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A trusted leader in measurement
and calibration solutions.

User Manual

M204 Series - Smart Manometer

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Glossary

Words and phrases with their definitions.

Absolute Isolated pressure (AI)

Absolute pressure is equal to the sum of these two:

1. Gauge pressure.
2. Atmospheric pressure (also known as barometric pressure).

Key

A **key** always refers to hardware push-buttons on the keyboard that you can press.

Compound Isolated pressure (CI)

A compound gauge can display both positive and negative (vacuum) pressures. The M204 replaces the need for buying one gauge for each sensor:

1. A pressure sensor.
2. A vacuum sensor.

Isolated

The word isolated refers to the sensing element being isolated from the media. It is commonly used in the phrases Absolute Isolated (AI) pressure and Compound Isolated (CI) pressure.

Meriam Calibration

Meriam calibration refers to any calibration completed at Meriam with *Meriam traceability*. Meriam calibration includes:

- Comprehensive full temperature calibration.
- Multipoint Meriam adjustment.

User Calibration

User calibration refers to any calibration done outside of Meriam with *non-Meriam traceability*. User calibration includes:

- Multipoint user calibration or adjustment.

General warnings and cautions

Preventing injury


Failure to follow all instructions could result in injury:

- Read the entire manual before using the M204.
- Understand the contents before using the M204.
- Follow all safety warnings and instructions provided with this product.
- Meet or exceed your employer's safety practices.

Safety Symbols

The following table defines the safety symbols, signal words, and corresponding safety messages used in the manual. These symbols:

- Identify potential hazards.
- Warn you about hazards that could result in personal injury or equipment damage.

Safety Symbols	Explaining the symbols
	This is the **Read Instruction Manua**l symbol. This symbol indicates that you must read the instruction manual.
	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
	Indicates information essential for proper product installation, operation or maintenance.

Certification

All M204 Series models are available for general-purpose use.

General Purpose (GP) versions are identified by the name plate located on the rear of the unit under the protective rubber boot. A sample of the General Purpose name plate is shown below:

Safety Warnings

Fire or Explosion Hazard.

⚠DANGER

- **Do not** use General Purpose versions in hazardous areas.
- **Do not** use General Purpose versions in areas that may contain flammable gas or vapors, combustible dusts or ignitable fibers where an unintended spark can cause a fire or explosion.

For General Purpose M204 Series

⚠CAUTION

- Substitution of components may impair operation and safety.
- Disconnect power before servicing.
- **Do not** power the M204 with a combination of new and old batteries.
- **Do not** power the M204 with a combination of batteries from different manufacturers.

Do not exceed pressure limits

⚠WARNING

- **Do no**t exceed the Pressure Limits listed in the Specifications section of this manual.
- Failure to operate within the specified pressure limit could result in minor or moderate injury.

Use a wrench to tighten

NOTICE

- You must use a wrench on the pressure manifold when installing user's 1/8" NPT fitting.
- Do not tighten the fitting without using a wrench on the pressure manifold.
- Failure to use a wrench on the manifold damages the plastic enclosure and voids the warranty.
- Do not apply torque to the manifold or the plastic enclosure will be damaged.

Keypad functions

On/Off & ◄ (backspace) Key

- The **On/Off** key turns the manometer on and enters the unit into the **Measure Mode**.
- Press the **On/Off** key while in the **Measure Mode** turns the unit off. It also serves as a **Backspace** key when editing in the Program Mode.
- The ◄ key takes the user out of a programmable parameter without changing the previous setting.
- Pressing this key repeatedly returns you to the **Measure Mode** and then shuts off the manometer.

Min/Max & ▲ (up) Key

- In the **Measure Mode** activates the Min/Max function of the manometer.
- When activated the minimum value is displayed on the upper left of the display and the maximum value on the upper right.
- This key also deactivates and resets this function.
- The ▲ key is used to scroll through the programmable parameters when the unit is in the Program Mode.
- Once a programmable parameter is selected the ▲ key can be used to edit that parameter.

Hold & ▼ (down) Key

- In the **Measure Mode** toggles on/off the Dual-line display Hold function. This freezes the value displayed.
- If the Min/Max function is activated, those values are also frozen. With HOLD activated, the letter **H** appears in the lower left of the display.
- The ▼ key is used to scroll through programmable parameters with the unit in the **Program Mode**.
- Once a programmable parameter is selected the ▼ key can be used to edit that parameter.

PRGM & ▶ (enter) Key

- Puts the manometer into the **Program Mode** from the **Measure Mode**.
- When in the **Program Mode**, pressing this key selects the programmable parameter to be edited (with prompt for password if **Lockout** is set).
- After the parameter has been edited, pressing the PRGM key enters the new setting into the manometer's permanent memory.
- This key also acts as a ▶ key when editing user input such as the header name and user units.

Backlight Key

The **Backlight** key, represented by the standard light bulb symbol, toggles the display backlight between green and off.

NOTICE The backlight consumes additional battery energy. Turn the backlight off to optimize battery life.

Zeroing the Manometer

To Zero DN, DI, or CI Type Manometers

1. Disconnect from pressure sources and vent the pressure port(s) to atmosphere (do not remove the factory installed P2 plug if present). The display should read close to zero.
2. Press the **Min/Max** and **Hold** keys at the same time (see inset photo below) and then release. The top line of the displays ZERO IN PROGRESS and the bottom line counts down from 9.
3. The process is complete when the unit returns to Measure Mode.
4. The lockout function, if enabled, does not prevent zeroing of the manometer.

