MGF16BN Battery-Powered Digital Pressure Gauges

TRANSCAT

- ● ±0.25% Test Gauge Accuracy
- ● 316L Stainless Steel Wetted Parts
- ● NEMA 4X
- ● Capture Minimum and Maximum Readings
- ● Push Button Zero
- ● Selectable Engineering Units
- ● Selectable Auto Shutoff Times

The Meriam Instrument MGF16BN digital pressure gauge successfully addresses the modern demands of process pressure measurement. Pressure ranges are available to 5,000 PSIG at standard accuracy of ±0.25% of full scale and optional accuracy of ±0.1% of full scale. Compound gauges that can be used for positive pressure measurements and vacuum measurements are also available.

The display is a 4½ digit LCD with 0.5" high numerals and a lower alphanumeric display for engineering units and to aid in set up. Each gauge includes up to 15 field selectable engineering units depending on the sensor range. The selectable units include PSIG, kiloPascals, megaPascals, millibar, bar, atmospheres, kilograms per square centimeter, grams per square centimeter, centimeters of water, ounces per square inch, feet of water, inches of water, millimeters of mercury, Torr, and inches of mercury.

Other standard features include min/max capture, zeroing, pass code program lock-out, adjustable display shutoff time and field recalibration. The housing is ABS/polycarbonate and is NEMA 4X rated. Wetted components are 316L stainless steel for compatibility with many process fluids. Process connection is via a 1⁄4" MNPT 316L stainless steel fitting. The gauge is powered by two AA alkaline batteries.

Typical applications are instrumentation and control in the process industries, hydraulics, pneumatics, industrial gases and OEM's.

ACCURACY
Standard: ±0.25% of full scale ±1 least significant digit
includes linearity, hysteresis, repeatability
Optional: -HA ±0.1% FS ±1 LSD
-NC NIST traceable test report and calibration data

DISPLAY
3 readings per second nominal display update rate
4½ digit LCD, 0.5" H, 5 character 0.25" H alphanumeric lower display

CONTROLS & FUNCTIONS
Front button turns gauge on or off, zeros gauge, and cycles through min/max functions
Internal push buttons for selection of engineering units, selection of auto shutoff times, and calibration

CALIBRATION
Pass code protected calibration
Non-interactive zero, span, and linearity, ±10% of range

AUTOMATIC SHUTOFF
5 minute default
User selectable times ranging from 1 minute to 8 hours or front button on/off

POWER
2 AA alkaline batteries
Approximately 2000 hours battery life
Low battery symbol on display when batteries must be replaced

WEIGHT
Gauge: 9 ounces (approximately)
Shipping weight: 1 pound (approximately)

MATERIAL
ABS/polycarbonate NEMA 4X case, rear gasket, polycarbonate label

CONNECTION SIZE
1/4" NPT male, 316L SS

MATERIAL, MEDIA COMPATIBILITY
All wetted parts are 316L SS, compatible with most liquids and gases

OVERPRESSURE
3000 psig range:	5000 psig
5000 psig range:	7500 psig
All others:	2 x pressure range

112.5% FS out-of-range display: $I---$ or $I-.-.-$ depending on model

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

ENVIRONMENTAL
Storage temperature:	–40 to 203°F (–40 to 95°C)
Operating temperature:	–4 to 185°F (–20 to 85°C)
Compensated temperature:	32 to 158°F (0 to 70°C)

