

**Ranges and Resolution**

See table below. Consult factory for special engineering units.  
Resolution is fixed as indicated in table.

**Accuracy**

Accuracy includes linearity, hysteresis, repeatability  
Standard accuracy: ±0.25% of full scale ±1 least significant digit  
HA accuracy option: ±0.1% FS ±1 LSD, see ranges for availability  
Sensor hysteresis: ±0.015% FS, included in accuracy  
Sensor repeatability: ±0.01% FS, included in accuracy

**Display**

4 readings per second nominal display update rate  
Up to 40 minute display operating time if loop power is lost  
4 digit LCD, 0.5" H and 5 character 0.25" H alphanumeric

**Controls and Functions**

SEL: Press to momentarily display pressure if loop power is lost  
Press and hold to display pressure for up to 40 minutes depending on state of charge

TEST: Used with SEL button to set loop current to allow testing of system operation. May be pass code protected.

▲ ▼ Up/down: When in setup used to set test values, enter pass code, units, scaling and calibration values

**Calibration**

User settable pass code 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

**Loop Supply Voltage**

Any DC supply/loop resistance that maintains 10-32 VDC at gauge terminals  
Reverse polarity protected  
Approx. 2 hours required to charge backup capacitor

**Output Characteristics**

4-20 mA DC current output  
Passive transmitter, requires external loop power  
Output drive (compliance) determined by power source  
Output updated approximately 16 times per second  
12,000 counts over sensor range

**Weight**

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 gaskets, 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  
Overpressure 3000 psig sensor: 5000 psig  
Overpressure 5000 psig sensor: 7500 psig  
Burst pressure: 4X sensor rating, or 10,000 psi, whichever is less


Under-range display (non-vacuum sensors): -Err

Over-range display at 112.5% full scale: 1 --- or / --- --

Vacuum service: 15 psia, ±15 psig, 15 psig, 30 psia, 100 psig, 100 psia, 200 psig sensors

**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)

- 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



F16LSC



NEMA 4X Housing F16LSCN


Quick Link: [cecomp.com/loop](http://cecomp.com/loop)