Note: *The smart manometer can only be zeroed if the new zero value is within ± 5 % (of FS) of the original factory calibrated zero. If the zero procedure generates a new zero value outside this limit, a ZERO RANGE ERROR message appears indicating that the procedure failed. Factory service may be required.*

To Zero AI (Absolute) Type Manometers

Steps	Dual-line display
1. Press ON/OF button.	• The display briefly displays HEADER NAME and full scale range in the last engineering unit selected. • Then it goes into the **Measure Mode** to display pressure
2. Connect the M204 to a vacuum source capable of a vacuum of 100 microns absolute pressure or less.	
3. Pull a full vacuum.	Display should read close to zero.
4. Press Min/Max and Hold keys at the same time. 	• Top line of display displays ZEROING SOURCE: • Bottom line of display displays REF TO ABS ZERO
5. Press the PRGM key.	• Top line of display displays ZERO IN PROGRESS while bottom line counts down from 9. • Zeroing is complete when unit returns to Measure Mode.

Program Mode

Configure the manometer

The program mode is used to configure the manometer for Measure Mode operation.

1. After the PRGM key is pressed in Measure Mode, the top line displays PROGRAM MODE. The bottom line displays UNITS SELECT.
2. Press the ▲ or ▼ arrow keys to scroll through the Program Mode to the target parameter.
    a. The configurable parameters that are found in Program Mode are: UNITS SELECT, DAMP RATE SELECT, USER INFO SELECT, CONTRAST SELECT, DATA LOGGING, LEAK TEST and EXIT.
    b. Two sub-modes under UNITS SELECT are provided: USER UNIT SELECT and FLOW UNIT SELECT.
3. Press the PRGM key to select either of these sub-modes and set up their respective function.
4. Press the PRGM key at any time during Measure Mode operation to put the manometer into Program Mode.
5. If LOCKOUT is set, you must enter the correct code when prompted.

Standard engineering units

The standard engineering units available on the Smart Manometer are:

1. PSI
2. inH20 (at 20 °C, 60 °F and 4 °C)
3. Kg/cm2
4. kPa
5. mbars
6. Bars
7. cmH2O (at 20 °C)
8. inHg (at 0 °C)
9. mmHg (at 0 °C)
10. User Units
11. Flow Units

NOTICE *If a given engineering unit cannot display the correct number of digits, the M204 automatically advances to the next displayable unit.*

When you turn on the M204, it defaults to the last selected pressure engineering unit.

Change the engineering units

To change the engineering units the manometer should be ON and in Measure Mode. Then follow these steps:

Steps	Dual-line display
1. Press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
2. Press the PRGM key.	• Top line displays UNITS SELECT • Bottom line displays current engineering units.
3. Press the up ▲ or down ▼ arrow key until the target engineering unit is displayed.	Engineering units on bottom line of display change.
4. Press the PRGM key to select the engineering unit.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
5. Press the down ▼ arrow key.	Bottom line displays EXIT.
6. Press the PRGM key.	Display returns to Measure Mode in new engineering unit.

USER UNIT SELECT programming

You can program engineering units that are not included in the standard selection into the manometer using the UNITS SELECT parameter in the program mode.

The value programmed into this parameter is used to calculate the target unit of measure.

Use this example of converting to **Feet of H2O** by following these steps, using the conversation factor of
1 psi = 2.30894 FT H2O.

Steps	LCD display
1. Press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
2. Press the PRGM key.	• Top line displays UNITS SELECT • Bottom line displays current engineering units.
3. Press the up ▲ or down ▼ arrow key until USER UNIT SELECT is displayed.	• Top line displays UNITS SELECT • Bottom line displays USER UNIT SELECT.
4. Press the PRGM key. See Note 1 at the end of this table.	• Top line displays VALUE=. • Bottom line displays CHANGE?: YES.
5. Press the PRGM key to change the value.	Top line displays USER UNIT VALUE.
6. Start entering the conversion factor by pressing the up ▲ arrow key until the first digit displays 2.	• Top line displays USER UNIT VALUE. • Bottom line displays 20000000.
7. Press the right ▶ arrow key to enter the value **2** and advance the cursor to the next digit.	• Cursor flashes to the right of the **2**. • Now numbers, decimal point or blank space can be entered.
8. Repeat step 6 and 7 until bottom line displays 2.30894	• Bottom line displays **2.30894**. • Last digit **4** is blinking.

Steps	LCD display
9. **If an error is made,** use the left ◀ arrow key to move the cursor back to the incorrect digit. Then press up ▲ or down ▼ arrow keys to display the correct value.	• The digit that is corrected is blinking.
10. Press the PRGM key until the display changes. *See Note 1 at the end of this table.*	• Top line displays VALUE=. • Bottom line displays CHANGE?: YES.
11. Press the PRGM key.	Top line displays USER UNIT NAME.
12. Follow steps 6-8 above to enter **FT H_2O**.	• Bottom line displays **FT H2O**. • Last letter **O** is blinking.
13. Press the PRGM key.	• Top line displays PROGRAM MODE. • Bottom line displays UNITS SELECT.
14. Press the down ▼ arrow key.	Bottom line displays EXIT.
15. Press the PRGM key.	• Manometer returns to Measure Mode. • Units Display displays **FT H_2O**.

Note 1: Customizing engineering units

1. If at steps 4 or 10 the VALUE= is the target value, press the up ▲ or down ▼ arrow key. This will toggle the bottom line from the default CHANGE?: YES to CHANGE?: NO.
2. Step 5 would then jump to step 10.
3. Step 11 would then jump to step 13.

FLOW UNIT SELECT

Smart Manometers that use differential pressure sensors can be programmed to display flow measurement units such as CFM or L/min.

- The primary element must be a differential pressure - square root - type device such as a pitot tube, orifice plate or venturi.

The flow constant and flow units description are programmed into the manometer using the same steps used in the USER UNIT SELECT section.

- At step 3, choose FLOW UNIT SELECT instead of USER UNIT SELECT.

