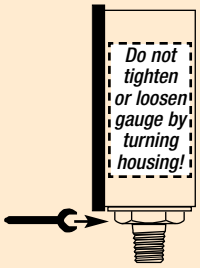
Cecomp Electronics Digital Pressure Gauge Calibration Instructions

Rev. January 28, 2008

This manual contains calibration procedures for Cecomp digital pressure gauges. Data sheets with operating instructions are also required and can be downloaded from www.cecomp.com

Installation Precautions

- ✔ Read and understand all information in the instruction sheet and this manual.
- ✔ Contact Cecomp for help or see www.cecomp.com for data sheets and operating instructions.
- ✔ Do not apply vacuum to gauges not specified for vacuum operation. Sensor damage will result.
- ✔ Outdoor or washdown applications require NEMA 4X gauges or installation in a NEMA 4X housing.
- ✔ Tighten or remove gauge using wrench on hex fitting only. Do not rotate gauge by turning housing.
- ✔ Never insert objects into the gauge port or blow out with compressed air. Sensor damage may result.



Safety Precautions & Warnings

- ⚠ WARNING! Do not exceed pressure range indicated on gauge label.
- ⚠ WARNING! Use fittings appropriate for the pressure range of the gauge.
- ⚠ WARNING! Gauges are not designed for use in hazardous locations or in the presence of flammable or explosive substances or atmospheres.
- ⚠ WARNING! Media being measured must be compatible with 316 SS.
- ⚠ WARNING! Gauges are not for oxygen service. Accidental rupture of sensor diaphragm may cause silicone oil inside sensor to react with oxygen.
- ⚠ WARNING! Use proper batteries or power for the gauge as specified in the instructions. Improper voltages will damage the gauge.
- ⚠ WARNING! Gauges contains no user serviceable parts except for those with replaceable batteries. Return gauges to Cecomp for service.

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Gauge Range Selection

Ranges of mechanical gauges are traditionally chosen so the working range is in the middle of the scale. Digital gauges provide the best performance when used in the upper half of their range. For example, if your working pressure is from 400 to 500 psig, select a 500 psig digital gauge.

Ranges are determined by available transducer ranges, selected engineering units, and display digits. It is advantageous to specify ranges that maximize display counts over a given transducer range. Practical display resolution is limited by noise and thermal drift to avoid undesirable instability in the last digit.

It is possible to scale and calibrate a gauge over part of the transducer range, but accuracy will always be determined by the full range of the transducer.

Cecomp's standard engineering units are specified in psi. See the table below for non-standard engineering. Other engineering units not shown below can generally be accommodated within the limitations of the available transducers and the 3½ digit or 4 digit displays.

15, 100, and 200 psi sensors can used for vacuum or pressure. They can be scaled to provide bipolar ranges (such as ±psi) or scaled in inHg for vacuum and psi for pressure to provide a compound gauge.

Engineering Units

See the gauge range table for available ranges and engineering units. We can manufacture gauges with almost any scale, limited by available display digits and transducer ranges. There is an extra charge for units other than psig or inHg. We can even do tons of force if you supply us with the conversion factor.

Psig is by far the most popular general purpose scale in the US. Some industries prefer certain units. Inches H_2O is common in HVAC. Torr Absolute is common for vacuum packaging and vacuum pumps. Inches Hg is popular for general purpose vacuum readings. Feet H_2O is common for water tank level.

Gauge Pressure Reference

Gauge Reference models are referenced to ambient pressure. This means that the gauge will read zero with no pressure applied and continue to read zero as atmospheric pressure changes.

Sealed Reference transducers are use in gauges 1000 psi and higher. These are referenced to a fixed value of 14.7 psia (normal atmospheric pressure). At these higher pressures, there is no noticeable difference in operation.

Absolute Reference gauges use absolute vacuum as a zero reference and thus will read zero at high vacuum and atmospheric pressure with the gauge port open to ambient.

The gauge's reading will vary with barometric pressure and altitude. Since barometric pressure is constantly changing, the gauge's reading will continuously change when the gauge port is open to atmosphere, or if the system to which it is attached changes in volume or pressure with response to atmospheric pressure changes.

As vacuum is applied, the readings will decrease, eventually reaching zero when full vacuum is applied. Absolute reference gauges are not available in ranges below 15 psi because the transducer would always be in an over range condition at normal atmospheric pressures.

Display Digits

A gauge's range and resolution is determined by the number of digits that can be shown on the display. Our LCDs (Liquid Crystal Displays) are available with various numbers of digits.

3-1/2 digit display range up to 1999

4 digit display range up to 9999

A display that reads up to 1999 also has decimal points that can also be used for lower ranges such as 19.99 or 199.9. Since the left-most digit can only be a 1 or turned off, it is known as a "half digit". The other three digits can display anything from 0 through 9 and thus are called full or whole digits. Thus a 1999 display is known in the electronics industry as a 31/2 digit display. Although the term "half digit" to describe a 1 may not make sense, this description originated in the early days of digital displays and has been used ever since.

A 31/2 digit display can provide a maximum of 1999 divisions or counts. If a vacuum range were specified with this display in inches of Hg, it would be only able to provide a 300 count range of 0-30.0 inHg vacuum.

If this same gauge were specified in psi, is would give a range of 0-15.00 psig vacuum, thus dividing the range into 1500 counts.

If we instead use a model with a 4-digit display, we could have a range of 0-30.00 inHg, dividing the range into 3000 counts.

Higher ranges such as 3000 and 5000 psi require the use of a 4 digit display. This type of display has 4 full digits and can read to 9999.

Accuracy

Accuracy calculations are based on the characteristics (linearity, hysteresis, repeatability) of the transducer and supporting electronics, range of the transducer, as well as the display resolution. It is expressed as a percent of full scale of the transducer plus the round-off error of the right most (least significant) digit. This round-off error has to do with the fact that the analog output of the pressure transducer needs to be rounded up or down when it is converted to a digital readout. This produces a 1 digit uncertainty in the rightmost digit in the display which can not be ignored. Sometimes the "±1 LSD" is left off of competitor's specifications, but it is safe to assume it should be there.

The accuracy statement is typically stated as ±0.25% FS ±1LSD. Another way of stating this would be ±(0.25% FS +1LSD).

For example, for a 100 psi gauge: ±0.0025 X 100 psi = ±0.25 psi

Since this range has a resolution of 0.1, we round the 0.25 error up to ±0.3. Then we add a last digit uncertainty of ±0.1 to get a calculated accuracy of ±0.4 psi. Our gauges are conservatively rated and generally are well within the stated accuracy limits.

High Accuracy (±0.1%) option

When a gauge is ordered with the **-HA** High Accuracy option, it is linearized and tested until it meets the high accuracy specification. See the gauge range table for ranges available with the **-HA** option. ☛

Typical gauge ranges and engineering units

PSI	Reference	inHg @ 0°C	inH_2O @ 20°C	oz/in^2	FtH_2O @ 20°C	kPa	MPa	mmHg* torr*	mbar*	bar	g/cm^2	kg/cm^2	atm	cmH_2O @ 20°C	mmH_2O @ 20°C
3	G	6	85	50	7	20		150	200					200	2000
5	G	10	140	80	12	35		250	350					350	3500
15	G† or A	30	400	240	35	100		760	1000	1	1000	1	1	1000	
30	G or A	60	850		70	200		1600	2000	2	2000	2	2	2000	
60	G	120			140	400			4000	4		4	4		
100	G† or A	200			230	700				7		7	7		
200	G†				480	1500				14		14	14		
300	G					2000				20		20	20		
500	G					3500	3.5			35		35	35		
1000	S**					7000	7			70		70	70		
2000	S**						14			140		140	135		
3000	S**						20			200		200	200		
5000	S**						35			350		350	340		

† Can be used for pressure, vacuum (VAC), bipolar (±), or compound ranges.
** 14.7 psia sealed reference transducer.
* Absolute reference is generally used for vacuum with these units.

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Some engineering units with certain display resolutions don't give any advantage with the high accuracy option. For example, a 30 psi gauge with 0.1 resolution would have the same calculated accuracy in both ±0.25% FS ±1 LSD and ±0.1% FS ±1 LSD versions due to fact that error is rounded up (we can't ignore possible error). A gauge in this range would require a 4 digit display (0.01 resolution) to take advantage of the high accuracy specification.

The High Accuracy option is available for the analog output only on any 3-1/2 digit gauge with an analog output. For these gauges the high accuracy linearization specification applies only to the analog output and not the display.

Calibration

All Cecomp gauges are calibrated at the factory on equipment traceable to NIST. There is no need to calibrate the gauge before putting it in service.

Calibration intervals depend entirely upon the customer's quality standards, thus the factory does not have a recommended calibration interval. Most industries check instrument calibration on an annual basis. Actual experience may suggest shorter or longer intervals based on severity of service and "as found" test results while the gauge is being serviced.

It is generally desirable to calibrate the gauge to read zero at zero pressure, and adjust the span to achieve best accuracy over the desired operating range. Span is usually adjusted for "best fit" to minimize errors at all test points. It is possible to adjust for best accuracy over a narrow pressure range, but be aware that the gauge accuracy specification is based on the entire transducer range.