RANGES	±0.25% FS MODELS	±0.1% FS MODELS	SELECTABLE ENGINEERING UNITS
−30.0 inHg to 15.0 PSIG	MGF16BN–30V15PSIG		InHg/PSI, can be user reconfigured as a bipolar gauge with selectable units
−30.0 inHg to 100.0 PSIG	MGF16BN–30V100PSIG		InHg/PSI, can be user reconfigured as a bipolar gauge with selectable units
−30.0 inHg to 200.0 PSIG	MGF16BN–30V200PSIG		InHg/PSI, can be user reconfigured as a bipolar gauge with selectable units
0 - 5.000 PSIG	MGF16BN5PSIG	MGF16BN5PSIG-HA	PSIG, kPa, mbar, bar, atm, kg/cm², g/cm², cmH₂O, oz/in², ftH₂O, inH₂O, mmHg, torr, mmH₂O, inHg
0 - 15.00 PSIG	MGF16BN15PSIG	MGF16BN15PSIG-HA	PSIG, kPa, MPa, mbar, bar, atm, kg/cm², g/cm², cmH₂O, oz/in², ftH₂O, inH₂O, mmHg, torr, inHg
0 - 60.00 PSIG	MGF16BN60PSIG	MGF16BN60PSIG-HA	PSIG, kPa, MPa, mbar, bar, atm, kg/cm², g/cm², cmH₂O, oz/in², ftH₂O, inH₂O, mmHg, torr, inHg
0 - 100.0 PSIG	MGF16BN100PSIG	MGF16BN100PSIG-HA	PSIG, kPa, MPa, mbar, bar, atm, kg/cm², g/cm², cmH₂O, oz/in², ftH₂O, inH₂O, mmHg, torr, inHg
0 - 200.0 PSIG	MGF16BN200PSIG	MGF16BN200PSIG-HA	PSIG, kPa, MPa, bar, atm, kg/cm², oz/in², ftH₂O, inH₂O, inHg
0 - 300.0 PSIG	MGF16BN300PSIG	MGF16BN300PSIG-HA	PSIG, kPa, MPa, bar, atm, kg/cm², oz/in², ftH₂O, inHg
0 - 500.0 PSIG	MGF16BN500PSIG	MGF16BN500PSIG-HA	PSIG, kPa, MPa, bar, atm, kg/cm², ftH₂O, inHg
0 - 1000 PSIG	MGF16BN1000PSIG	MGF16BN1000PSIG-HA	PSIG, kPa, MPa, bar, atm, kg/cm², ftH₂O, inHg
0 - 2000 PSIG	MGF16BN2000PSIG	MGF16BN2000PSIG-HA	PSIG, MPa, bar, atm, kg/cm², ftH₂O, inHg
0 - 3000 PSIG	MGF16BN3000PSIG	MGF16BN3000PSIG-HA	PSIG, MPa, bar, atm, kg/cm², ftH₂O, inHg
0 - 5000 PSIG	MGF16BN5000PSIG	MGF16BN5000PSIG-HA	PSIG, MPa, bar, atm, kg/cm²
Optional for all Models	NC	NC	NIST traceability certificate with 5 test points and data

MGF16BN Instructions

INSTALLATION AND PRECAUTIONS

Read these instructions before installing the gauge. The configuration options may be easier to set up before the gauge is installed.

NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage will result to the sensor.

Use an appropriate screen or filter to keep debris out of gauge port.

Use fittings appropriate for the pressure range of the gauge.

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

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

Do not apply vacuum to gauges not designed for vacuum operation. Permanent damage will result to the sensor.

POWER-UP

1. Press the front button.
2. The full-scale range is indicated and the display segments are tested.
3. The actual pressure and units are displayed.

POWER-UP WITH ZERO

1. Be sure the gauge port is exposed to normal atmospheric pressure and no pressure or vacuum is applied. The zeroing function is only activated at each power-up and the stored zero correction is erased when the gauge is shut off.
2. Press and hold the front button until $o o o o$ is displayed and then release the button. This indicates that the gauge has been zeroed.
3. The full-scale range is indicated and the display segments are tested.
4. The actual pressure and units are displayed.

Attempting to zero the gauge with pressure greater than approximately 3% of full-scale applied will result in an error condition, and the display will alternately indicate $Err0$ and the actual pressure. The gauge must be powered down to reset the error condition.

NORMAL OPERATION

Following the start-up initialization, the display indicates the pressure reading updated approximately 3 times per second. The auto shutoff timer starts when the gauge is powered up or whenever the button is pushed, unless the gauge is set up with the auto shutoff timer turned off ($0\ ASt$).

If excessive vacuum is applied to a pressure-only gauge, the display will indicate $-Err$ until the vacuum is released. Applying vacuum to a gauge designed for pressure may damage the pressure sensor. If excessive pressure is applied (112.5% over range), an out-of-range indication of $I---$ or $I-.-.-$ will be displayed depending on model.

MINIMUM AND MAXIMUM READINGS

Minimum and maximum readings are continuously stored and updated whenever gauge is on. The stored readings can be manually cleared if desired. The high and low memory is also cleared whenever the gauge is off.

Press and hold the button for about 1 second until HI is displayed alternating with the units. The maximum stored value is displayed.

After HI is displayed, press and hold the button again for about 1 second until LO is displayed alternating with the units. The minimum stored value is displayed.

