

#### 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 Sensor Ranges and Engineering Units

#### **Output Characteristics**

4-20 mADC 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 I - - - -Vacuum service: 15 psia, ±15 psig, 15 psig, 30 psia, 100 psig,

100 psia, 200 psig sensors

#### **Environmental**

‡ -HA option not available

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



**Quick Link** cecomp.com/loop









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

Range-see table at left

torr = TORR psi = PSI mbar = MBARinHg = INHG  $mmH_20 = MMH20$ bar = BAR $oz/in^2 = ZIN$  $kg/cm^2 = KGCM$  $cmH_20 = CMH20 \\$  $inH_2O = INH2O$  $g/cm^2 = GCM$ atm = ATM $ftH_2O = FTH2O$ kPa = KPAmmHg = MMHGMPa = MPA

G = gauge reference pressure VAC = gauge reference vacuum A = absolute reference

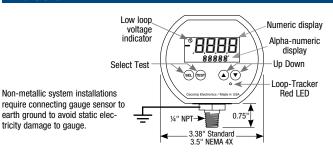
Options—add to end of model number						
НА	High accuracy, ±0.1% FS ±1 LS See table at left for availability					
MC	Metal front cover instead of plastic, n/a NEMA 4X					
PM	Panel mount, 4.1" x 4.1", n/a NEMA 4X					
CC	Moisture resistant circuit board conformal coating					
CD	Calibration data; 5 test points and date					
NC	NIST traceability documentation, 5 points and date					

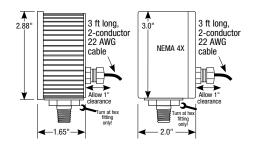
Filter screen fitting keeps debris out of gauge sensor. Use for food vacuum packaging applications. 303 SS body, 100 micron 304 SS screen.