The pressure sensor is designed to maintain specifications over its temperature compensated range, usually 0 to 70°C. Deviations in pressure sensor output occur as the gauge transducer operates in temperatures that are different than normal ambient. This is mainly due to thermal expansion/contraction of the piezoelectric sensing device. Temperature compensation circuitry built into the sensor automatically eliminates for most of the variance. For most applications the gauge should be adjusted at normal ambient temperatures of 20 to 25°C. It is acceptable to calibrate the gauge at the temperature at which it is to be used.

Sensor Cavity Volume

Sensor cavity volume is approximately 0.01 to 0.02 cubic inches. The volume change over the range of the sensor is negligible.

Gauge Isolators

You can use a gauge isolator with Cecomp gauges except for the older DPG500 series. Cecomp **DPG1000**, **F4** and **F16** series gauges have 316 stainless steel wetted parts, so often an isolator is not needed unless the media is incompatible with stainless steel. Chemical compatibility data is commonly available from online sources or the Compass Corrosion Guide.

Please be aware that a gauge isolator can degrade the accuracy and sensitivity of any gauge it is attached to. Refer to the gauge isolator manufacturer's data for more information. Your local gauge distributor may be able to assist you with gauge isolator selection, installation, and service.

Please remove the isolator from any gauge you send to us for calibration or service. Cecomp is not equipped to install, service, or refill gauge isolators. Your local gauge distributor may also be able to recalibrate your Cecomp gauge.

Retransmission Outputs

See the gauge data sheet for specific information for using the analog outputs.

DPG1000 and **F4** series retransmission outputs are driven by the transducer rather than the display and thus are true analog outputs. Outputs are filtered to improve noise immunity and have a response time of about 50 msec.

F16 series gauges are microprocessor-based and produce an analog output with approximately 12,000 counts over the entire range. This output is updated approximately 16 times per second.

Voltage Retransmission - When using the voltage retransmission option, do not allow the resistive load on the output to fall below 5K ohms. Also, avoid large capacitive loads (greater that 1000 pF) such as those caused by long runs of shielded cable. For long retransmission runs, use the 4-20 mA option instead.

Current Retransmission - Be sure to observe the output compliance (voltage drive) capabilities of the gauge. See the gauge data sheet for output drive compliance specifications. The compliance, and therefore the maximum loop resistance the output can drive, is a function of the supply voltage to the gauge. Too large a loop resistance will cause the gauge output to "limit" or saturate before reaching its full 20 mA output.

System Grounding with Retransmission - For gauges with retransmission, the power supply (–) lead is tied to the retransmission output ground. Therefore, if a DC supply is used, the power supply (–) lead should be considered common with the retransmission output (–) connection.

Alarm Outputs

For gauges equipped with alarms, see the gauge rear label for the specific alarm configuration and the gauge data sheet for alarm configuration options. Note that most gauges have built-in deadbands (hysteresis) of 1% of span as standard. The alarm contacts are rated at 1A/24VDC or 0.5A/115VAC. No internal fusing is included in the alarm contact circuits. The circuit external to the gauge alarm outputs should be fused by the user in applications where good design practice dictates.

Common Pressure Conversions – See www.cecomp.com for a pressure conversion calculator

Multiply / From \ To	psi	inH_2O @ 39.2°F or 4°C	inH_2O @ 60°F or 15.6°C	inH_2O @ 68°F or 20°C	ftH_2O @ 68°F or 20°C	kPa	atm (std)	atm (metric)	bar	mbar	inHg @ 32°F	inHg @ 60°F	cmHg @ 0°C	Torr or mmHg @ 0°C	kg/cm^2	cmH_2O @ 4°C	oz/in^2
psi	1	27.681	27.707	27.730	2.3067	6.8947	0.0681	0.07031	0.06895	68.947	2.0360	2.0416	5.1715	51.715	0.07031	70.307	16
inH_2O @ 39.2°F or 4°C	0.0361	1	1.0010	1.0018	0.0833	0.2491	0.00246	0.00254	0.00249	2.4908	0.0736	0.0738	0.1868	1.8683	0.00254	2.540	0.5780
inH_2O @ 60°F or 15.6°C	0.0361	0.9990	1	1.0008	0.0833	0.2488	0.00246	0.00254	0.00249	2.4884	0.0735	0.0737	0.1866	1.8664	0.00254	2.5375	0.5775
inH_2O @ 68°F or 20°C	0.0361	0.9982	0.9992	1	0.0832	0.2486	0.00246	0.00254	0.00249	2.4864	0.0734	0.0736	0.1865	1.8650	0.00254	2.5355	0.5770
ftH_2O @ 68°F or 20°C	0.4327	11.979	11.991	12.000	1	2.9837	0.02950	0.03048	0.02984	29.837	0.8811	0.8836	2.2380	22.380	0.03043	30.426	6.9240
kPa	0.1450	4.0147	4.0186	4.0219	0.3346	1	0.0099	0.01020	0.01	10	0.2953	0.2961	0.7501	7.5006	0.0102	10.197	2.3206
atm (std)	14.696	406.79	407.18	407.51	33.900	101.33	1	1.0332	1.0133	1013.25	29.921	30.003	76	760	1.0332	1033.23	235.14
atm (metric)	14.223	393.71	394.09	394.40	32.810	98.066	0.9678	1	0.9807	980.66	28.959	29.038	73.556	735.56	1	1000	227.57
bar	14.504	401.47	401.86	402.19	33.456	100	0.9869	1.0197	1	1000	29.530	29.611	75.006	750.06	1.0197	1019.72	232.06
mbar	0.0145	0.4015	0.4019	0.4022	0.0335	0.1	0.00099	0.00102	0.001	1	0.0295	0.02961	0.07501	0.7501	0.00102	1.0197	0.2321
inHg @ 32°F	0.4912	13.596	13.608	13.619	1.1330	3.386	0.0334	0.03453	0.0339	33.864	1	1.0027	2.54	25.400	0.03453	34.532	7.8585
inHg @ 60°F	0.4898	13.559	13.571	13.581	1.1299	3.3769	0.0333	0.03444	0.0338	33.772	0.9973	1	2.5331	25.331	0.03444	34.438	7.8371
cmHg @ 0°C	0.1934	5.3525	5.3576	5.3620	0.4461	1.3332	0.0132	0.01360	0.01333	13.332	0.3937	0.3948	1	10	0.0136	13.595	3.0939
torr or mmHg @ 0°C	0.01934	0.5353	0.5357	0.5362	0.0446	0.1333	0.0013	0.00136	0.00133	1.3332	0.0394	0.03948	0.1	1	0.00136	1.3595	0.3094
kg/cm^2	14.223	393.71	394.09	394.41	32.809	98.067	0.9678	1	0.9807	980.66	28.959	29.038	73.556	735.56	1	1000	227.57
cmH_2O @ 4°C	0.0142	0.3937	0.3941	0.3944	0.0328	0.0981	0.00097	0.001	0.00098	0.9806	0.0290	0.02904	0.07355	0.7355	0.001	1	0.2276
oz/in^2	0.0625	1.7300	1.7316	1.7331	0.1442	0.4309	0.00425	0.00439	0.00431	4.3092	0.1273	0.1276	0.3232	3.2322	0.00439	4.3942	1