After LO is displayed, press and hold the button again for about 1 second until AP (Applied Pressure) is displayed. The high and low readings are kept in memory and the gauge returns to normal operation with the display indicating the current pressure.

Press and continue to hold the button until the display indicates $clr\ HI/LO$ (about 3 seconds total) and then release the button. Both HI and LO values are cleared and the gauge returns to the normal mode and displays the current pressure.

SHUT-DOWN

To shut off the gauge manually at any time, press and hold the button until the display indicates OFF (about 5 seconds) and then release.

When an auto shutoff time is set, the display indicates OFF five seconds prior to auto shutoff. The button can be pressed to keep the gauge on. The auto shutoff timer is reset whenever the button is pressed and released.

If the gauge is set up with the auto shutoff timer turned off ($0\ ASt$) it will stay on until manually shut off or until the batteries are depleted. Turn gauge off when not in use to conserve battery life.

DIMENSIONS
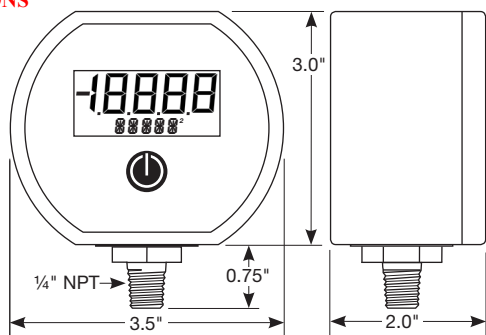
OPERATION SUMMARY

Function	Button	Prompt—Release Button	Result
Gauge On	Press	Gauge Range/Display Test	Actual Pressure
Gauge On & Zero	Press/hold	$o o o o$	Zeroed Actual Pressure
Hi Reading	Press/hold	HI	Maximum Reading
Lo Reading	Press/hold	LO	Minimum Reading
Exit Hi/Lo	Press/hold	AP	Actual Pressure
Clear Hi/Lo	Press/hold	$HI/LO/AP \to clr$	Actual Pressure
Off, Clear Zero	Press/hold	$HI/LO/AP \to clr \to OFF$	Gauge Off, Clear Zero

ENGINEERING UNIT SELECTION

Engineering unit selection is done via internal buttons to help prevent accidental or unauthorized changes in the field. The selected engineering unit is stored in non-volatile memory and will be retained even with the battery off or batteries removed. The available engineering units depend on the sensor range, display resolution, and is limited to prevent unwanted reading instability.

Compound (inHg/PSIG) gauges can be changed to display single-unit vacuum/pressure readings (i.e. ±psig) when in the user configuration mode.

Standard PSIG units are mathematically converted to the newly selected engineering unit. When the gauge is powered up, the originally configured PSIG range is displayed and then the conversion with the selected engineering unit is displayed.

To change engineering units and remove the rear cover to gain access to the two internal buttons located near the lower right and left corners of the circuit board.

With the gauge powered up, press and hold the UP button. Release the button when the engineering units begin to flash.

Use the UP and DOWN buttons to scroll through the list of engineering units available for the pressure range of the sensor.

When the desired units are displayed, press and release the front button to save the selection and return to normal operation.

Replace the rear cover taking care not to pinch the power wires between the cover and the case.

AUTO SHUTOFF TIME SELECTION

Auto shutoff time selection is done via internal buttons to help prevent accidental or unauthorized changes in the field. The selected shut off time is stored in non-volatile memory and will be retained even with the battery off or batteries removed.

Remove the rear cover to gain access to the two internal buttons located near the lower right and left corners of the circuit board.

With the gauge powered up, press and hold the DOWN button. Release the button when the auto shutoff time is displayed on the upper section.

The lower display segments will indicate $ASt\ M$ if the time displayed is in minutes, and $ASt\ H$ if it in hours.

An auto shutoff time of zero signifies that the auto shutoff feature is disabled.

Use the UP and DOWN buttons to select 0, or 1, 2, 5, 10, 15, 20 or 30 minutes, or 1, 2, 4, or 8 hours.

When the desired auto shutoff time is displayed, press and release the front button to save the selection and return to normal operation.

Replace the rear cover taking care not to pinch the power wires between the cover and the case.

BATTERY REPLACEMENT

A low battery indication will be shown in the upper left-hand corner of the display when the battery voltage falls sufficiently. The battery should be replaced soon after the indicator comes on or unreliable readings may result or the gauge may fail to power up.