Calculate the Flow Constant

Calculate the Flow constant from the following equation:

$F_c = Q \div \sqrt{DP}$

where: F_c *= Flow constant*

Q *= Flow rate (from the flow element calculation sheet), any flow unit*

DP *= Differential pressure corresponding to* Q*, unit must be inches* H_20 *at 20 °C*

Example: *If the* DP *is 25 inches* H_20 *at 20 °C when the flow rate is 10,000 units, then the Flow constant is 2,000.*

Damp Rate Select

Adjustable exponential type damping is available to steady the display when you measure pulsating pressure or flow.

- The Smart Manometer has a range of damping rates: 0.1, 0.2, 0.5, 1, 2, 5, 10, or 25 seconds.
- Exponential damping displays approximately 70 % of a step change in pressure upon the next display update.
- When set for 5 second time constant, it takes 5 seconds from the time of the step change until the manometer displays the full value of the new pressure.

Set the damp rate

To set the damp rate, follow the steps below:

Steps	Dual-line display
1. Press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
2. Press the ▲ arrow key.	Bottom line displays DAMP RATE SELECT.
3. Press the PRGM key.	Top line displays DAMP RATE SELECT.
4. Press the ▲ or ▼ arrow key until the target damp rate is displayed on the bottom line.	Bottom line displays damp rate in seconds.
5. Press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
6. Press the ▼ arrow key.	Bottom line displays EXIT.
7. Press the PRGM key.	Returns to Measure Mode.

User Info Select

Read Only Information

The **USER INFO SELECT** menus are designed to provide the user with information about the manometer's hardware and software. This parameter provides read only information on the sensor's accuracy, software version, date of manufacture and serial number.

Edit Information

USER INFO SELECT also allows the user to edit the AUTO SHUT-OFF, LOCKOUT and Start-Up HEADER NAME features.

To view and configure the **USER INFO SELECT** parameters, follow the steps below.

Steps	Dual-line display
1. From the Measure Mode press the PRGM key.	**Read only** • Top line displays PROGRAM MODE. • Bottom line displays UNITS SELECT.
2. Press the up ▲ arrow key twice.	**Read only** • Bottom line displays USER INFO SELECT.
3. Press the PRGM key.	**Read only** • Bottom line displays ACCURACY in % of Full Scale.
4. Press the up ▲ arrow key.	**Read only** • Bottom line displays SOFTWARE VERSION NUMBER.
5. Press the up ▲ arrow key.	**Read only** • Bottom line displays the sensor MANUFACTURE DATE.
6. Press the up ▲ arrow key. *If you want to edit AUTO SHUT-OFF values, click the link.*	**Edit** • Top line displays AUTO SHUT OFF • Bottom line displays ENTER TO SELECT.
7. Press the up ▲ arrow key.	**Read only** • Bottom line displays SERIAL NUMBER of the manometer.

Steps	Dual-line display
8. Press the up ▲ arrow key. *If you want to edit LOCKOUT values, click the link.*	**Edit** • Top line displays LOCKOUT CODE • Bottom line displays ENTER TO SELECT.
9. Press the up ▲ arrow key. *If you want to edit HEADER NAME values, click the link.*	**Edit** • Top line displays HEADER NAME • Bottom line displays MERIAM. • The cursor flashes at bottom left.
10. Press the left ◀ arrow key to go back to USER INFO SELECT screen.	**Read only** • Top line displays PROGRAM MODE • Bottom line displays USER INFO SELECT.

Auto Shut-Off

Enabling the Auto Shut-Off feature allows the manometer to turn itself off after you select a period of keypad inactivity.

You can select these options: DISABLED, 10 Minutes (which is the factory shipped default), 20 Minutes, 30 Minutes, 45 Minutes and 60 Minutes.

Note: *If you select DISABLED, you must manually press the On/Off key to shut the unit off.*

Configure auto shut-off

To configure auto shut-off follow these steps:

Steps	Dual-line display
1. From the Measure Mode press the PRGM key.	**Read only** • Top line displays PROGRAM MODE. • Bottom line displays UNITS SELECT.
2. Press the up ▲ arrow key twice	**Read only** • Bottom line displays USER INFO SELECT.
3. Press the PRGM key.	**Read only** • Bottom line displays ACCURACY in % of Full Scale.
4. Press the up ▲ arrow key.	**Read only** • Bottom line displays SOFTWARE VERSION NUMBER.
5. Press the up ▲ arrow key.	**Read only** • Bottom line displays the sensor MANUFACTURE DATE.
6. Press the up ▲ arrow key.	**Edit** • Top line displays AUTO SHUT OFF • Bottom line displays ENTER TO SELECT.

Steps	Dual-line display
7. Press the PRGM key, then the up ▲ or down ▼ arrow keys, until the target shut-off time is displayed.	• Top line displays AUTO SHUT-OFF • Bottom line toggles to **DISABLED, 10, 20, 30, 45**, and **60** minutes .
8. Press the PRGM key.	• Target Auto Shut-Off time is selected. • Top line displays AUTO SHUT-OFF • Bottom line displays ENTER TO SELECT.
9. Press the left ◄ arrow key twice.	Returns to Measure Mode.

NOTICE The **Auto Shut-Off** timer is suspended during Data Logging and Leak Test sessions to prevent accidental loss of information. Auto Shut-Off is automatically re-instated after completion of Data-Logging or Leak Test sessions.

Lockout Select

Enabling the Lockout feature prevents unauthorized users from making changes to the configuration of the manometer. To enter the Program Mode when Lockout is active, the user must first enter the **password** (two-digit Lockout Code) within approximately 40 seconds of the display prompt. Failure to enter the correct two digit code within approximately 40 seconds will return the unit to Measure Mode. Any two-digit numeric code can be programmed. The factory Lockout Code of 00 (which is the default as shipped from the factory) disables the Lockout.