Sensor Ranges and Engineering Units ‡ -HA option not available											
3 psig ‡	Res	15 psig vac ‡	Res	30 psia	Res	-15V100psig ‡	Res	300 psig	Res	500 psig	Res
3PSIG	.001	100KPAVAC	.1	2KGCMVA	.001	-15V100PSIG	.1	300PSIG	.1		
6INHGG	.001	0.1MPAVAC	.0001	2ATMA	.001	-30INHG/100PSIG	.1	610INHGG	.1		
85INH20G	.1	1BARVAC	.001	30 psig	Res	-30V200INHGG	.1	4800ZING	1		
50ZING	.01	1KGCMMVAC	.01	30PSIG	.01	-400V2770INH20G	1	700FTH20	.1		
210GCMG	.1	1ATMVAC	.001	60INHGG	.01	-240V1600ZING	1	2000KPAG	1		
150MMHGG	.1	15 psig	Res	850INH20G	1	-760V5200MMHGG	1	2MPAG	.001		
150TORRG	.1	15PSIG	.01	480ZING	.1	-760V5200TORRG	1	20BARG	.01		
200MBARG	.1	30INHGG	.01	2100GCMG	1	-100V700KPAG	1	20KGCMMG	.01		
200CMH20G	.1	400INH20G	.1	1600MMHGG	1	-0.1V0.7MPAG	.001	20ATMG	.01		
2000MMH20G	1	240ZING	.1	1600TORRG	1	-1V7BARG	.01	500 psig	Res		
7FTH20	.001	1000GCMG	1	2000MBARG	1	-1V7KGCMMG	.01	500PSIG	.1		
20KPAG	.01	760MMHGG	.1	2100CMH20G	1	-1V7ATMG	.01	1020INHGG	1		
		760TORRG	.1	70FTH20	.01	100 psig	Res	1150FTH20	1		
5PSIG	.001	1000MBARG	1	200KPAG	.1	100PSIG	.1	3500KPAG	1		
10INHGG	.01	1000CMH20G	1	0.2MPAG	.0001	200INHGG	.1	3.5MPAG	.001		
140INH20G	.1	35FTH20	.01	2BARG	.001	2770INH20G	1	35BARG	.01		
80ZING	.1	100KPAG	.1	2KGCMMG	.001	1600ZING	.01	35KGCMMG	.01		
350GCMG	.1	0.1MPAG	.0001	2ATMG	.001	7000GCMG	1	35ATMG	.01		
260MMHGG	.1	1BARG	1	60 psig	Res	5200MMHGG	1	1000 psig	Res		
260TORRG	.1	1KGCMMG	1	60PSIG	.01	5200TORRG	1	1000PSIG	1		
350MBARG	.1	1ATMG	1	120INHGG	.1	7000MBARG	1	2040INHGG	1		
350CMH20G	.1	±15 psig ‡	Res	1660INH20G	1	7000CMH20G	1	2300FTH20	1		
3500MMH20G	1	±15PSIG	.01	960ZING	1	230FTH20	.1	7000KPAG	1		
12FTH20	.01	-30INHG/15PSIG	.01	4200GCMG	1	700KPAG	.1	7MPAG	.0001		
35KPAG	.01	±30INHGG	.01	3100MMHGG	1	0.7MPAG	.0001	70BARG	.01		
		±400INH20G	1	3100TORRG	1	7BARG	.001	70KGCMMG	.01		
15 psia	Res	±240ZING	.1	4100MBARG	1	7KGCMMG	.001	70ATMG	.01		
15PSIA	.01	±1000GCMG	1	4200CMH20G	1	7ATMG	.001	2000 psig	Res		
30INHGA	.01	±1000GCMG	1	140FTH20	.1	-15V200 psig ‡	Res	2000PSIG	1		
400INH20A	.1	±760MMHGG	1	400KPAG	.1	-15V200PSIG	.1	4070INHGG	1		
240ZINA	.1	±760TORRG	1	0.4MPAG	.0001	-30INHG/200PSIG	.1	4600FTH20	1		
1000GCMVA	1	±1000MBAR	1	4BARG	.001	-30V400INHGG	.1	14MPAG	.01		
760MMHGA	.1	±1000CMH20G	1	4KGCMMG	.001	-400V5500INH20G	1	140BARG	.1		
760TORRA	.1	±100KPAG	.1	4ATMG	.001	-240V3200ZING	1	140KGCMMG	.1		
1000MBARA	1	±0.1MPAG	.0001	100 psia	Res	-100V1400KPAG	1	140ATMG	.1		
1000CMH20A	1	±1BARG	.001	100PSIA	.1	-0.1V1.4MPAG	.001	3000 psig	Res		
100KPAA	.1	±1KGCMMG	.001	200INHGA	.1	-1V14BARG	.01	3000PSIG	1		
0.1MPAA	.0001	±1ATMG	.001	2770INH20A	1	-1V14KGCMMG	.01	6100INHGG	1		
1BARA	.001	30 psia	Res	1600ZINA	1	-1V 14ATMG	.01	6900FTH20	1		
1KGCMA	.001	60INHGA	.01	7000GCMVA	1	200 psig	Res	20MPAG	.01		
1ATMA	.001	850INH20A	1	5200MMHGA	1	200PSIG	.1	200BARG	.1		
		15 psig vac ‡	Res	5200TORRA	1	400INHGG	.1	200KGCMMG	.1		
15PSIVAC	.01	480ZINA	.1	7000MBARA	1	5500INH20G	1	200ATMG	.1		
30INHGVAC	.01	2100GCMVA	1	7000CMH20A	1	3200ZING	1	5000 psig	Res		
400INH20VAC	.1	1600MMHGA	1	700KPAA	.1	480FTH20	.1	5000PSIG	1		
240ZINVAC	.1	1600TORRA	1	7000GCMVA	1	1400KPAG	1	35MPAG	.01		
1000GCMVAC	1	2000MBARA	1	7BARA	.001	1.4MPAG	.001	350BARG	.1		
760MMHGVAC	.1	2100CMH20A	1	7KGCMA	.001	14BARG	.01	350KGCMMG	.1		
760TORRVAC	.1	200KPAA	.1	7ATMA	.001	14KGCMMG	.01	340ATMG	.1		
1000MBARVAC	1	0.2MPAA	.0001	14ATMG	.01						
1000CMH20VAC	1	2BARA	.001								