Digital Pressure Gauge Ranges and Accuracies

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Gauge Ranges		3½ Digit Display, DPG1000, ARM, F4 Series			4-Digit Display F16 Digi Max		
Pounds per Square Inch	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
–30INHG/15PSIG	±15.0	0.1	±0.2 psi	n/a	0.01	±0.09 psi	n/a
–30INHG/100PSIG	–15.0/100.0	0.1	±0.4 psi	n/a	0.1	±0.4 psi	n/a
–30INHG/200PSIG	–15.0/199.9	0.1	±0.7 psi	n/a	0.1	±0.7 psi	n/a
3PSIG	3.00	0.01	±0.02	n/a	0.001	±0.009	n/a
5PSIG	5.00	0.01	±0.03	±0.02	0.001	±0.014	±0.006
15PSIA	15.00 abs	0.01	±0.05	n/a	0.01	±0.05	n/a
15PSIGVAC	–15.00	0.01	±0.05	±0.03	0.01	±0.05	±0.03
±15PSIG	±15.0	0.1	±0.2	n/a	0.01	±0.09	n/a
15PSIG	15.00	0.01	±0.05	±0.03	0.01	±0.05	±0.03
30PSIA	30.0 abs	0.1	±0.2	n/a	0.01	±0.09	n/a
30PSIG	30.0	0.1	±0.2	n/a	0.01	±0.09	±0.04
60PSIG	60.0	0.1	±0.3	±0.2	0.01	±0.16	±0.07
100PSIA	100.0 abs	0.1	±0.4	n/a	0.1	±0.4	n/a
100PSIG	100.0	0.1	±0.4	±0.2	0.1	±0.4	±0.2
200PSIG	199.9/200.0	0.1	±0.6	±0.3	0.1	±0.6	±0.3
300PSIG	300	1	±2	n/a	0.1	±0.9	±0.4
500PSIG	500	1	±3	±2	0.1	±1.4	±0.6
1000PSIG	1000	1	±4	±2	1	±4	±2
2000PSIG	1999/2000	1	±6	±3	1	±6	±3
3000PSIG	3000	1	±9	±4	1	±9	±4
5000PSIG	5000	1	±14	±6	1	±14	±6
Inches Hg Mercury @ 0°C	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
6INHGG	2.95	0.01	±0.03	n/a	0.001	±0.017	n/a
10INHGG	4.91	0.01	±0.04	±0.03	0.01	±0.04	±0.03
30INHGA	14.73 abs	0.1	±0.2	n/a	0.01	±0.09	n/a
30INHGVAC	–14.73	0.1	±0.2	n/a	0.01	±0.09	±0.04
±30INHGG	±14.73	0.1	±0.3	n/a	0.01	±0.17	n/a
30INHGG	14.73	0.1	±0.2	n/a	0.01	±0.09	±0.05
60INHGA	29.5 abs	0.1	±0.3	n/a	0.01	±0.17	n/a
60INHGG	29.5	0.1	±0.3	±0.2	0.01	±0.17	±0.08
120INHGG	58.9	0.1	±0.5	±0.3	0.1	±0.5	±0.3
200INHGA	98.2 abs	0.1	±0.7	n/a	0.1	±0.7	n/a
200INHGG	98.2	0.1	±0.7	±0.4	0.1	±0.7	±0.4
Inches H_2O @ 20°C	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
85INH2OG	3.07	0.1	±0.4	n/a	0.1	±0.4	n/a
140INH2OG	5.05	0.1	±0.5	±0.3	0.1	±0.5	±0.3
400INH2OA	14.42 abs	1	±3	n/a	0.1	±1.2	n/a
400INH2OVAC	–14.42	1	±3	±2	0.1	±1.2	±0.6
±400INH2OG	±14.42	1	±4	n/a	1	±4	n/a
400INH2OG	14.42	1	±3	±2	0.1	±1.2	±0.6
850INH2OG	30.7	1	±4	±2	1	±4	±2
Feet H_2O @ 20°C	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
7FTH2O	3.03	0.01	±0.03	n/a	0.001	±0.019	n/a
12FTH2O	5.20	0.01	±0.04	±0.03	0.01	±0.04	±0.03
35FTH2O	15.2	0.1	±0.2	n/a	0.01	±0.10	±0.05
70FTH2O	30.3	0.1	±0.3	±0.2	0.01	±0.19	±0.08
140FTH2O	60.7	0.1	±0.5	±0.3	0.1	±0.5	±0.3
230FTH2O	99.7	1	±2	n/a	0.1	±0.7	±0.4
480FTH2O	208	1	±3	±2	0.1	±1.3	±0.6
Ounces per Square Inch	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
50ZING	3.13	0.1	±0.3	n/a	0.01	±0.14	n/a
80ZING	5.00	0.1	±0.3	±0.2	0.1	±0.3	±0.2
240ZING	15.0	1	±2	n/a	0.1	±0.7	±0.4

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Gauge Ranges		3½ Digit Display, DPG1000, ARM, F4 Series			4-Digit Display F16 Digi Max		
KiloPascals	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
–100V/700KPA	–15/102	1	±3	n/a	±3	±3	n/a
20KPAG	2.90	0.01	±0.07	n/a	0.01	±0.07	n/a
35KPAG	5.08	0.1	±0.2	n/a	0.01	±0.10	±0.05
100KPAA	14.5 abs	0.1	±0.4	n/a	0.1	±0.4	n/a
100KPAVAC	–14.5	0.1	±0.4	±0.3	0.1	±0.4	±0.3
±100KPAG	±14.5	0.1	±0.7	n/a	0.1	±0.7	n/a
100KPAG	14.5	0.1	±0.4	±0.3	0.1	±0.4	±0.3
200KPAA	29.0 abs	0.1	±0.7	n/a	0.1	±0.7	n/a
200KPAG	29.0	0.1	±0.7	±0.4	0.1	±0.7	±0.4
400KPAG	58	1	±3	±2	0.1	±1.2	±0.6
700KPAA	102 abs	1	±3	n/a	0.1	±1.9	n/a
700KPAG	102	1	±3	±2	0.1	±1.9	±0.8
1500KPAG	218	1	±5	±3	1	±5	±3
2000KPAG	290	1	±7	±4	1	±7	±4
3500KPAG	508	1	±10	±5	1	±10	±5
7000KPAG	1015	1	±19	±8	1	±19	±8
MegaPascals	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
3.5MPAG	508	0.01	±0.02	n/a	0.001	±0.01	±0.005
7MPAG	1015	0.01	±0.03	±0.02	0.001	±0.019	±0.008
14MPAG	2031	0.01	±0.05	±0.03	0.01	±0.05	±0.03
20MPAG	2901	0.01	±0.07	±0.04	0.01	±0.07	±0.04
35MPAG	5076	0.1	±0.2	n/a	0.01	±0.10	±0.05
Millibars	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
200MBARG	2.90	0.1	±0.7	n/a	0.1	±0.7	n/a
350MBARG	5.08	1	±2	n/a	0.1	±1.0	±0.5
1000MBARA	14.5 abs	1	±4	n/a	1	±4	n/a
±1000MBARG	±14.5	1	±7	n/a	1	±7	n/a
1000MBARG	14.5	1	±4	±3	1	±4	±3
2000MBARA	29.0 abs	1	±7	n/a	1	±7	n/a
2000MBARG	29.0	1	±7	±4	1	±7	±4
4000MBARG	58.0	1	±12	±6	1	±12	±6
Bar	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
–1V/7BAR	–14.5/101.5	0.01	±0.04	n/a	0.01	±0.04	n/a
1BARA	14.50 abs	0.001	±0.004	n/a	0.001	±0.004	n/a
±1BARG	±14.50	0.001	±0.007	n/a	0.001	±0.004	n/a
1BARVAC	–14.50	0.001	±0.004	±0.003	0.001	±0.004	±0.003
1BARG	14.50	0.001	±0.004	±0.003	0.001	±0.004	±0.003
2BARA	29.0 abs	0.001	±0.007	n/a	0.001	±0.007	n/a
2BARG	29.0	0.001	±0.007	±0.004	0.001	±0.007	±0.004
4BARG	58.0	0.01	±0.03	±0.02	0.001	±0.012	±0.006
7BARA	101.5 abs	0.01	±0.03	n/a	0.001	±0.019	n/a
7BARG	101.5	0.01	±0.03	±0.02	0.001	±0.019	±0.008
14BARG	203	0.01	±0.05	±0.03	0.01	±0.05	±0.03
20BARG	290	0.01	±0.07	±0.04	0.01	±0.07	±0.04
35BARG	508	0.1	±0.2	n/a	0.01	±0.10	±0.05
70BARG	1015	0.1	±0.3	±0.2	0.01	±0.19	±0.08
140BARG	2031	0.1	±0.5	±0.3	0.1	±0.5	±0.3
200BARG	2901	0.1	±0.7	±0.4	0.1	±0.7	±0.4
350BARG	5076	1	±2	n/a	0.1	±1.0	±0.5