Set the Lockout Code

To set the Lockout Code, follow these steps:

Steps	Dual-line display
1. From Measure Mode, press the PRGM key. ***Note:*** *If the Lockout is set, enter the correct* ***password*** *when prompted.*	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
2. Press the up ▲ arrow key **twice**.	Bottom line displays USER INFO SELECT.
3. Press the PRGM then the up ▲ arrow key **five** times.	• Top line displays LOCKOUT CODE • Bottom line displays ENTER TO SELECT.
4. Press the right ▶ arrow key, then press the up ▲ or down ▼ arrow keys to change the first digit.	• Bottom line displays the old Lockout Code. The cursor flashes at the first position while the value is changed, then the cursor moves to the second position once the right-arrow ▶ key is pressed.
5. Press the right ▶ arrow key to proceed to second digit.	
6. Press the right ▶ arrow key when the target code is set.	• Top line displays LOCKOUT CODE and bottom line displays ENTER TO SELECT. Lockout is activated.
7. Press the left ◀ arrow key twice.	Returns to Measure Mode.

Header name

Follow the steps below to edit the HEADER NAME.

Steps	Dual-line display
1. From Measure Mode, press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
2. Press the up ▲ arrow key **twice**.	Bottom line changes to USER INFO SELECT.
3. Press the PRGM key.	Bottom line displays serial number.
4. Press the down ▼ arrow key.	• Top line displays HEADER NAME • Bottom line displays MERIAM. • The cursor flashes at bottom left.
5. If the header name is correct press, backspace ◄ key. *If you want to edit the Header Name, proceed to **step 7**.*	• Top line displays PROGRAM MODE • Bottom line displays USER INFO SELECT.
6. Press the left ◄ arrow key. ***Note:** This takes you back to **step 1**.*	Returns to Measure Mode.
7. Press the up ▲ or down ▼ arrow keys to set the correct alphanumeric value.	Displays a number between 0 to 9, a letter from A to Z, a slash "/", or a blank space.
8. Press the right ▶ arrow key to accept entry.	Cursor advances one space to right.

Steps	Dual-line display
9. Repeat steps 8 and 9 until the target Header is displayed.	
10. **If an error is made,** press the back arrow ◄ key until the cursor is over the incorrect value. 11. Follow step 8 to correct. 12. Press the right ► arrow key to advance the cursor without changing values.	
13. When the Header is complete, press the PRGM key until the header is accepted.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
14. Press the left ◄ arrow key.	Returns to Measure Mode.

Contrast Select

The CONTRAST SELECT parameter allows the user to adjust the character contrast of the Dual-line display to provide the best visibility for the ambient light conditions.

Adjust the contrast

To adjust the contrast, follow these steps:

Steps	Dual-line display
1. From Measure Mode, press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.

Steps	Dual-line display
2. Press the up ▲ arrow key **three (3)** times.	Bottom line displays CONTRAST SELECT.
3. Press the PRGM key.	• Top line displays CONTRAST ADJUST • Bottom line displays VALUE= (a numeric value).
4. Press the up ▲ or down ▼arrow keys to increase or decrease the contrast value. ***Note:*** *A low number gives maximum contrast and a high number gives minimum contrast.*	LCD lightens or darkens depending on the value set.
5. Press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
6. Press the left ◄ arrow key.	Returns to Measure Mode.

Note: *If an error is made during the contrast adjustment, pressing the ◄key returns the display to the previous contrast setting.*

Data Logging

Pressure measurements

Data Logging can be used to record pressure measurements. Two record modes are supported: automatic and manual.

- In **automatic** mode, a pressure value is captured every 5 seconds for 20 minutes, resulting in 240 stored values.
- In **manual** mode, a pressure value is captured each time the PRGM key is pressed up to 240 values.

Note: *The data collected during a logging session can be viewed upon completion.*

Steps	Dual-line display
1. From Measure Mode, press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
2. Press the up ▲ arrow key four times.	Bottom line displays DATA LOGGING.
3. Press the PRGM key.	• Top line displays DATA LOGGING • Bottom line displays RECORD.
4. Press the PRGM key.	• Top line displays RECORD MODE • Bottom line displays AUTO or MANUAL.
5. Press the PRGM key at AUTO to start automatic logging or at MANUAL to start manual logging mode.	• Top line displays RECORDING X • Bottom line displays XX.XX UNITS. • AUTO records value every 5 seconds. • Manual records value each time PRGM key is pressed.
6. To stop recording values at any time, press the ◄ key.	• Top line displays DATA LOGGING • Bottom line displays RECORD.

Steps	Dual-line display
7. To access recorded values, press the ▲ key.	• Top line displays DATA LOGGING • Bottom line displays VIEW.
8. To view recorded values, press the PRGM key.	• Top line displays DATA LOG: 1 • Bottom line displays the value. Continue pressing the ▲ key to view all values.
9. Press the ◀key 3 times.	Returns to Measure Mode.

NOTICE The **Auto Shut-Off** timer is disabled for Data Logging sessions. Be sure to end the session to re-enable the Auto Shut-Off timer.

Leak Test

The Leak Test feature allows you to determine the leak rate in the pneumatic system being monitored. Once configured, Leak Test monitors the measured pressure over time and displays the leak rate in **pressure units per minute** at the conclusion of the test. The maximum configurable leak test period is 1440 min (1 day). Pressing any key during the leak test aborts the test.

Enable Leak Test

To enable Leak Test follow these steps:

Steps	Dual-line display
1. From Measure Mode, press the PRGM key.	• Top line displays PROGRAM MODE • Bottom line displays UNITS SELECT.
2. Press the down ▼ arrow key twice.	Bottom line displays LEAK TEST
3. Press the PRGM key.	• Top line displays LEAK TEST • Bottom line displays CONFIGURE.
4. Press the PRGM key.	• Top line displays LEAK TEST PERIOD • Bottom X.X MIN.
5. Use the up ▲, down ▼, and right ▶ keys to input test period.	Bottom line displays target period; Example: **20.0 MIN**.
6. Press the PRGM key.	• Top line displays LEAK TEST • Bottom line displays CONFIGURE.
7. Press the up ▲ arrow key once.	• Top line displays LEAK TEST • Bottom line displays PRGM TO START.