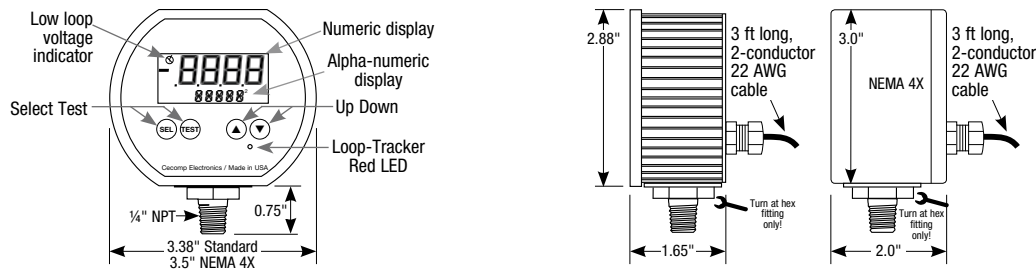
How to Specify	Type
F16LSC range - options	Standard housing
F16LSCN range - options	NEMA 4X housing

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

**SCR14SS**  
Filter screen fitting keeps debris out of gauge sensor. Use for food vacuum packaging applications. 303 SS body, 100 micron 304 SS screen. 

## Dimensions



## Ranges and Selectable Units

### Range Codes

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

### Selectable Ranges

Engineering units may be changed to any of those listed in the same row as shown in the table below.

### Conversion

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

Sensor Range and Units	psi	kPa	MPa	mbar	bar	atm	kg/cm <sup>2</sup>	g/cm <sup>2</sup>	mmH <sub>2</sub> O	cmH <sub>2</sub> O	oz/in <sup>2</sup>	ftH <sub>2</sub> O	inH <sub>2</sub> O	mmHg	torr	inHg
-14.7 to 15.0 psig	-14.7 to 15.0	-101.3 to 103.4	-1013 to 1034	-1013 to 1034	-1.013 to 1.034	-1.000 to 1.021	-1.033 to 1.055	-1033 to 1055		-1033 to 1055	-235.1 to 240.0	-33.90 to 34.61	-407 to 415	-760 to 776	-760 to 776	-29.92 to 30.54
-29.9 inHg to 15.0 psig	-14.7 to 15.0	-101.3 to 103.4	-1013 to 1034	-1013 to 1034	-1.013 to 1.034	-1.000 to 1.021	-1.033 to 1.055	-1033 to 1055		-1033 to 1055	-235.1 to 240.0	-33.90 to 34.61	-407 to 415	-760 to 776	-760 to 776	-29.92 to 30.54
-29.9 inHg to 100.0 psig	-14.7 to 100.0	-101 to 690	-101 to 690		-1.01 to 6.90	-1.00 to 6.81	-1.03 to 7.03				-235 to 1600	-33.9 to 230.7	-407 to 2767	-760 to 5171	-760 to 5171	-29.9 to 203.6
-29.9 inHg to 200.0 psig	-14.7 to 200.0	-101 to 1379	-101 to 1379		-1.01 to 13.79	-1.00 to 13.61	-1.03 to 14.06				-235 to 3200	-33.9 to 461.4	-407 to 5534			-29.9 to 407.2
0 to 3.000 psig	3.000	20.68		206.8	.2068	.2041	.2109	210.9	2109	210.9	48.00	6.921	83.0	155.1	155.1	6.108
0 to 5.000 psig	5.000	34.47		344.7	.3447	.3402	.3515	351.5	3515	351.5	80.0	11.54	138.4	258.6	258.6	10.18
15.00 to 0 psi abs	15.00 abs	103.4 abs	.1034 abs	1034 abs	1.034 abs	1.021 abs	1.055 abs	1055 abs		1055 abs	240.0 abs	34.61 abs	415.1 abs	775.7 abs	775.7 abs	30.54 abs
0 to 14.70 psig vac	14.70 vac	101.3 vac	.1013 vac	1013 vac	1.013 vac	1.000 vac	1.033 vac	1033 vac		1033 vac	235.1 vac	33.90 vac	406.8 vac	760 vac	760 vac	29.92 vac
0 to 15.00 psig	15.00	103.4	.1034	1034	1.034	1.021	1.055	1055		1055	240.0	34.61	415.1	775.7	775.7	30.54
30.00 to 0 psi abs	30.00 abs	206.8 abs	.2068 abs	2068 abs	2.068 abs	2.041 abs	2.109 abs	2109 abs		2109 abs	480.0 abs	69.21 abs	830 abs	1551 abs	1551 abs	61.08 abs
0 to 30.00 psig	30.00	206.8	.2068	2068	2.068	2.041	2.109	2109		2109	480.0	69.21	830	1551	1551	61.08
0 to 60.00 psig	60.00	413.7	.4137	4137	4.137	4.083	4.218	4218		4218	960	138.4	1660	3103	3103	122.2
100.0 to 0 psi abs	100.0 abs	689.5 abs	.6895 abs	6895 abs	6.895 abs	6.805 abs	7.031 abs	7031 abs		7031 abs	1600 abs	230.7 abs	2767 abs	5171 abs	5171 abs	203.6 abs
0 to 100.0 psig	100.0	689.5	.6895	6895	6.895	6.805	7.031	7031		7031	1600	230.7	2767	5171	5171	203.6
0 to 200.0 psig	200.0	1379	1.379		13.79	13.61	14.06				3200	461.4	5534			407.2
0 to 300.0 psig	300.0	2068	2.068		20.68	20.41	21.09				4800	692.1				610.8
0 to 500.0 psig	500.0	3447	3.447		34.47	34.02	35.15					1154				1018
0 to 1000 psig	1000	6895	6.895		68.95	68.05	70.31					2307				2036
0 to 3000 psig	3000		20.68		206.8	204.1	210.9					6921				6108
0 to 5000 psig	5000		34.47		344.7	340.2	351.5									