		Ingineering Units		‡ -HA option not ava		45)(400 : 1	-		-
3 psig ‡		15 psig vac ‡				-15V100psig ‡			Res
3PSIG	.001	100KPAVAC	.1	2KGCMA	.001	-15V100PSIG	.1	300PSIG	.1
6INHGG	.001	0.1MPAVAC		2ATMA	.001	-30INHG/100PSIG	.1	610INHGG	.1
85INH20G	.1	1BARVAC	.001	30 psig		-30V200INHGG	.1	4800ZING	1
50ZING	.01	1KGCMVAC	.001	30PSIG	.01	-400V2770INH20G	1	700FTH20	.1
210GCMG	.1	1ATMVAC	.001	60INHGG	.01	-240V1600ZING	1	2000KPAG	1
150MMHGG	.1	15 psig		850INH20G	1	-760V5200MMHGG	1	2MPAG	.001
150TORRG	.1	15PSIG	.01	480ZING	.1	-760V5200TORRG	1	20BARG	.01
200MBARG	.1	30INHGG	.01	2100GCMG	1	-100V700KPAG	1	20KGCMG	.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	-1V7KGCMG	.01	500PSIG	.1
20KPAG	.01	760MMHGG	.1	2100CMH20G	1	-1V7ATMG	.01	1020INHGG	1
5 psig ‡	Res	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	2KGCMG	.001	1600ZING	1	35KGCMG	.01
350GCMG	.1	0.1MPAG		2ATMG	.001	7000GCMG	1	35ATMG	.01
260MMHGG	.1	1BARG	.001	60 psig		5200MMHGG	1	1000 psig	Res
260TORRG	.1	1KGCMG	.001	60PSIG	.01	5200TORRG	1	1000PSIG	1
350MBARG	.1	1ATMG	.001	120INHGG	.1	7000MBARG	1	2040INHGG	1
350CMH20G	.1	±15 psig ‡		1660INH20G	1	7000CMH20G	1	2300FTH20	1
3500MH20G	1	±15PSIG	.01	960ZING	1	230FTH20	.1	7000KPAG	1
12FTH20	.01	-30INHG/15PSIG	.01	4200GCMG	1	700KPAG	.1	7MPAG	.001
35KPAG	.01	±30INHGG	.01	3100MMHGG	1	0.7MPAG		70BARG	.001
15 psia		±400INH20G	1	3100TORRG	1	7BARG	.0001	70KGCMG	.01
15 psia 15PSIA	.01	±240ZING	.1	4100MBARG	1	7KGCMG	.001	70ATMG	.01
30INHGA	_	±1000GCMG	1		1				
400INH20A	.01	±760MMHGG	1	4200CMH20G 140FTH20	.1	7ATMG	.001	2000 psig 2000PSIG	Res
			-			-15V200 psig ‡			-
240ZINA	.1	±760TORRG	1	400KPAG	.1	-15V200PSIG	.1	4070INHGG	1
1000GCMA	1	±1000MBARG	1	0.4MPAG	.0001	-30INHG/200PSIG	.1	4600FTH20	1
760MMHGA	.1	±1000CMH20G	1	4BARG	.001	-30V400INHGG	.1	14MPAG	.01
760TORRA	.1	±100KPAG	.1	4KGCMG	.001	-400V5500INH20G	1	140BARG	.1
1000MBARA	1	±0.1MPAG		4ATMG	.001	-240V3200ZING	1	140KGCMG	.1
1000CMH20A	1	±1BARG	.001	100 psia	Res	-100V1400KPAG	1	140ATMG	.1
100KPAA	.1	±1KGCMG	.001	100PSIA	.1	-0.1V1.4MPAG	.001	3000 psig	Res
0.1MPAA	_	±1ATMG	.001	200INHGA	.1	-1V14BARG	.01	3000PSIG	1
1BARA	.001	30 psia		2770INH20A	1	-1V14KGCMG	.01	6100INHGG	1
1KGCMA	.001	30PSIA	.01	1600ZINA	1	–1V 14ATMG	.01	6900FTH20	1
1ATMA	.001	60INHGA	.01	7000GCMA	1	200 psig	Res	20MPAG	.01
15 psig vac ‡	Res	850INH20A	1	5200MMHGA	1	200PSIG	.1	200BARG	.1
15PSIVAC	.01	480ZINA	.1	5200TORRA	1	400INHGG	.1	200KGCMG	.1
30INHGVAC	.01	2100GCMA	1	7000MBARA	1	5500INH20G	1	200ATMG	.1
400INH20VAC	.1	1600MMHGA	1	7000CMH20A	1	3200ZING	1	5000 psig	Res
240ZINVAC	.1	1600TORRA	1	700KPAA	.1	480FTH20	.1	5000PSIG	1
1000GCMVAC	1	2000MBARA	1	0.7MPAA	.0001	1400KPAG	1	35MPAG	.01
760MMHGVAC	.1	2100CMH20A	1	7BARA	.001	1.4MPAG	.001	350BARG	.1
760TORRVAC	.1	200KPAA	.1	7KGCMA	.001	14BARG	.01	350KGCMG	.1
1000MBARVAC	1	0.2MPAA		7ATMA	.001	14KGCMG	.01	340ATMG	.1
1000CMH20VAC	1	2BARA	.001			14ATMG	.01		
10000HIIIZUVAU	1.	-D. 4171	.001			1 17 ( 1 M) U			

#### **Dimensions**





#### Ranges and Selectable Units

#### Range Codes

The gauge model range code indicates the default range. Alternate

#### Selectable Ranges

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

#### Conversion

Engineering unit conversions are calculated from the factory default

default engineering u	illo illay be	oruereu.		row as shown in the table below.												
Sensor Range and Units	psi	kPa	MPa	mbar	bar	atm	kg/cm²	g/cm²	mmH <sub>2</sub> O	cmH <sub>2</sub> O	oz/in²	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 1.379		-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.
- X Avoid permanent sensor damage! Do not apply vacuum to nonvacuum gauges or hydraulic vacuum to any gauges.
- X 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 diaphragm may cause silicone oil inside sensor to react with
- NEVER connect the gauge wires directly to 115 VAC or permanent damage will result.