Digital Pressure Gauge Ranges and Accuracies

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Gauge Ranges		3½-Digit Display, DPG1000, ARM, F4 Series			4-Digit Display F16 Digi Max		
Kilograms per cm²	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
1KGCMA	14.22 abs	0.001	±0.004	n/a	0.001	±0.004	n/a
±1KGCMG	±14.22	0.001	±0.007	n/a	0.001	±0.007	n/a
1KGCMG	14.22	0.001	±0.004	±0.003	0.001	±0.004	±0.003
2KGCMA	28.4 abs	0.001	±0.007	n/a	0.001	±0.007	n/a
2KGCMG	28.4	0.001	±0.007	±0.004	0.001	±0.007	±0.004
4KGCMG	56.9	0.01	±0.03	±0.02	0.001	±0.012	±0.006
7KGCMA	99.6 abs	0.01	±0.03	n/a	0.001	±0.019	n/a
7KGCMG	99.6	0.01	±0.03	±0.02	0.001	±0.019	±0.009
14KGCMG	199.1	0.01	±0.05	±0.03	0.01	±0.05	±0.03
20KGCMG	284	0.01	±0.07	±0.04	0.01	±0.07	±0.04
35KGCMG	498	0.1	±0.2	n/a	0.01	±0.10	±0.05
70KGCMG	996	0.1	±0.3	±0.2	0.01	±0.19	±0.09
140KGCMG	1991	0.1	±0.5	±0.3	0.1	±0.5	±0.3
200KGCMG	2845	0.1	±0.7	±0.4	0.1	±0.7	±0.4
350KGCMG	4978	1	±2	n/a	0.1	±1.0	±0.5
Grams per cm²	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
1000GCMA	14.22 abs	1	±4	n/a	1	±4	n/a
1000GCMG	14.22	1	±4	±3	1	±4	±3
1999GCMA	29.9 abs	1	±7	n/a	1	±7	n/a
1999GCMA	29.9 abs	1	±7	n/a	1	±7	n/a
2100GCMG	29.9	n/a	n/a	n/a	1	±7	±4
2100GCMG	29.9	n/a	n/a	n/a	1	±7	±4
mmHg or Torr Mercury @ 0°C	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
150MMHGG	2.90	0.1	±0.5	n/a	0.1	±0.5	n/a
260MMHGG	5.03	1	±2	n/a	0.1	±0.8	±0.4
760TORRA	14.7 abs	1	±3	n/a	0.1	±2.1	n/a
760MMHGA	14.7 abs	1	±3	n/a	0.1	±2.1	n/a
760MMHGVAC	–14.7	1	±3	n/a	0.1	±2.1	n/a
760MMHGG	14.7	1	±3	±2	0.1	±2.1	±0.9
1600MMHGA	30.9 abs	1	±5	n/a	1	±5	n/a
1600MMHGG	30.9	1	±5	±3	1	±5	±3
cm H_2O @ 20°C	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
200CMH2OG	2.84	0.1	±0.7	n/a	0.1	±0.7	n/a
350CMH2OG	4.97	1	±2	n/a	0.1	±1.0	±0.5
1000CMH2OG	14.2	1	±4	±3	1	±4	±3
1999CMH2OG	28.4	1	±7	±4	1	±7	±4
2100CMH2OG	29.8	n/a	n/a	n/a	1	±7	±4
mm H_2O@ 20°C	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
1999MMH2OG	2.84	1	±7	n/a	1	±7	n/a
2100MMH2OG	2.98	n/a	n/a	n/a	1	±7	n/a
3500MMH2OG	4.97	n/a	n/a	n/a	1	±10	±5
Atmospheres std	**Equivalent psi**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**	**Display Resolution**	**±0.25% ±1 LSD Accuracy**	**±0.1% ±1 LSD Accuracy**
1ATMG	14.70	0.001	±0.004	±0.003	0.001	±0.004	±0.003
2ATMG	29.39	0.01	±0.02	±0.02	0.001	±0.007	±0.004
4ATMG	58.8	0.01	±0.03	±0.02	0.001	±0.012	±0.006
7ATMG	102.9	0.01	±0.03	±0.02	0.001	±0.019	±0.008
14ATMG	206	0.01	±0.05	±0.03	0.01	±0.05	±0.03
20ATMG	294	0.01	±0.07	±0.04	0.01	±0.07	±0.04
35ATMG	514	0.1	±0.2	n/a	0.01	±0.10	±0.05
70ATMG	1029	0.1	±0.3	±0.2	0.01	±0.19	±0.08
135ATMG	1984	0.1	±0.5	±0.3	0.1	±0.5	±0.3
200ATMG	2939	0.1	±0.7	±0.4	0.1	±0.7	±0.4
340ATMG	4997	1	±2	n/a	0.1	±1.0	±0.5

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Gauges with Single Line 3-1/2 or 4 Digit LCD
Battery Powered: DPG1000B, DPG1000BBL, F4B, F4BBL, ARM760B, ARM760BBL
Low Voltage Powered: DPG1000AD, DPG1000ADBL, F4AD, F4ADBL, ARM760AD, ARM760ADBL, DPG1000ADA

Precautions

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten or loosen by turning housing or any other part of the gauge.

Use fittings appropriate for the pressure range of the gauge as indicated on the rear label.

Do not apply vacuum to gauges not designed for vacuum operation.

Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.

NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

NEVER connect low-voltage-powered gauge wires directly to 115 VAC or permanent damage not covered by warranty will result. Common 24 VAC transformers often supply over 32 VAC unless they are loaded to 80% of rated capacity. Over voltage may result in damage.

These products do not contain user serviceable parts except for those with replaceable batteries as specified in the instructions. Contact us for repairs, service, or refurbishment.

Preparation

1. Please refer to the appropriate data sheet for specifications, installation, wiring, and operating instructions.
2. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures.
3. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 10 microns (0.01 torr or 10 millitorr) or lower is required for vacuum and absolute gauges.
4. It is good practice to install fresh batteries before calibrating battery-powered gauges.

   For low-voltage powered gauges connect to a the appropriate power supply as indicated on the gauge or data sheet. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.
5. Allow the gauge to equalize to normal room temperature before calibration.

Calibration Potentiometer Access

Access the calibration potentiometers based on the model as shown below. Contact Customer Service to purchase replacement potentiometer covers.

Models with top potentiometers: Remove label on top of gauge to expose opening with calibration potentiometers. This label may be reused many times if kept clean. See rear label of gauge for potentiometer identification.

Models with front potentiometers: Remove the black plastic caps to expose the calibration potentiometers.

NEMA 4X models with front potentiometers: Unscrew nylon screws with o-rings to expose the calibration potentiometers.

Top Potentiometers

Front Potentiometers

Front Potentiometers NEMA 4X

Calibration of Battery-Powered Models DPG1000B, DPG1000BBL, F4B, F4BBL, ARM760B, ARM760BBL

1. It is good practice to install fresh batteries before calibrating battery-powered gauges.
2. **Zero for gauge reference pressure or vacuum gauges:** With the gauge port open to atmosphere, adjust the Zero potentiometer for a display indication of zero.

   Zero for absolute reference gauges: Apply full vacuum to the gauge. Adjust the Zero potentiometer for a display indication of zero.
3. **Span for gauge reference pressure gauges and absolute reference gauges:** Apply full-scale pressure and adjust the Span potentiometer for a display indication equal to full-scale pressure.

   Span for gauge reference vacuum gauges: Apply full vacuum to the gauge. Adjust the Span potentiometer for a display indication equal to full-scale vacuum.
4. Verify pressure indications at 0%, 25%, 50%, 75%, and 100% of full scale and repeat calibration as needed to achieve best accuracy over desired operating range.

End of this procedure

Calibration of Low-Voltage Powered Models DPG1000AD, DPG1000ADBL, F4AD, F4ADBL, ARM760AD, ARM760ADBL, DPG1000ADA

1. Low-voltage powered gauges must be connected to 8-24 VAC 50/60 Hz or 9-32 VDC during the calibration procedure. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges.

   NEVER connect gauge wires directly to 115 VAC or permanent damage not covered by warranty will result. Common 24 VAC transformers often supply over 32 VAC unless they are loaded to 80% of rated capacity. Over voltage may result in damage.
2. **Zero for gauge reference pressure or vacuum gauges:** With the gauge port open to atmosphere, adjust the Zero potentiometer for a display indication of zero.

   Zero for absolute reference gauges: Apply full vacuum to the gauge. Adjust the Zero potentiometer for a display indication of zero.
3. **Span for gauge reference pressure gauges and absolute reference gauges:** Apply full-scale pressure and adjust the Span potentiometer for a display indication equal to full-scale pressure.

   Span for gauge reference vacuum gauges: Apply full vacuum to the gauge. Adjust the Span potentiometer for a display indication equal to full-scale vacuum.
4. Verify pressure indications at 0%, 25%, 50%, 75%, and 100% of full scale and repeat calibration as needed to achieve best accuracy over desired operating range.

End of this procedure

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Gauge with 2 Line LCD and Internal Potentiometers
Battery Powered: DPG1000B, DPG1000BBL, F4B, F4BBL, F16B, F16BBL
Low Voltage Powered: DPG1000AD, DPG1000ADBL, F4AD, F4ADBL, F16AD, F16ADBL

Precautions

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten or loosen by turning housing or any other part of the gauge.

Use fittings appropriate for the pressure range of the gauge. The gauge range is indicated on the rear label and is indicated on the display during power-up.

Do not apply vacuum to gauges not designed for vacuum operation.

Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.

NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

NEVER connect low-voltage-powered gauge wires directly to 115 VAC or permanent damage not covered by warranty will result. Common 24 VAC transformers often supply over 32 VAC unless they are loaded to 80% of rated capacity. Over voltage may result in damage.

These products do not contain user serviceable parts except for those with replaceable batteries as specified in the instructions. Contact us for repairs, service, or refurbishment.

Preparation

1. Please refer to the appropriate data sheet for specifications, installation, wiring, and operating instructions.
2. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures.
3. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 10 microns (0.01 torr or 10 millitorr) or lower is required for vacuum and absolute gauges.
4. It is good practice to install fresh batteries before calibrating battery-powered gauges.

   For low-voltage powered gauges connect to a the appropriate power supply as indicated on the gauge or data sheet. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.
5. Allow the gauge to equalize to normal room temperature before calibration.

Entering Calibration Mode

1. Note the locations of the calibration mode jumper points and the three calibration potentiometers. IMPORTANT: Do NOT adjust the calibration potentiometers unless the gauge is in the calibration mode.
2. To enter the calibration mode, place a jumper wire between the calibration mode jumper points as shown below.
3. Press the front push button to power up the gauge. The display first indicates the gauge's full-scale pressure range, tests all display segments, and then indicates CAL to indicate that the gauge is in the calibration mode.
4. The display will then indicate the current pressure reading, updating approximately 3 times per second. The jumper can be removed at this time and the gauge will remain in the calibration mode until powered down manually.