1. Remove the 6 Phillips-head screws on the back of the unit.
2. Remove batteries by lifting up the positive end of the battery (opposite the spring) taking care not to bend the battery holder spring.
3. Always replace both batteries at the same time with high quality alkaline batteries. Install batteries with correct orientation. The negative (flat) end of each battery should be inserted first facing the battery holder spring.
4. Replace the back cover, including the rubber sealing gasket taking care not to pinch the power wires between the cover and the body of the case.

USER CONFIGURATION

Remove the rear cover to gain access to the buttons located near the lower right and left corners of the circuit board.

With the gauge off, press and hold the UP button. Then press the front button. Release all buttons when the display indicates CFG and the program version then the full-scale range is indicated and the display segments are tested.

The display then indicates _ _ _ _ with the first underscore blinking, and with $PASS$ on the character segments.

Note: The gauge will automatically revert to normal operation if no buttons are operated for approximately 15 seconds. To cancel and return to normal operation, press and release the front button without entering any pass code characters.

Enter the user-modifiable pass code (3510 factory default)

1. Use the UP or DOWN buttons to set the left-most digit to 3.
2. Press and release the front button to index to the next position. The 3 will remain, and the second position will be blinking.
3. Use the UP or DOWN buttons to select 5.
4. Press and release the front button to index to the next position. 35 will remain, and the third position will be blinking.
5. Use the UP or DOWN buttons to select l.
6. Press and release the front button to index to the next position. 351 will remain, and the fourth position will be blinking.
7. Use the UP or DOWN buttons to select 0.
8. Press and release the front button to proceed with configuration procedures.

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

Factory/User configuration

The upper display section will be blank, and the lower section will display either $USER\_$ or $FCTRY$.

If $USER\_$ is selected, the existing user configuration will be retained and will be accessible for modification as described in the following steps. To select $USER\_$, press and release the DOWN button. The lower section of the display will indicate $USER\_$. Press and release the front button to continue with configuration.

If $FCTRY$ is selected, the existing user configuration will be replaced by the configuration as it left the factory. To select $FCTRY$, press and release the UP button. The lower section of the display will indicate $FCTRY$. Press and release the front button to restore the factory configuration and restart the gauge.

High and low value capture configuration

The upper display section will be blank.

Use the UP and DOWN buttons to select from the following:

HI/LO	Both highest and lowest values measured will be captured
$HI/--$	Only highest value measured will be captured
$--/LO$	Only lowest value measured will be captured
$--/--$	Capture feature is disabled

Press and release the front button to move on to the next parameter.

Gauge type configuration (vacuum/pressure models only)

This will only appear with 15, 100, or 200 psig ranges that were originally ordered as compound gauges.

The upper display section will be blank.

Use the UP and DOWN buttons to select from the following:

$-/+EU$	Vacuum is indicated as negative pressure in the selected engineering units
$CMPND$	Vacuum is negative INHG, pressure is PSI

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

Replace the rear cover taking care not to pinch the power wires between the cover and the case.

CALIBRATION

The gauge is calibrated at the factory using equipment traceable to NIST. There is no need to calibrate the gauge before putting it in service.

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 gauges.

Remove the rear cover to gain access to the UP and DOWN buttons located near the lower right and left corners of the circuit board.

With the gauge off, press and hold the DOWN button. Then press the front button. Release all buttons when the display indicates CAL.

The display begins by indicating the full-scale positive pressure rating of the gauge in the engineering units as configured by the factory, and then proceeds to show all display segments.

Before the gauge enters the Calibration Mode, the display initially indicates _ _ _ _ with the first underscore blinking, and with $PASS$ on the character segments.

Note: The gauge will automatically revert to normal operation if no buttons are oper-

ated for approximately 15 seconds. To cancel and return to normal operation, press and release the front button without entering any pass code characters.

Enter the user-modifiable pass code (3510 factory default)

1. Use the UP or DOWN buttons to set the left-most digit to 3.
2. Press and release the front button to index to the next position. The 3 will remain, and the second position will be blinking.
3. Use the UP or DOWN buttons to select 5.
4. Press and release the front button to index to the next position. 35 will remain, and the third position will be blinking.
5. Use the UP or DOWN buttons to select l.
6. Press and release the front button to index to the next position. 351 will remain, and the fourth position will be blinking.
7. Use the UP or DOWN buttons to select 0.
8. Press and release the front button to proceed with configuration procedures.