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



WARNING: This product can expose you to chemicals including nickel and chromium, which are known to the State of Califor-nia to cause cancer or birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

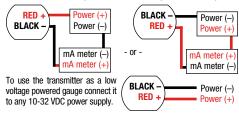
# **Electrical Connection**

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:

#### Vmin = 10V + (20mA x Total loop resistance)



# **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

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

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

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	"O" 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	

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#### **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.

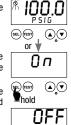
After initialization, the gauge will indicate the applied pressure for 15 seconds.

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 Dn.

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 *DFF* the gauge.

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



SEL (TEST)

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(SEL) (TEST)

SEL (EST)

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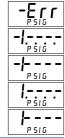
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# **Out-of-Range Indications**

If excessive vacuum is applied to a pressureonly gauge, the display will indicate an out-ofrange indication of -Err. Applying vacuum to a pressure-only gauge can damage the sensor.

If excessive vacuum is applied to a vacuumpressure gauge, the display will indicate an outof-range indication of -1 - - or -1 - - 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.



SEL (EST)

SEL TEST

SEL TEST

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35 1/1

35

EL (EST

# **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

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

#### 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 appa is displayed.

The display will indicate a new zero tare value with Z DFF (zero offset) on the lower display. To exit with no changes, press SEL.

If not within approximately 3% Erru full scale of zero, ErrD 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 **\( \Lambda \)** button.

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

# (SEL) (TEST) 0.0 SEL (TEST) $\bullet$

50.0

50.0

 $\bullet$ 

 $\bullet$ 

P 510

hold

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 $\bullet$ 

hold

 $\bullet$ 

0. I

 $\bullet$ 

P 516

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0000

SEL TEST

SEL (TEST)

SEL (TEST)

SEL (TEST)

or

ZOFF

then

played.

# **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

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  ${\color{red}\blacktriangle}$  buttons, then press the SEL button. then Release all buttons when the display indicates

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 lacktriangledown or lacktriangledown 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:

Vacuum is indicated as a negative -/+EU number in the selected engineering units

CMPND Vacuum is displayed as negative InHq 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 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: 7TARF Zero Tare function enabled.

NN7TR 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 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:

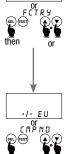
Press and release the SEL button to save the user configuration and restart the gauge.

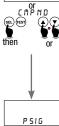
The configuration parameters will not be saved if the procedure is interrupted before completion.



















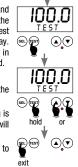












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SEL (TEST)

#### 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

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.



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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.

# CRL V OYE SET (EST) $\bullet$ 0.00 ZERO

SEL (TEST)

SEL (TEST)

SEL TEST

0.00

or

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QQ

0.00

0.00

SPAN

-5PRN

# **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 set rest 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% (SEL) (TEST) 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.

# 0.00 MID 0.00



until gauge restarts

#### **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

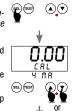
Press and release the SEL button until the display briefly indicates LCAL.

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

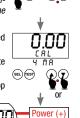
between *CAL* and *4 MA*.

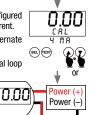
Use the ▲ or ▼ buttons to adjust the actual loop current to 4 mA.



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mA meter continued next column

# Loop Current Calibration—continued

#### 20 mA Loop Current

current to 20 mA.

will restart.

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.

To store the calibration parameters and exit the

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

## 100.0 SEL (TEST) Use the ▲ or ▼ buttons to adjust the actual loop or Power (+) 100.0 Power (-) 20.00 Calibration Mode, press and hold the SEL button mA meter until the display indicates ---. 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 A 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  $\ensuremath{\blacktriangledown}$  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

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.