## 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.
- Outdoor or wash down applications require a NEMA 4X gauge or installation in a NEMA 4X housing.
- Use a pressure or vacuum range appropriate for the application.
- Use fittings appropriate for the pressure range of the gauge.
- Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.
- For contaminated media use an appropriate screen or filter to keep debris out of gauge port.
- Remove system pressures before removing or installing gauge.
- Install or remove gauge using a wrench on the hex fitting only. Do not attempt to turn gauge by forcing the housing.
- Good design practice dictates that positive displacement liquid pumps include protection devices to prevent sensor damage from pressure spikes, acceleration head, and vacuum extremes.
- Avoid permanent sensor damage! Do not apply vacuum to non-vacuum gauges or hydraulic vacuum to any gauges.
- Avoid permanent sensor damage! NEVER insert objects into gauge port or blow out with compressed air.
- NEVER connect the gauge wires directly to 115 VAC or permanent damage will result.

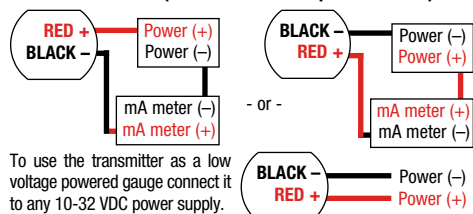
## Electrical Connection

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 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.

For correct operation and to avoid erratic or erroneous readings, the gauge terminal voltage must not fall below 10 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:

$$V_{min} = 10V + (20mA \times \text{Total loop resistance})$$



To use the transmitter as a low voltage powered gauge connect it to any 10-32 VDC power supply.

## Normal Operation

The F16LSC is designed for continuous operation. Warm-up time is negligible.

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.

Sensor Range	Full vacuum	"0" on display	Full pressure
Gauge reference pressure	n/a	4 mA	20 mA
Gauge reference vacuum	20 mA	4 mA	n/a
Compound -30inHg/15psi	4 mA	12 mA	20 mA
Compound -30inHg/100psi	4 mA	5.5 mA	20 mA
Compound -30inHg/200psi	4 mA	4.8 mA	20 mA
Absolute reference	4 mA	4 mA	20 mA
Bipolar ±	4 mA	12 mA	20 mA

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

**Backup Power Mode Operation**

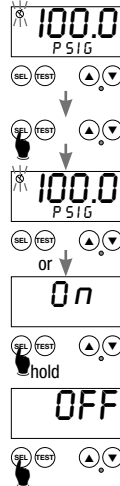
The power supply for the Backup Power mode takes approximately two hours of operation in the Normal Mode to fully charge the backup power supply from the loop supply.