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

The gauge enters and remains in the Calibration Mode until restarted manually or power is removed. While in the Calibration Mode, the auto shutoff timer is disabled, the push button zeroing at startup is disabled, the Min/Max feature is disabled, and compound range models are set for the same engineering units for pressure and for vacuum.

The calibration may be performed in any of the available engineering units as well as percent (PCT). For greatest accuracy, use the UP and DOWN buttons to select engineering units for calibration with highest resolution. Press and release the front button when the appropriate engineering units are displayed. Suggested units are listed below.

Sensor	Suggested range and units for calibration
5 PSI	5.000 PSI
15 PSI	775.7 MMHG (TORR)
30 PSI	61.08 INHG
50 PSI	50.00 PSI
60 PSI	60.00 PSI
100 PSI	7.031 KG/CM2
200 PSI	407.2 INHG
300 PSI	610.8 INHG
500 PSI	500.0 PSI
1000 PSI	70.31 KG/CM2
2000 PSI	4072 INHG
3000 PSI	6108 INHG
5000 PSI	5000 PSI
Any	10000 PCT (percent)

The display will then indicate the currently applied pressure in the engineering units selected for calibration.

Gauge reference pressure gauges

Apply zero pressure. This may be done by venting to atmosphere. The character segments of the display will alternate between $ZERO$ and CAL. Adjust for a display indication of zero using the UP and the DOWN buttons. *See note below.

Apply full-scale pressure. The character segments of the display will alternate between $+SPAN$ and CAL. Adjust for a display indication of full-scale pressure using the UP and the DOWN buttons. *See note below.

Apply 50% full-scale pressure. The character segments of the display will alternate between $+MID$ and CAL. Adjust for a display indication equal to 50% of full-scale pressure using the UP and the DOWN buttons. *See note below.

Compound gauges (vacuum/pressure ranges)

Warning: application of vacuum to non-vacuum models may result in irreparable damage to the sensor.

In addition to the steps described above for pressure gauges, apply full-scale vacuum. The character segments of the display will alternate between $-SPAN$ and CAL. Adjust for a display indication of actual applied vacuum using the UP and the DOWN buttons. *See note below.

For bipolar and –30.00inHg/+15.00psig compound range models only, apply 50% full-scale vacuum. The character segments of the display will alternate between $-MID$ and CAL. Adjust for a display indication equal to 50% of full-scale vacuum using the UP and the DOWN buttons. *See note below.

* Note: Each time one of the calibration buttons 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 calibration button. After about one second, the display will begin to change continuously. Release the button to halt the continuous change. Then make fine adjustments by pressing and quickly releasing the calibration buttons as previously described.

Save Calibration

Once the adjustments are complete, press and hold the front button until the display indicates _ _ _ _ then release the button to store the calibration parameters in non-volatile memory and restart the gauge.

Verify the pressure indications at 0%, 25%, 50%, 75% and 100% of full scale.

Replace the rear cover taking care not to pinch the power wires between the cover and the case.

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USER DEFINED PASS CODE CONFIGURATION

Remove the rear cover to gain access to the buttons located near the lower right and left corners of the circuit board.

Battery powered models: With the gauge off, press and hold the UP button. Then press the front button. Release all buttons when the display indicates CFG.

The display initially indicates $\_\_\_\_$ with the first underscore blinking, and with $PASS$ on the character segments.

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

To cancel and return to normal operation, press and release the POWER button without entering any pass code characters.

Enter access code 1220

1. Use the UP and DOWN buttons to set the left-most digit to 1.
2. Press and release the front button to index to the next position. The 1 will remain, and the second position will be blinking.
3. Use the UP and DOWN buttons to select 2.
4. Press and release the front button to index to the next position. 12 will remain, and the third position will be blinking.
5. Use the UP and DOWN buttons to select 2.
6. Press and release the front button to index to the next position. 122 will remain, and the fourth position will be blinking.
7. Use the UP and DOWN buttons to select 0.
8. Press and release the front 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 access code

Once the correct access code has been entered, the display will indicate the existing user-defined pass code with $UDPCD$ on the character segments.

1. Operate the UP or DOWN button to select the first character of the new pass code.
2. When the correct first character is being displayed, press and release the front button to proceed to the next pass code character.
3. Repeat above until the entire pass code is complete.
4. To exit the User-Defined Pass Code change mode, press and hold the front button. Release the button when the display indicates $----$ to restart the gauge.
5. Replace the rear cover taking care not to pinch the power wires between the cover and the case.