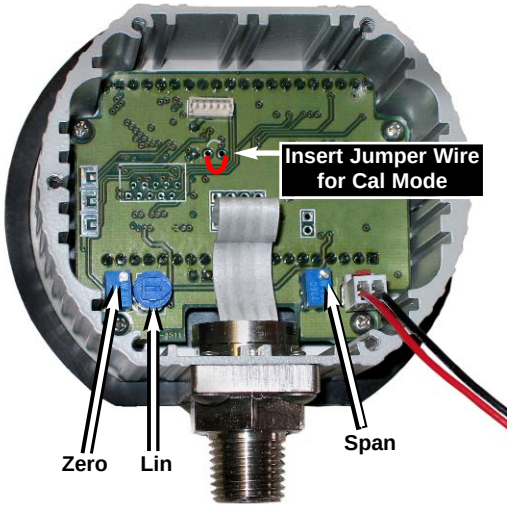
   While in the calibration mode, the auto shutoff timer is disabled, the One Touch Zero (used on gauge reference models only) is disabled, and the calibration potentiometers remain active. In normal operation, the calibration potentiometers are only read during initialization to conserve power.

Calibration

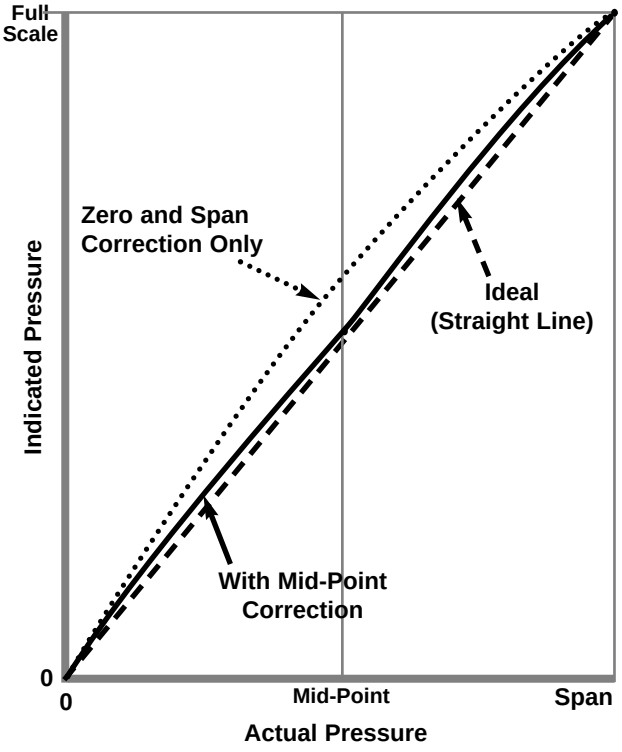
1. **Zero for gauge reference pressure or vacuum gauges:** With the gauge port open to atmosphere, adjust the Zero potentiometer for a display indication of zero.

   Zero for absolute reference gauges: Apply full vacuum to the gauge. Adjust the Zero potentiometer for a display indication of zero.
2. **Span for gauge reference pressure gauges and absolute reference gauges:** Apply full-scale pressure and adjust the Span potentiometer for a display indication equal to full-scale pressure.

   Span for gauge reference vacuum gauges: Apply full vacuum to the gauge. Adjust the Span potentiometer for a display indication equal to full-scale vacuum.
3. Apply 50% full-scale pressure (or vacuum as appropriate) and adjust the single-turn Linearization potentiometer (marked Lin on the circuit board) for a display indication equal to 50% of full-scale pressure.
4. Verify pressure indications at 0%, 25%, 50%, 75%, and 100% of full scale.
5. Remove the jumper between the calibration mode terminals following calibration. Failure to remove the jumper will greatly reduce battery life.
6. Turn off gauge power to return gauge to normal operating mode.
7. Replace the rear cover and screws, taking care not to pinch the power leads between the case and the rear cover.



Gauge Calibration with Mid-Point Linearization Correction



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Gauges with 2 Line LCD and Internal Push Buttons
Battery Powered: DPG1000B, DPG1000BBL, F4B, F4BBL, F16B, F16BBL
Low Voltage Powered: DPG1000AD, DPG1000ADBL, F4AD, F4ADBL, F16AD, F16ADBL

Precautions

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten or loosen by turning housing or any other part of the gauge.

Use fittings appropriate for the pressure range of the gauge. The gauge range is indicated on the rear label and is indicated on the display during power-up.

Do not apply vacuum to gauges not designed for vacuum operation.

Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.

NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

NEVER connect low-voltage-powered gauge wires directly to 115 VAC or permanent damage not covered by warranty will result. Common 24 VAC transformers often supply over 32 VAC unless they are loaded to 80% of rated capacity. Over voltage may result in damage.

These products do not contain user serviceable parts except for those with replaceable batteries as specified in the instructions. Contact us for repairs, service, or refurbishment.

Preparation

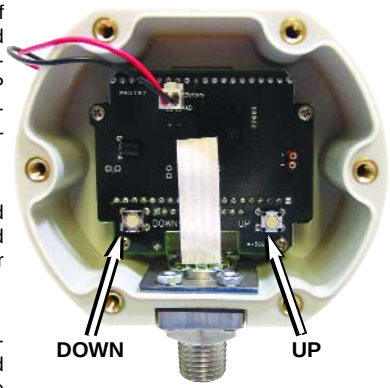
1. Please refer to the appropriate data sheet for specifications, installation, wiring, and operating instructions.
2. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures.
3. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 10 microns (0.01 torr or 10 millitorr) or lower is required for vacuum and absolute gauges.
4. It is good practice to install fresh batteries before calibrating battery-powered gauges.

   For low-voltage powered gauges connect to a the appropriate power supply as indicated on the gauge or data sheet. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.
5. Allow the gauge to equalize to normal room temperature before calibration.

Entering the Calibration Mode

1. Remove the screws on the back of the unit and remove cover and note the locations of the two internal calibration buttons marked UP and DOWN. These buttons are disabled unless the gauge is in calibration mode.
2. **Battery-powered gauges**
   With the gauge off, press and hold the DOWN calibration button, and also press the front button to power up the gauge in calibration mode.

   Low-voltage powered gauges
   Press and hold the DOWN calibration button, and also press and hold the front button to reset the gauge and switch it into calibration mode.



Calibration Mode Functions

1. The display first indicates the gauge's full-scale pressure range, tests all display segments, and then indicates CAL to indicate that the gauge is in the calibration mode. Release all buttons.
2. The display will then indicate the current pressure reading, updating approximately 3 times per second. The gauge will remain in the calibration mode until powered down or reset manually. While in the calibration mode, the shutoff timer, One Touch Zero (gauge reference models only), Min/Max (for applicable models) are all disabled, and the calibration buttons are active.
3. Each press of the UP or DOWN button makes a small correction, which may not always be indicated on the digital display. Press and hold the button for one second or longer to make larger continuous corrections. The display of the gauge being calibrated is adjusted to match the calibrator's setting or readout.
4. If the battery pack is unplugged or the power removed during calibration, calibration settings will not be saved.

Gauge Reference Gauges (3 Points)

1. With the gauge port open to atmosphere, the character display will alternate between ZERO and CAL. Press the UP and DOWN buttons to obtain a display indication of zero.
2. Apply full-scale pressure. The character display will alternate between +SPAN and CAL. Press the UP and DOWN buttons to obtain a display indication equal to full-scale pressure.
3. Apply 50% of full-scale pressure. The character display will alternate between +MID and CAL. Press the UP and DOWN buttons to obtain a display indication equal to 50% of full-scale pressure.

Absolute Reference Gauges (3 Points)

1. Apply full vacuum to the gauge. The character display will alternate between ZERO and CAL. Press the UP and DOWN buttons to obtain a display indication of zero.
2. Apply full-scale pressure. The character display will alternate between +SPAN and CAL. Press the UP and DOWN buttons to obtain a display indication equal to full-scale pressure.
3. Apply 50% of full-scale pressure. The character display will alternate between +MID and CAL. Press the UP and DOWN buttons to obtain a display indication equal to 50% of full-scale pressure.

Bipolar (±) and –30inHg/15psig Compound Ranges (5 Points)

1. With the gauge port open to atmosphere, the character display will alternate between ZERO and CAL. Press the UP and DOWN buttons to obtain a display indication of zero.
2. Apply full-scale positive pressure. The character display will alternate between +SPAN and CAL. Press the UP and DOWN buttons to obtain a display indication equal to full-scale pressure.
3. Apply 50% of full-scale positive pressure. The character display will alternate between +MID and CAL. Press the UP and DOWN buttons to obtain a display indication equal to 50% of full-scale pressure.
4. Apply full vacuum. The character display will alternate between –SPAN and CAL. Press the UP and DOWN buttons to obtain a display indication equal to the full vacuum reading.
5. Apply 50% of the full-scale vacuum range (for example, –7.4 psi for a ±15 psi gauge). The character display will alternate between –MID and CAL. Press the UP and DOWN buttons to obtain a display indication equal to 50% of full-scale vacuum.

–30inHg/100psig and –30inHg/200psig Compound (4 Points)

1. With the gauge port open to atmosphere, the character display will alternate between ZERO and CAL. Press the UP and DOWN buttons to obtain a display indication of zero.
2. Apply full-scale positive pressure. The character display will alternate between +SPAN and CAL. Press the UP and DOWN buttons to obtain a display indication equal to full-scale pressure.
3. Apply 50% of full-scale positive pressure. The character display will alternate between +MID and CAL. Press the UP and DOWN buttons to obtain a display indication equal to 50% of full-scale pressure.
4. Apply full vacuum. The character display will alternate between –SPAN and CAL. Press the UP and DOWN buttons to obtain a display indication equal to the full vacuum reading.