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 shutoff, 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.

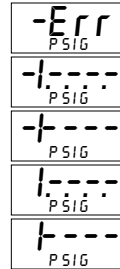
The gauge will return to Normal Mode when loop power is restored.

**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-range pressure is applied, an out-of-range indication of *1---* or *1.---* will be displayed depending on model.

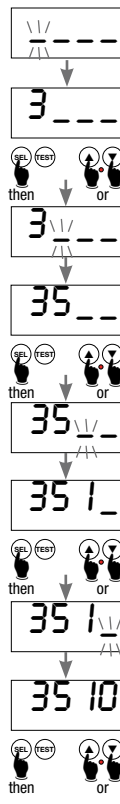


**Enter Configuration Pass Code**

When a pass code is required, the upper display will indicate *----*, and the lower display will indicate *CFGPC*, *CALPC*, 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.

Note: If an incorrect pass code is entered, the gauge will return to the start of the pass code entry sequence.

**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.

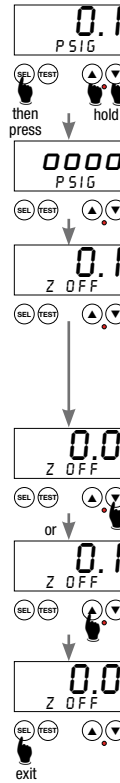
To exit with no changes, press SEL.

If not within approximately 3% full scale of zero, *Err0* 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.

To exit the Zero Tare mode and return to the Normal Mode, press and release the SEL 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.

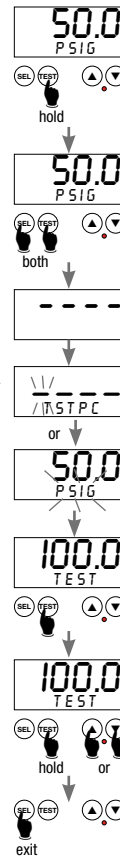
Next, the upper display will indicate the applied pressure and the units display will be blinking.

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 *FCTRY*.

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

To reset the gauge to the factory configuration, press SEL while *FCTRY* 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

*CMPSD* 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 *CMPSD* was selected.

Use the **▼** or **▲** buttons to select the engineering 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.

*NOTPC* 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 *ANGLO*.

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.

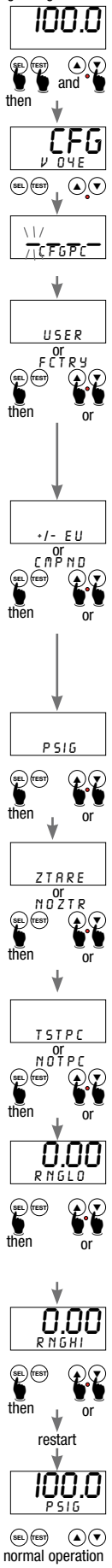
**Range Upper Limit Adjust**

The upper display will indicate the pressure value corresponding to 20 mA loop current. The lower section will display *ANGHI*.

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.



## 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 microns (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.

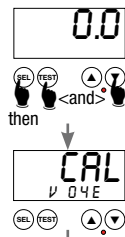
Allow the gauge to equalize to normal room temperature for at least 20 minutes before calibration.

## 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 **▼** 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 **CAL** (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**.

### 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 **+SPAN**.

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

Verify the pressure indications 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

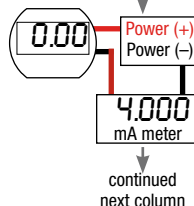
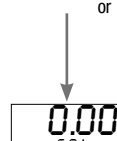
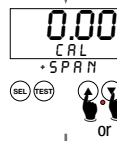
Press and release the **SEL** button until the display briefly indicates **LCAL**.

*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

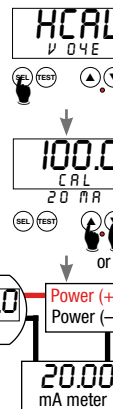
Press and release the **SEL** button until the display briefly indicates **HCAL**.

*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**, **CALPC**, 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**, **CALPC**, 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.