Steps	Dual-line display
8. Press the PRGM key.	• Top line displays MIN/MAX pressure values at left or right. • Bottom line displays the current pressure value and units. **At end of test period:** • Top line displays the leak rate in units per minute. • Bottom line displays the live pressure reading.

NOTICE The **Auto Shut-Off** timer is disabled for Leak Test sessions. Be sure to end the session to re-enable the Auto Shut-Off timer.

Re-Calibration

The Manometer can be re-calibrated in the field for zero, span, and linearity. The proper primary standards must be available prior to calibrating the Manometer. These standards should meet the accuracy requirements for your company or industry. Meriam Process Technologies follows the guidelines established by ANSI / NCSL Z540-1-1994 which requires that the primary standard be 4 times more accurate than the unit under test.

The re-calibration is not intended to replace the Factory Lab Calibration Procedure. It is intended to correct the curve fit if the actual sensor characteristics change slightly over time.

For sensors up to 200 psi, Meriam recommends a ± 0.0015 % of reading deadweight tester. For sensors 200 psi and above, a ± 0.0030 % of reading deadweight tester is recommended. If calibrating using inches of water units, be sure to match the reference temperature of water in both the unit under test and the M204. Note that AI type M204 manometers require Absolute referenced dead weight testers or standards for field recalibration. The options are:

- 1-point (within upper 50 % of Full Scale)
- 5-point (nominal values of 0 %, 25 %, 50 %, 75 % & 100 % of Full Scale).
- Restore factory default re-calibration.
- For the 5-Point re-calibration, points 2, 3 and 4 can be adjusted within ± 1 % of reading around the nominal values. Point #5 can be adjusted within -1 % of reading around nominal. Point #1 is fixed.

  For example: *for a 2000 inH2O sensor, Point # 2 (25 %) can be edited from 495 to 505 inH2O. Point #5 (100 %) can be edited from 1980 to 2000 inH2O.*

The unit can only be re-calibrated if the calibration points are within 5 times the accuracy of the original factory calibration (e.g. at 0.05 % accuracy, the point limit is ± 0.25 % of Full Scale). If the re-calibration procedure generates a new value outside this limit the procedure fails. In this case the unit would need to be returned to the factory for service.

Once a re-calibration has been performed (either 1-point or 5-point) the unit continues to allow future re-calibrations only with that type of re-calibration. In order to enable the other re-calibration type, the user must first **Restore Factory Defaults** and then choose the desired re-calibration method.

Re-Calibration – 1 Point EDIT and START

To perform a 1-point re-calibration, apply a pressure between 50 % and 100 % of Full Scale and then follow these steps:

Steps	Dual-line display
1. With unit OFF, press and hold the MIN/MAX key, turn the unit on by pressing the ON/OFF key, then release MIN/MAX.	• Top line displays RE-CAL. • Bottom line displays EDIT.
2. Press the up ▲ arrow key until START is displayed on the bottom line.	• Top line displays RE-CAL. • Bottom line displays START.
3. Press the PRGM key.	• Top line displays RE-CAL START. • Bottom line displays 1-POINT.
4. Press the PRGM key.	• Top line displays CAL POINT • Bottom line displays the cal point value.
5. Press the up ▲or down ▼arrow keys to edit the selected digit. Use the left ◄ or right ► arrow keys to change the cursor position. Value entered must be 50 % to 100 % of FS.	• Bottom line displays the cal point value. The cursor flashes at the first position while the value is changed, then moves to the right position when the right ► arrow key is pressed.

Steps	Dual-line display
6. Press the right ▶ arrow key while on the right most digit to proceed.	• Top line displays APPLY: • Bottom line displays the CAL POINT value.
7. Apply the input pressure indicated using an appropriate reference standard; press PRGM key.	• Top line displays RE-CAL. • Bottom line displays START, Manometer has been recalibrated.
8. Press the left ◀ arrow key.	Returns to Measure Mode

Re-Calibration – 5 Point EDIT

To edit the calibration points for a 5 Point re-calibration follow the steps below.

Note: *If the factory default values are acceptable, skip this section and proceed to the re-calibration 5-Point START procedure.*

Steps	Dual-line display
1. With unit OFF, press and hold the MIN/MAX key, turn the unit on using the ON/OFF key, then release	• Top line displays RE-CAL. • Bottom line displays EDIT.
2. Press the PRGM key.	• Top line displays CAL POINT 1. • Bottom line displays the cal point value. ***Note:*** *This point displays but cannot be edited.*
3. Press the PRGM key.	• Top line displays CAL POINT 2. • Bottom line displays the cal point value.
4. Press the up ▲ or down ▼ arrow keys to edit the selected digit. Use the left ◄ or right ► arrow keys to change the cursor position.	• Bottom line displays the cal point value. The cursor flashes at the first position while the value is changed, then moves to the right position when the right ► arrow key is pressed.
5. Press the right ► arrow key while on the right most digit to proceed to the next point.	• Top line displays CAL POINT 3. • Bottom line displays the cal point value.

Steps	Dual-line display
6. Repeat steps 4 and 5 for CAL POINTS 3, 4 and 5.	• Top line displays CAL POINT 2/3/4/5. • Bottom line displays the CAL POINT value.
7. After editing CAL POINT 5 press the right ▶ arrow key while on the right most digit to proceed.	• Top line displays RE-CAL. • Bottom line displays EDIT.
8. To perform the 5-point RE-CAL, press the up ▲ arrow key until START is displayed on the bottom line. OR To exit without performing the 5-point re-cal press the left ◀ arrow key	• Top line displays RE-CAL. • Bottom line, START. • Continue with 5-Point Re-calibration procedure at step 4 on next page. OR • Returns to Measure Mode.