Exit Calibration Mode and Verify Calibration

1. **Battery-powered gauges:** Exit the calibration mode and save the calibration data by pressing and holding the front button until the display indicates OFF.

   Low-voltage powered gauges: Exit the calibration mode and save the calibration data by pressing and holding the front button until the gauge resets and powers up normally.
2. Verify pressure indications at 0%, 25%, 50%, 75%, and 100% of full scale.
3. Replace the rear cover and screws, taking care not to pinch the power leads between the case and the rear cover.

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Loop Powered DPG1000L and F4L Series

Precautions

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten or loosen by turning housing or any other part of the gauge.

Use fittings appropriate for the pressure range of the gauge as indicated on the rear label.

Do not apply vacuum to gauges not designed for vacuum operation.

Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.

NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

NEVER connect low-voltage-powered gauge wires directly to 115 VAC or permanent damage not covered by warranty will result.

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

Preparation

1. Please refer to the DPG1000L or F4L series data sheet for specifications, installation, wiring, and operating instructions.
2. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures.
3. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 10 microns (0.01 torr or 10 millitorr) or lower is required for vacuum and absolute gauges.
4. Connect to a 9-32 VDC power supply during the calibration procedure. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.
5. Allow the gauge to equalize to normal room temperature before calibration.

Calibration Potentiometer Access

Access the calibration potentiometers based on the model as shown below. Contact Customer Service to purchase replacement potentiometer covers.

Models with top potentiometers: Remove label on top of gauge to expose opening with calibration potentiometers. This label may be reused many times if kept clean. See rear label of gauge for potentiometer identification.

Models with front potentiometers: Remove the black plastic caps to expose the calibration potentiometers.

NEMA 4X models with front potentiometers: Unscrew nylon screws with o-rings to expose the calibration potentiometers.

Top Potentiometers

Front Potentiometers

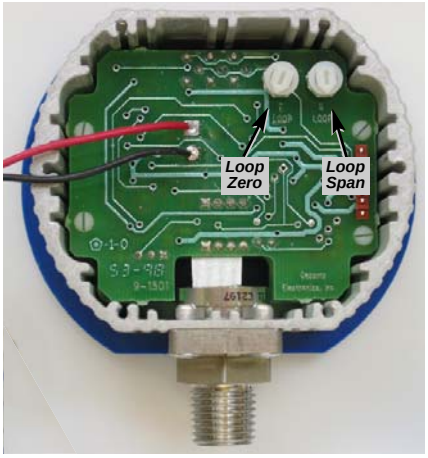
Front Potentiometers NEMA 4X

Calibration

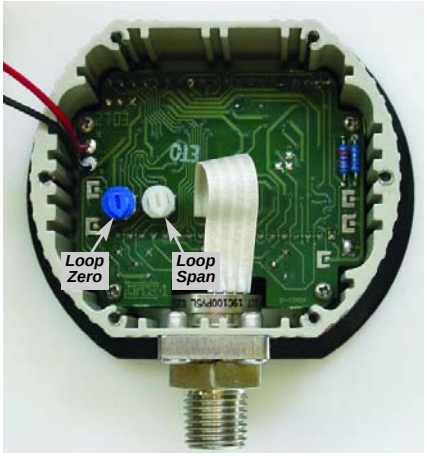
1. Loop-powered gauges must be connected to 9-32 VDC during the calibration procedure. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.
2. Internal Zero and Span potentiometers adjust the agreement between the display and the analog output. These normally do not need to be adjusted. If the output does need adjustment, remove the rear cover to access the potentiomers. See photos below.
3. **Zero for gauge reference pressure or vacuum gauges:** With the gauge port open to atmosphere, adjust the Zero potentiometer for a display indication of zero. Gauge output should be 4.0 milliamps.

   Zero for absolute reference gauges: Apply full vacuum to the gauge. Adjust the Zero potentiometer for a display indication of zero. Gauge output should be 4.0 milliamps.
4. **Span for gauge reference pressure gauges and absolute reference gauges:** Apply full-scale pressure and adjust the Span potentiometer for a display indication equal to full-scale pressure. Gauge output should be 20.0 milliamps.

   Span for gauge reference vacuum gauges: Apply full vacuum to the gauge. Adjust the Span potentiometer for a display indication equal to full-scale vacuum. Gauge output should be 20.0 milliamps.
5. Verify pressure indications at 0%, 25%, 50%, 75%, and 100% of full scale and repeat calibration as needed to achieve best accuracy over desired operating range.
6. Replace the rear cover and screws, taking care not to pinch the power leads between the case and the rear cover.



Loop-powered models with square TEST button



Loop-powered models with round TEST button

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01/08

Low Voltage Powered Gauges with Outputs
DPG1000AR, DPG1000DR, DPG1000DRBL, F4DR, F4DRBL, DPG1000AAR, DPG1000DAR

Precautions

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten or loosen by turning housing or any other part of the gauge.

Use fittings appropriate for the pressure range of the gauge as indicated on the rear label.

Do not apply vacuum to gauges not designed for vacuum operation.

Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.

NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

NEVER connect low-voltage-powered gauge wires directly to 115 VAC or permanent damage not covered by warranty will result. Common 24 VAC transformers often supply over 32 VAC unless they are loaded to 80% of rated capacity. Over voltage may result in damage.

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

Preparation

1. Please refer to the appropriate data sheet for specifications, installation, wiring, and operating instructions.
2. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures.
3. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge.
4. Connect to a the appropriate power supply as indicated on the gauge or data sheet during the calibration procedure. Low-voltage powered gauges are typically powered by 8-24 VAC 50/60 Hz or 9-32 VDC. The **AR** and **AAR** series are to be powered by 8-24 VAC 50/60 Hz only.

   The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage. Always check the data sheet or gauge rear label for correct power requirements.
5. Allow the gauge to equalize to normal room temperature before calibration.

Calibration Potentiometer Access

Access the calibration potentiometers based on the model as shown below. Contact Customer Service to purchase replacement potentiometer covers.

Models with top potentiometers: Remove label on top of gauge to expose opening with calibration potentiometers. This label may be reused many times if kept clean. See rear label of gauge for potentiometer identification.

Models with front potentiometers: Remove the black plastic caps to expose the calibration potentiometers.

NEMA 4X models with front potentiometers: Unscrew nylon screws with o-rings to expose the calibration potentiometers.

Top Potentiometers

Front Potentiometers

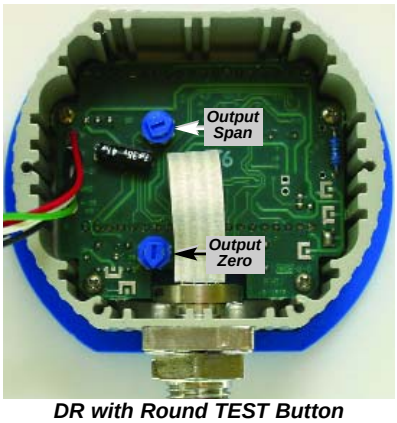
Front Potentiometers NEMA 4X

Pressure Calibration

1. **Zero for gauge reference pressure or vacuum gauges:** With the gauge port open to atmosphere, adjust the Zero potentiometer for a display indication of zero. Gauge output should be 4.0 milliamps (-I models) or 0 volts (-V models).

   Zero for absolute reference gauges: Apply full vacuum to the gauge. Adjust the Zero potentiometer for a display indication of zero. Gauge output should be 4.0 milliamps (-I models) or 0 volts (-V models).
2. **Span for gauge reference pressure gauges and absolute reference gauges:** Apply full-scale pressure and adjust the Span potentiometer for a display indication equal to full-scale pressure. Gauge output should be 20.0 milliamps (-I models) or 2.0 volts (-V models).

   Span for gauge reference vacuum gauges: Apply full-scale vacuum and adjust the Span potentiometer for a display indication equal to full-scale vacuum. Gauge output should be 20.0 milliamps (-I models) or 2.0 volts (-V models).
3. Verify pressure indications at 0%, 25%, 50%, 75%, and 100% of full scale and repeat calibration as needed to achieve best accuracy.



DR with Round TEST Button

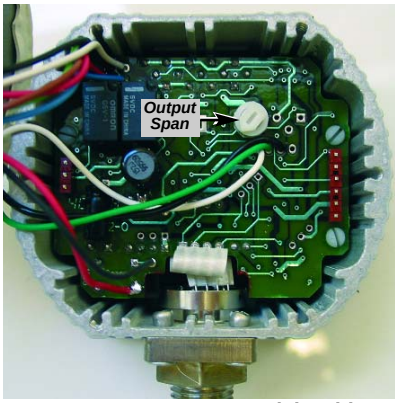
Output Calibration

1. Internal potentiometer(s) adjust the agreement between the display and the output. These normally do not need to be adjusted. If the output does need adjustment, remove the rear cover to access the potentiometers. See photos to identify versions.

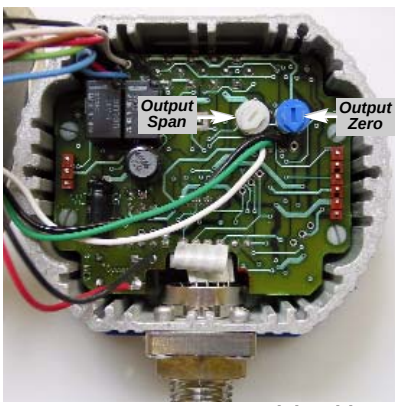
   DR models with single round TEST button: The display should be calibrated before the output is adjusted. Adjust the output Span first and then adjust output Zero.

