.

Press the ▲ or ▼ button to select the first character of the new pass code.

When the correct first character is being displayed, press and release the SEL button to proceed to the next pass code character.

Repeat above until the entire pass code is complete.

To exit the User-Defined Pass Code change mode, press and hold the SEL button until the gauge restarts.

<table>
<thead>
<tr>
<th>20.00</th>
<th>Power (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>Power (+)</td>
</tr>
<tr>
<td>0000</td>
<td>mA meter</td>
</tr>
</tbody>
</table>

continued next column