Re-Calibration – 5 Point START

To begin the 5-point re-calibration procedure, turn the unit OFF and follow the steps below.

Steps	Dual-line display
1. Press and hold the MIN/MAX key and turn the unit on by pressing the ON/OFF key.	• Top line displays RE-CAL. • Bottom line displays EDIT.
2. Press the up ▲ arrow key until START is displayed on the bottom line.	• Top line displays RE-CAL. • Bottom line displays START.

Steps	Dual-line display
3. Press the PRGM key.	• Top line displays RE-CAL • Bottom line displays 1-POINT.
4. Press the up ▲ arrow key until 5-POINT is displayed on the bottom line.	• Top line displays RE-CAL START. • Bottom line displays 5-POINT.
5. Press the PRGM key.	• Top line displays POINT 1 – ZERO: • Bottom line displays live applied pressure.
6. Vent P1 and P2 ports to atmosphere and simultaneously press the MIN/MAX and HOLD keys, then release.	• Unit takes new zero. Top line displays POINT 1 - ZERO: • Bottom line displays live applied pressure. POINT 1 has been taken.
7. Press the right ▶ arrow key while on the right most digit to proceed.	• Top line displays POINT 2 - APPLY:. • Bottom line displays the cal point value to apply.
8. Apply the indicated calibration point pressure using external pressure standards. After pressure is stable, press the right ▶ arrow key.	• Top line displays POINT 3 - APPLY:. • Bottom line displays the cal point value to apply.
9. Repeat step 8 for CAL POINTS 4 and 5.	• Top line displays POINT 4/5 - APPLY • Bottom line displays the cal point value.

Steps	Dual-line display
10. Use up ▲ or down ▼ arrow keys to select NO or YES when asked SAVE? the Re-Calibration data.	• Top line displays SAVE?. • Bottom line displays NO or YES.
11. Press the PRGM key at YES to save the Re-Calibration data or at NO to exit without saving.	• Top line displays RE-CAL. • Bottom line displays START. • Re-cal is complete.
12. Press the left ◄ arrow key.	Returns to Measure Mode.

Re-Calibration – Restore Factory Defaults

To restore the re-calibration data to the factory defaults, follow these steps:

Steps	Dual-line display
1. With unit OFF, press and hold the MIN/MAX key, turn the unit on using the ON/OFF key, then release.	• Top line displays RE-CAL. • Bottom line displays EDIT.
2. Press the up ▲ arrow key twice.	• Top line displays RE-CAL. • Bottom line displays RESTORE DEFAULTS.
3. Press the PRGM key.	• Top line displays RESTORE DEFAULTS. • Bottom displays YES or NO.
4. Use the up ▲ and down ▼ arrow keys to select YES or NO when asked to restore defaults.	• Top line displays RESTORE DEFAULTS. • Bottom displays YES or NO.
5. Press the PRGM key at YES to restore the Factory Default Calibration data or at NO to exit without restoring.	• Top line displays RE-CAL. • Bottom line displays RESTORE DEFAULTS. Factory defaults have been restored.
6. Press the left ◄ arrow key.	Returns to Measure Mode.

Specifications

Accuracy 0.050 %

Type, Range, and Display Resolution

Model number	Pressure range			Display
Absolute Isolated				
ZM204-AI0017-1	17 psi		(900 mmHg)	XX.YYY
ZM204-AI0038-1	38 psi		(2000 mmHg)	XX.YYY
ZM204-AI0100-1	100 psi		(52000 mmHg)	XXX.YY
ZM204-AI1000-1	1000 psi		(52000 mmHg)	XXXX.Y
Differential Non-Isolated				
ZM204-DN0010-1	10" H2O		(0.35 psi)	XX.YYY
ZM204-DN0028-1	28" H2O		(1.00 psi)	XX.YYY
ZM204-DN0200-1	200" H2O		(7.21 psi)	XXX.YY
ZM204-DN0415-1	415" H2O		(15.00 psi)	XXX.YY
ZM204-DN2000-1	2000" H2O		(72.10 psi)	XXXX.Y
Compound Isolated				
ZM204-CI0015-1	–15 psi	to	15 psi	XX.YYY
ZM204-CI0030-1	–15 psi	to	30 psi	XX.YYY
ZM204-CI0050-1	–15 psi	to	50 psi	XX.YYY
ZM204-CI0100-1	–15 psi	to	100 psi	XXX.YY
ZM204-CI0300-1	–15 psi	to	300 psi	XXX.YY
ZM204-CI0500-1	–15 psi	to	500 psi	XXX.YY
ZM204-CI1000-1	–15 psi	to	1000 psi	XXXX.Y
ZM204-CI3000-1	–15 psi	to	3000 psi	XXXX.Y
Differential Isolated				
ZM204-DI0001-1	1 psi		WET–WET	X.YYYY
ZM204-DI0005-1	5 psi		WET–WET	X.YYYY
ZM204-DI0015-1	15 psi		WET–WET	XX.YYY
ZM204-DI0030-1	30 psi		WET–WET	XX.YYY
ZM204-DI0100-1	100 psi		WET–WET	XXX.YY
ZM204-DI0300-1	300 psi		WET–WET	XXX.YY
ZM204-DI0500-1	500 psi		WET–WET	XXX.YY