   Models with square front button(s) and Voltage (-V) output: These models only have an output Span potentiometer. Adjust the output Span for 2.0 V output when the gauge is at full scale.

   Models with square front button(s) and Current (-I) Output: These models only have output Zero and Span potentiometers. Adjust the output Zero for 4 mA output when the gauge is at zero pressure. Adjust the output Span for 20.0 mA output when the gauge is at full scale.
2. Verify output indications at 0% and 100% of full scale and repeat calibration as needed.
3. Replace the rear cover and screws, taking care not to pinch the power leads between the case and the rear cover.



AR, DR, AAR, DAR Models with Voltage Output



AR, DR, AAR, DAR Models with Current Output

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Loop Powered F16L and F16LN

Precautions

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten or loosen by turning housing or any other part of the gauge. Use fittings appropriate for the pressure range of the gauge as indicated on the rear label. Do not apply vacuum to gauges not designed for vacuum operation. Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation. NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor. NEVER connect low-voltage-powered gauge wires directly to 115 VAC or permanent damage not covered by warranty will result. These products do not contain user serviceable parts. Contact us for repairs, service, or refurbishment.

Preparation

1. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures.
2. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 10 microns (0.01 torr or 10 millitorr) or lower is required for vacuum and absolute gauges.
3. Connect to a 9-32 VDC or 8-24 VAC (50 or 60Hz) power supply during the calibration procedure. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.
4. Allow the gauge to equalize to normal room temperature before calibration.

Power Up

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

1. All active display segments are turned on for approximately 1 second.
2. The full scale pressure is indicated for approximately 1 second, while the engineering units are displayed for 1/2 second on the character segments and then FS (Full Scale) is displayed for 1/2 second on the character segments.
3. All active display segments are again turned on for approximately 1 second.

After initialization, the display and the loop current will correspond to the applied pressure.

Entering the Calibration Mode

1. While pressing and holding the ▼ button, press the TEST button to enter the calibration mode. The upper section of the display will indicate CAL.
2. When all buttons are released, the upper section of the display will indicate _ _ _ _ with the left-most position blinking, and the lower section will indicate PASS. To exit and return to the normal operating mode, press and release the TEST button.
3. Enter the user-modifiable calibration pass code (3510 factory default)

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

   Press and release the TEST button to index to the next position. The 3 will remain, and the second position will be blinking. Use the ▲ and ▼ buttons to select 5.

   Press and release the TEST button to index to the next position. 3 5 will remain, and the third position will be blinking. Use the ▲ and ▼ buttons to select 1.

   Press and release the TEST button to index to the next position. 3 5 1 will remain, and the fourth position will be blinking. Use the ▲ and ▼ buttons to select 0.
4. Press and release the TEST button to proceed with calibration.

If an incorrect pass code was entered, the gauge will to exit to the normal operating mode.

Calibration

Upon successful calibration pass code entry, the upper display will indicate the applied pressure in the configured engineering units with the corresponding loop current.

The lower display will alternate between CAL and the calibration region corresponding to the applied pressure (ZERO, +MID, +SPAN, –MID, or –SPAN).

Note: To store the calibration parameters and exit calibration mode at any time, press and hold the TEST button until the display indicates – – – – .

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 the data sheet for wiring instructions.

Note: During any of the following calibration steps if the TEST button is held depressed for longer than 2 seconds, the display will change to indicate – – – – , and the gauge will exit the calibration mode when all buttons are released.

4 mA loop current

Press the TEST button and release it when the display indicates LCAL.

The upper display segments will indicate the preconfigured pressure corresponding to a 4 mA loop current.

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

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

20 mA loop current

Press the TEST button and release it when the display indicates HCAL.

The upper display segments will indicate the preconfigured pressure corresponding to a 20 mA loop current.

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

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

F16LN

F16L

Pressure Calibration

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

Note: During any of the following calibration steps if the TEST button is held depressed for longer than 2 seconds, the display will change to indicate – – – – , and the gauge will exit the calibration mode when all buttons are released.

Zero calibration

Press the TEST button and release it when the display indicates CAL.

Apply zero pressure.

The lower display will alternate between CAL and ZERO.

Use the ▲ and ▼ buttons to adjust the upper display to indicate zero.

Span calibration

Apply full-scale pressure.

The lower display will alternate between CAL and +SPAN.

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure.

Midpoint non-linearity calibration

Apply 50% full-scale positive pressure.

The lower display will alternate between CAL and +MID.

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure.

Negative span calibration (bipolar and compound ranges only)

Apply full-scale negative pressure.

The lower display will alternate between CAL and –SPAN.

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure.

Negative midpoint non-linearity calibration (bipolar ranges only)

Apply 50% full-scale negative pressure.

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

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure.

Save and exit

To store the calibration parameters and exit calibration mode, press and hold the TEST button until the display indicates – – – – .

Change Calibration Pass Code

1. While pressing and holding the ▲ button, press the TEST button to enter the configuration mode. The upper section of the display will indicate CFG.
2. When all buttons are released, the upper section of the display will indicate _ _ _ _ with the left-most position blinking, and the lower section will indicate PASS. To exit and return to the normal operating mode, press and release the TEST button.
3. Enter factory pass code 1220

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

   Press and release the TEST 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 TEST 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 TEST 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.
4. Press and release the TEST button to proceed to the configuration parameters. Note: If an incorrect pass code was entered, the gauge will exit to the normal operating mode.
5. The upper display section will indicate the calibration pass code. The lower section will display UDPCD.
6. To change the calibration pass code, press and release either the ▲ or ▼ buttons. The first character of the pass code will begin to blink.

   Use the ▲ and ▼ buttons to set the blinking character to the desired value, then press and release the TEST button to move to the next character. Repeat for each character position.
7. When the calibration pass code is displayed with no characters blinking, press and release the TEST button to save the new pass code and restart the gauge. Note: To make a correction to the new calibration pass code before saving and restarting, press either the ▲ and ▼ button to return to the UDPCD code entry sequence.

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Low Voltage Powered with Alarms F16ADA, F16ADAN, F16ADAH, F16ADAHN Series

Precautions

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten or loosen by turning housing or any other part of the gauge. Use fittings appropriate for the pressure range of the gauge as indicated on the rear label. Do not apply vacuum to gauges not designed for vacuum operation. Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation. NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor. NEVER connect low-voltage-powered gauge wires directly to 115 VAC or permanent damage not covered by warranty will result. These products do not contain user serviceable parts. Contact us for repairs, service, or refurbishment.

Preparation

1. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures.
2. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 10 microns (0.01 torr or 10 millitorr) or lower is required for vacuum and absolute gauges.
3. Connect to a 9-32 VDC or 8-24 VAC (50 or 60Hz) power supply during the calibration procedure. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.
4. Allow the gauge to equalize to normal room temperature before calibration.

Power Up

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

1. All active display segments are turned on for approximately 1 second.
2. The full scale pressure is indicated for approximately 1 second, while the engineering units are displayed for 1/2 second and then FS (Full Scale) is displayed for 1/2 second on the lower display.
3. All active display segments are again turned on for approximately 1 second.

After initialization, the display will correspond to the applied pressure.

Entering the Calibration Mode

Note: During pass code entry the LEDs will extinguish and the gauge will not respond to changes in applied pressure. The alarm relays and LCD indicators will maintain their prior states. The gauge will automatically revert to Normal Mode if no buttons are operated for approximately 15 seconds.

1. From the normal operating mode (not the test mode), press and hold the TEST and the ▼ buttons.
2. Then press the SEL (select) button.
3. Release all buttons when the display indicates CAL.
4. When the gauge enters the calibration mode, the display initially indicates _ _ _ _ with the first underscore blinking, and with PASS on the character segments.
5. Enter the user-modifiable calibration pass code (3510 factory default):

   Use the ▲ and ▼ 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 ▲ and ▼ 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 ▲ and ▼ 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 ▲ and ▼ buttons to select 0.
6. Press and release the TEST button to proceed with calibration procedures.

Note: If an incorrect pass code was entered, the gauge will to exit to the normal operating mode.

Calibration Procedures

Upon successful calibration pass code entry, the upper display will indicate the applied pressure in the configured engineering units and the loop current will correspond to the applied pressure.

The lower display will alternate between CAL and the calibration region corresponding to the applied pressure (ZERO, +MID, +SPAN, –MID, or –SPAN).

In the calibration mode, the gauge automatically recognizes the calibration region corresponding to the applied pressure.

There are 3, 4, or 5 calibration regions depending upon the pressure range of the gauge.

All gauges have Zero, +Mid, and +Span regions.

Gauges that measure vacuum as well as pressure will also have a –Span region and if the sensor is 15 psig or less, the gauge will have a –Mid region as well.

Pressure Calibration

F16ADAH

Zero calibration

Apply zero pressure.

The lower display segments will alternate between CAL and ZERO.

Use the ▲ and ▼ buttons to adjust the upper display segments to indicate zero.