Accuracy 0.025 %

Type, Range, and Display Resolution

Model number	Pressure range			Display
Absolute Isolated				
ZM204-AI0017-2	17 psi		(900 mmHg)	XX.YYY
ZM204-AI0038-2	38 psi		(2000 mmHg)	XX.YYY
ZM204-AI0100-2	100 psi		(52000 mmHg)	XXX.YY
ZM204-AI1000-2	1000 psi		(52000 mmHg)	XXXX.Y
Differential Non-Isolated				
ZM204-DN0028-2	28" H2O		(1.00 psi)	XX.YYY
ZM204-DN0200-2	200" H2O		(7.21 psi)	XXX.YY
ZM204-DN0415-2	415" H2O		(15.00 psi)	XXX.YY
ZM204-DN2000-2	2000" H2O		(72.10 psi)	XXXX.Y
Compound Isolated				
ZM204-CI0015-2	–15 psi	to	15 psi	XX.YYY
ZM204-CI0030-2	–15 psi	to	30 psi	XX.YYY
ZM204-CI0050-2	–15 psi	to	50 psi	XX.YYY
ZM204-CI0100-2	–15 psi	to	100 psi	XXX.YY
ZM204-CI0300-2	–15 psi	to	300 psi	XXX.YY
ZM204-CI0500-2	–15 psi	to	500 psi	XXX.YY
ZM204-CI1000-2	–15 psi	to	1000 psi	XXXX.Y
ZM204-CI3000-2	–15 psi	to	3000 psi	XXXX.Y
Differential Isolated				
ZM204-DI0001-2	1 psi		WET–WET	X.YYYY
ZM204-DI0005-2	5 psi		WET–WET	X.YYYY
ZM204-DI0015-2	15 psi		WET–WET	XX.YYY
ZM204-DI0030-2	30 psi		WET–WET	XX.YYY
ZM204-DI0100-2	100 psi		WET–WET	XXX.YY
ZM204-DI0300-2	300 psi		WET–WET	XXX.YY
ZM204-DI0500-2	500 psi		WET–WET	XXX.YY

Note: Why are the available units different between a 15-psi and 100-psi?

If a given engineering unit cannot display the correct number of digits, the M204 automatically advances to the next displayable unit.

Accuracy: M204

Pressure measurements

± 0.05 % of Full Scale or optional ± 0.025 % of Full Scale

(± 0.05 % FS only for M204-DN0010-1 [10" H2O range])

Accuracy statements include the combined effects of linearity, repeatability, hysteresis and temperature over the specified operating temperature range.

- Warm up time = 5 minutes.

Unit should be zeroed at working ambient temperature before use.

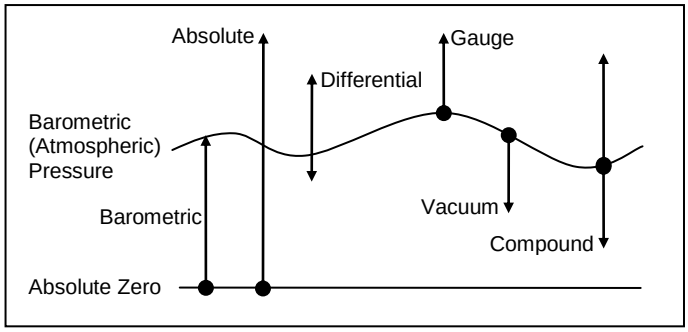
Overrange limit

Overrange pressure or temperature means the value is outside the calibrated upper or lower range.

- Above 100 %, the red backlight turns on automatically.

  Above 120 %, the red backlight turns on and displays OVER RANGE in place of pressure reading.

Pressure Reference Chart



Temperature: M204

Storage: –40 °C to 60 °C (–40 °F to 140 °F)

Operating: –20 °C to 50 °C (–4 °F to +122 °F)

Media Compatibility

Pressure Types

- DN: Differential pressure, non-isolated sensors for use with clean, dry, non-corrosive gases only.
- DI: Differential pressure, isolated sensors for use with gases and liquids compatible with 316L SS and Viton o-rings
- CI, AI: Compound or Absolute pressure sensors for use with gases and liquids compatible with 316L SS

Pressure Limits

- CI and AI units: 2x range
- DN units: 2x range when pressurized on high side only. 150 psi (10.5 Kg/cm^2) static when applied to both sides of sensor simultaneously.
- DI units: 1000 psi common mode, P1 (HI) only is 3x range, P2 (LO) only is 3x range or 150 PSI, whichever is less.

Battery Type

4 each AA alkaline batteries of the same battery type.

Remove and / or replace batteries in non-hazardous areas only.

Battery Operation

> 100 hours continuous use, 1 year shelf life, auto power off programmable at Disabled, 10, 20, 30, 60 or 90 minutes.

Enclosure

6.9" × 3.8" × 2.3" Polycarbonate, Permanently Static Dissipative, ESD Protection.

Enclosure with Boot

7.2" × 4.2" × 2.5"

Changing the Batteries

DANGER Remove and / or replace batteries in non-hazardous areas only. Also see the Certification and the Safety Warnings section of this manual for additional important information.

Low battery condition

- The manometer is powered by four, 1.5 volt AA size batteries. When the output of the batteries under load drops, the display alternates between LOW POWER DETECT and REPLACE BATTERY.
- Low power may affect performance. The unit should not be used to measure pressure in this condition. All four batteries should be replaced.

Replace batteries

1. To replace the battery locate the battery compartment at the bottom rear of the M204. See the figure below.

2. Remove the two screws on either side of the battery cover by turning them counterclockwise until they are fully disengaged from the M204 base.
3. Lift the cover from the back of the unit.
4. Remove the batteries by pulling the positive side first straight out of the battery compartment. Note the positive (+) and negative (-) battery polarity markings at the bottom of the compartment. See the figure below.

5. To install the four batteries:
   a. Make sure polarity of battery matches the markings in the compartment.
   b. Place the (+) end of the battery into the battery slot.
   c. Push in the (-) end of the battery until seated in the bottom of the battery slot.

   Note: *The battery compartment has stand offs molded into the side of the compartment. When a battery is installed with the polarity reversed, the stand offs prevent the negative battery terminal from contacting the positive terminal in the battery compartment. The unit does not turn on when a battery is installed this way. Should this happen, simply reverse the battery to align the polarity.*
6. With the batteries secured in the battery compartment, replace the compartment cover. The cover has only one correct alignment.

⚠WARNING Do not open in explosive atmosphere

Note: *The WARNING DO NOT OPEN IN EXPLOSIVE ATMOSPHERE statement on the battery cover must be visible and aligned in the middle of the M204 case.*

7. To secure the cover, torque the screws clockwise to 1.6 to 1.8 in-lbs. Do not over tighten.

NOTICE To prevent internal damage to circuitry, do not substitute screws with lengths that are different from the screws Meriam provided you.

Connections

Connection: 1/8" female NPT, 316L SS.

- P1 is the high pressure connection.
- P2 is the low pressure connection.

The pressure connections are marked in two locations, identified as P1 and P2.

- One location is the top of the keypad (shown on page 1).
- The second marking is stamped into the pressure manifold, next to the pressure connections, as shown below.

DN or DI

CI or AI

Notes:

- P1 is the high pressure connection
- P2 is the low pressure connection for DN and DI units (P2 is plugged at factory for CI and AI units.
- Do not remove a factory installed P2 plug.)

CI and AI models use only the P1 pressure port. The unused P2 port vents the enclosure to atmosphere (a vent plug is factory installed in the P2 port).

NOTICE

- Connecting to the incorrect pressure port on DN or DI differential pressure modules may cause damage to the pressure sensor.

  Note: *See Overrange limit in the section called Specifications concerning overrange pressure limits. If over pressure damage occurs, you must return the unit to the factory for sensor replacement.*

- You must use a wrench on the pressure manifold when installing user's 1/8" NPT fitting.

- Do not tighten the fitting without using a wrench on the pressure manifold. Failure to use a wrench on the manifold damages the plastic enclosure and voids warranty. Do not apply torque to the manifold with respect to plastic enclosure.
- Do not over tighten.

Help

Returning for repair or calibration

If the M204 cannot be zeroed, recalibrated or is damaged, it must be returned to the factory for servicing. In this case, contact the Meriam Process Technologies representative in your area or call the factory at the numbers listed below for a Return Material Authorization (RMA) number.

First — Request a Number

In the event that an M204 requires service and must be returned, please contact Meriam using one of the methods listed in the following table to request a **Return Material Authorization (RMA)** number:

Method	Information	
Website	http://www.meriam.com/resources/service-repair-authorization/ Complete the information online and submit the form.	
Fax	If you printed and completed the Service & Repair Authorization form, then fax it to:	
	US and International Customers	**+ 1 216 281 0228**
E-mail	We need the following information in the email: • Look on the product label to find the model number & the serial number. • Give a brief description of the problem. • Send the e-mail to: returnforms@meriam.com	

Return Material Authorization

Do not send any unit for repair unless you contacted Meriam for a Return Material Authorization (RMA) number.

Important: If you have not received this number and have not clearly marked it on the package being shipped back, we will return the unit at your expense.

The Meriam Service & Repair Department will provide you with this number when you complete the website form, fax or e-mail your information.

An RMA number must accompany all incoming packages to insure proper tracking, processing, and repair work.

Questions? Call Meriam

US Customers

(800) 817-7849

International customers

+ 1 216 281 1100

Ship the box to

Meriam

10920 Madison Avenue

Cleveland, Ohio 44102

USA

Meriam Contact Information

Address

Meriam
10920 Madison Avenue
Cleveland | Ohio | 44102 | USA

Telephone

US customers (800) 817-7849

International customers + 1 216 281 1100

Fax

US & International customers + 1 216 281 0228

E-mail addresses

Return Material Authorization / Service & Repair Department

returnforms@meriam.com

Sales

sales@meriam.com

Website

meriam.com

Find a local Meriam representative

Use this map to help you find a Meriam representative.

http://www.meriam.com/representatives-map/

Appendix 1: M204-DI Application Notes

Zeroing for Position Sensitivity

M204-DI (wet/wet) units have liquid filled, sealed sensor assemblies. The fill fluid applies hydrostatic head pressure to the DP sensor in uniform ways depending on the orientation of the handheld during measurement sessions.

- Horizontal plane (yaw axis): No zero offset
- Vertical plane (pitch axis): No zero offset

Roll axis: Zero offset occurs

When the unit is rotated about its roll axis in the horizontal plane or any less-than-vertical plane, the fill fluid in the highest side imparts a greater hydrostatic pressure to the DP sensor. The result is a zero offset in either the + or – direction depending on the roll direction.

Zeroing with no pressure applied to P1 or P2 ports

Place the unit in the orientation it will be used in when making measurements. Then use the Zero function keys to null out the position effect on zero. Measurement stability is excellent at any fixed position.

M204-DI0001 and M204-DI0005 ranges

These ranges are most sensitive to roll axis position because the affect is a greater percentage of full scale range than in higher ranges. Small changes in position about the roll axis appears on the display as significant pressure changes. Therefore, these two ranges need to be held still while taking measurements or they may need to be placed on a bench or other stationary support prior to making measurements.

Zeroing for Static Pressure Effect on Zero

M204-DI models are available in measurement ranges from 1 to 500 PSI for common mode static pressures up to 1000 PSI. The zero reading on these units is linearly offset by the static pressure of the service. This offset is easily zeroed out using the zero function. Meriam recommends applying normal static pressure to the subject DI model using a 3-valve equalizing manifold to properly pressurize the M204-DI. The DI model should be zeroed under normal static pressure conditions, with the equalizing valve open (common mode pressure on P1 and P2 ports), to assure proper zeroing.