Span calibration

Apply full-scale pressure.

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

Use the ▲ and ▼ buttons to adjust the upper display segments to indicate the applied pressure value.

Midpoint non-linearity calibration

Apply 50% full-scale positive pressure.

The lower display will alternate between CAL and +MID.

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure value.

Negative span calibration (bipolar and compound ranges only)

Apply full-scale negative pressure.

The lower display will alternate between CAL and –SPAN.

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure value.

Negative midpoint non-linearity calibration (bipolar ranges only)

Apply 50% full-scale negative pressure.

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

Use the ▲ and ▼ buttons to adjust the upper display to indicate the applied pressure value.

To store the calibration parameters and exit calibration mode, press and hold the SEL button until the display indicates – – – – .

Change Calibration Pass Code

1. From the normal mode (not the test or calibration mode), press and hold the TEST and the ▲ buttons.
2. Then press the SEL (select) button.
3. Release all buttons when the display indicates CFG.
4. Before the gauge proceeds to the User-Defined Calibration pass code change mode, the display initially indicates _ _ _ _ with the left-most underscore blinking, and with PASS on the character segments.

   Note: While in the pass code entry mode the LEDs will extinguish and the gauge will not respond to changes in applied pressure. The output relays will maintain their prior state. The gauge will automatically revert to normal operation if no buttons are operated for approximately 15 seconds.
5. Enter factory pass 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.
6. Press and release the SEL button to proceed.

   Note: If an incorrect pass code was entered, the gauge will exit to the normal operating mode.
7. Once the correct password has been entered, the display will indicate the existing calibration pass code with UDPCD on the character segments.

   Note: While in the calibration pass code change mode, the LEDs will extinguish and the gauge will not respond to changes in applied pressure and the output relays will be de-energized.
8. Operate the ▲ and ▼ button to select the first character of the calibration password.
9. When the correct first character is being displayed, press and release the SEL button to proceed to the next password character.
10. Repeat 1 & 2 above until the entire password is complete.
11. To exit the pass code change mode, press and hold the SEL button.
12. Release the button when the display indicates – – – – to restart the gauge in the normal mode.

Note: To store the calibration parameters and exit calibration mode at any time, press and hold the SEL button until the display indicates – – – – .

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Low Voltage Powered with Retransmission F16DR and F16DRN
Low Voltage Powered with Alarms and Retransmission F16DAR and F16DARN

Precautions

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten or loosen by turning housing or any other part of the gauge. Use fittings appropriate for the pressure range of the gauge as indicated on the rear label. Do not apply vacuum to gauges not designed for vacuum operation. Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation. NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor. NEVER connect low-voltage-powered gauge wires directly to 115 VAC or permanent damage not covered by warranty will result. These products do not contain user serviceable parts. Contact us for repairs, service, or refurbishment.

Preparation

1. Calibration should only be performed by qualified individuals using appropriate calibration standards and procedures. The calibration equipment should be at least four times more accurate than the gauge being calibrated. The calibration system must be able to generate and measure pressure/vacuum over the full range of the gauge. A vacuum pump able to produce a vacuum of 10 microns (0.01 torr or 10 millitorr) or lower is required for vacuum and absolute gauges.
2. Connect to a 9-32 VDC or 8-24 VAC (50 or 60Hz) power supply during the calibration procedure. The supply voltage has negligible effects on the gauge calibration as long as it is within the stated voltage ranges. Over voltage may result in damage.
3. Allow the gauge to equalize to normal room temperature before calibration.

Power Up

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

1. All active display segments are turned on for approximately 1 second.
2. The full scale pressure is indicated for approximately 1 second, while the engineering units are displayed for 1/2 second and then FS (Full Scale) is displayed for 1/2 second on the lower display.
3. All active display segments are again turned on for approximately 1 second.

After initialization, the display and the retransmission output will correspond to the applied pressure.

Entering the Calibration Mode

The gauge will automatically revert to normal mode if no buttons are operated for approximately 15 seconds.

F16DR series: During pass code entry the gauge will not respond to changes in applied pressure. The retransmission output will maintain its prior state.

F16DAR series: During pass code entry the LEDs will extinguish and the gauge will not respond to changes in applied pressure. The alarm relays, LCD indicators, and the retransmission output will maintain their prior states.

1. From the normal operating mode (not the test mode), press and hold the TEST and the ▼ buttons.
2. Then press the SEL (select) button.
3. Release all buttons when the display indicates CAL.
4. When the gauge enters the calibration mode, the display initially indicates _ _ _ _ with the first underscore blinking, and with PASS on the character segments.
5. Enter the user-modifiable calibration pass code (3510 factory default):

   Use the ▲ and ▼ 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 ▲ and ▼ 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 ▲ and ▼ 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 ▲ and ▼ buttons to select 0.
6. Press and release the TEST button to proceed with calibration procedures.

If an incorrect pass code was entered, the gauge will to exit to the normal operating mode.

Calibration Procedures

Upon successful calibration pass code entry, the upper display will indicate the applied pressure in the configured engineering units and the retransmission output will correspond to the applied pressure.

The lower display will alternate between CAL and the calibration region corresponding to the applied pressure (ZERO, +MID, +SPAN, –MID, or –SPAN).

In the calibration mode, the gauge automatically recognizes the calibration region corresponding to the applied pressure. There are 3, 4, or 5 calibration regions depending upon the pressure range of the gauge. All gauges have Zero, +Mid, and +Span regions.

Gauges that measure vacuum as well as pressure will also have a –Span region and if the sensor is 15 psig or less, the gauge will have a –Mid region as well.

To store the calibration parameters and exit calibration mode, press and hold the SEL (select) button until the display indicates – – – – .

Retransmission Output Calibration

Retransmission output calibration coordinates the analog output to the display indication, and is performed independently of applied pressure. It requires a direct physical measurement of the retransmission output.

During this procedure if the SEL button is held depressed for longer than 2 seconds, the display will change to indicate – – – – , and the gauge will exit the calibration mode when all buttons are released.

Retransmission output low value

Press and release the SEL (select) button to step to the retransmission output low value calibration sequence, indicated by LCAL on the display.

The upper display will indicate the preconfigured pressure corresponding to the retransmission output low value. The lower display will alternate between CAL and 4 MA, 0 VDC, or –2VDC depending on retransmission option.

Use the ▲ and ▼ buttons to adjust the actual retransmission output to its low value.

Retransmission output high value

Press and release the SEL button to step to the retransmission output high value calibration sequence, indicated by HCAL on the display.

The upper display will indicate the preconfigured pressure corresponding to the retransmission output high value. The lower display will alternate between CAL and 20 MA or +2VDC depending on retransmission option.

Use the ▲ and ▼ buttons to adjust the actual retransmission output to its high value.

Pressure Calibration

Zero calibration

Apply zero pressure. The lower display segments will alternate between CAL and ZERO. Use the ▲ and ▼ buttons to adjust the upper display segments to indicate zero.

Span calibration

Apply full-scale pressure. The lower display segments will alternate between CAL and +SPAN. Use the ▲ and ▼ buttons to adjust the upper display segments to indicate the applied pressure value.

Midpoint non-linearity calibration

Apply 50% full-scale positive pressure. The lower display segments will alternate between CAL and +MID. Use the ▲ and ▼ buttons to adjust the upper display segments to indicate the applied pressure value.

Negative span calibration (bipolar and compound ranges only)

Apply full-scale negative pressure. The lower display segments will alternate between CAL and –SPAN. Use the ▲ and ▼ buttons to adjust the upper display segments to indicate the applied pressure value.

Negative midpoint non-linearity calibration (bipolar ranges only)

Apply 50% full-scale negative pressure. The lower display segments will alternate between CAL and –MID. Use the ▲ and ▼ buttons to adjust the upper display segments to indicate the applied pressure value.

Save and exit

To store the calibration parameters and exit calibration mode, press and hold the SEL button until the display indicates – – – – .

Change Calibration Pass Code

1. From the normal mode (not the test or calibration mode), press and hold the TEST and the UP buttons.
2. Then press the SEL (select) button.
3. Release all buttons when the display indicates CFG.
4. Before the gauge proceeds to the User-Defined Calibration pass code change mode, the display initially indicates _ _ _ _ with the left-most underscore blinking, and with PASS on the character segments.
   Note: While in the pass code entry mode the LEDs will extinguish and the gauge will not respond to changes in applied pressure. The output relays will maintain their prior state. The gauge will automatically revert to normal operation if no buttons are operated for approximately 15 seconds.
5. Enter factory pass 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.
6. Press and release the SEL button to proceed. Note: If an incorrect pass code was entered, the gauge will exit to the normal operating mode.
7. Once the correct password has been entered, the display will indicate the existing calibration pass code with UDPCD on the character segments.
   Note: While in the calibration pass code change mode, the LEDs will extinguish and the gauge will not respond to changes in applied pressure and the output relays will be de-energized.
8. Operate the ▲ or ▼ button to select the first character of the calibration password.
9. When the correct first character is being displayed, press and release the SEL button to proceed to the next password character.
10. Repeat 1 and 2 above until the entire password is complete.
11. To exit the pass code change mode, press and hold the SEL button.
12. Release the button when the display indicates – – – – to restart the gauge in the normal mode.