

Instruction Manual

μmaxμm® II



Digital Indicator

Document Part No. 2249001 Rev. C

- 0 +



EXACTLY

These instructions cover the following μ Max μ m II Digital Indicators:

μ Max μ m[®] II Standard Model

NOTE: Features available for the Standard Version are noted with this symbol “[S]” where applicable throughout this manual. Advanced features are not included.

Part	Description	Stem Diameter	Stem Length
2034101	Standard Version	0.375in	0.46in
2034103	Standard Version	0.375in	1.5in
2034105	Standard Version	8mm	11.68mm
2034107	Standard Version	8mm	38.1mm

Range = ± 0.040 in / ± 1.0 mm

For model number ordering assistance see the product catalog or call:

1-800-343-2050

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1.0 Precautions and General Information

All μ Max μ m II Series Models:

μ Max μ m II (Micro-Maxum) Series Models are ruggedly built to withstand hard use, and their gasketed case, crystal and stem assemblies resist encroachment by most fluids. However, μ Max μ m II Series Models should never be immersed. Regularly inspect all seals to guard against fluid penetration.

NOTE: *To prevent contaminate from entering the 4-pin digital output connector, the output cover should always be firmly in place whenever an output cable is not connected.*

All μ MaxumII style indicators are covered in this manual.

2.0 Product Features

2.1 Hardware Display

Rotating Bezel

Allows rotation through 270° for ease of reading.

Power Management

The μ Maxum II also makes use of an auto power down feature. If it senses 15 minutes of inactivity (i.e. no spindle movement, no buttons pushed, and no data output requests), the unit will turn itself off.

Range Signal

Notifies an “off-scale” condition when the digital range is exceeded. The digital display will turn off and the analog left or right arrow will be left on.

2.2 Control Features

Makes use of three push buttons (inch/mm, M/OFF, ZERO/ON).

NOTE: *If the unit is configured with a lockout feature, it will prompt the operator for a factory set password.*

inch/mm (Hold)

Normal Operation [S]: Allows the selection of inch or metric display any time a reading is present.

Dynamic Operation : Toggles between hold and resume of the displayed reading.

M/OFF (Data)

Normal Operation [S]: Used to turn the unit “OFF”, send data, and for entering Setup Mode. The M/OFF button must be held down for a minimum of 3 seconds to turn the unit “OFF”. A quick press sends the displayed reading to the Output Port.

Dynamic Operation: Cycles through Difference Mode Data Collection.

ZERO/ON (Reset)

Normal Operation [S]: This button is used to turn the unit “ON”. It is also used to electronically set the analog display to its mid-point and set the digital display to zero or a preset value (if used).

Dynamic Operation: Used to reset and restart a **min, max, TIR** Dynamic Measurement.

SWITCHABLE RESOLUTION (Mode M13) [S]

Resolution can be selected per the resolution table Ref: (Section 5.5, page 21). From 0.00001in to 0.01in (0.0002 to 0.2mm) depending on the indicator unit.

MULTIPLIER (Mode M3)

Allows the indicator to display a reading that is a multiple of the scale movement. Any multiplier from 00.001 to 99.999 may be entered to satisfy ratio type applications. For example, if the multiplier is 2.00000, and the scale is moved 0.10000, the unit will display 0.200.

Multipliers less than 1.000

Using a multiplier less than 1 (one) will reduce the displayed resolution. For example: given a multiplier of 0.01 and a resolution of 0.0001, the digital display will convert the scale location of 0.1575 to 0.0016.

Additional resolution selections are available that allow the user to display a smaller resolution than that provided by the scale. Using the previous example with a resolution of 0.00001, the display value will be 0.00158, preserving more of the indicator's resolution.

Non-Integer Multiplier

A non-integer multiplier will also cause the count size to be different from the resolution. Normally, the least significant digit changes by the resolution. When a multiplier of 11.3333 is used with a resolution of 0.00005, the step size will be 0.00057. It is recommended that the resolution be greater than the step size. For our example we would suggest 0.001.

Multipliers greater than 1.000:

Using a multiplier greater than 1 (one) will increase the display resolution. For example, given a multiplier of 10.000 and a resolution of 0.0001, the digital display will convert the scale location of 0.1575 to 1.5750. In this case, the least significant digit will be created by the multiplication and not from the scale. In this case, the resolution should be changed until the least significant digit is derived from the scale. In the example, the resolution should be changed to 0.001. With this resolution, the digital readout will display 1.575.

LOCKED MULTIPLIER

The indicator can be set to lock out the multiplier used in setup mode. This function is factory locked out (default unlocked multiplier entry).

LOCKED CALIBRATION (μ Max μ m II only) [P]

The calibration mode is locked and accessible using the entry of a factory password (default: unlocked Calibration Mode).

AUTO POWER DOWN DISABLED

Disables the indicator's power down function. The indicator can only be powered down by use of the "M/OFF" button (default: Auto-Power Down Enabled).

NOTE: No Auto-Power Down:

Standard units automatically power down after 15 minutes of inactivity: i.e. no spindle movement, no buttons pushed and no data output requests. Selection of this option will disable the Auto-Power Down feature so that the unit remains on until manually turned off. This feature may reduce the battery life depending on usage.

3.0 Inspection

The μ Max μ m II indicator is shipped without batteries installed. Refer to Section 7.0 for battery installation instructions. After batteries have been installed, turn the unit on by pressing the **ON** button.

5.0 Setup Mode

All μ Max μ m II style indicators are covered in this manual.

NOTE: *If the unit is configured with a lockout feature, a prompt to enter a 4 digit numeric password will appear. Only the Setup and Calibration modes are accessible by entering the correct password. All other locked features are not accessible.*

Entering the setup modes is accomplished by pressing and holding the M/OFF button and then press and release the inch/mm button. The M1 icon will be displayed. Then press and release the M/OFF button until the desired Mx icon is displayed in the lower left corner of the LCD display.

The μ Maxum II sequences through several setup modes identified on the display by M1, M2, M12, M23, M13, (M3, M1X1, M2X1, M3X1) and M123 icons. The icon's are located on the lower part of the display to identify the selected setup mode.

Setup Modes - Standard Model

- M1** signifies Measurement Direction / Analog Scale Magnification **[S]**
- M2** signifies Preset Entry Mode **[S]**
- M12** signifies Limit #1 Tolerance Entry Mode **[S]**
- M23** signifies Limit #2 Tolerance Entry Mode **[S]**
- M13** signifies Digital Resolution Selection Mode **[S]**

Setup Modes - Advanced Model

- M1** signifies Measurement Direction / Analog Scale Magnification **[S]**
- M2** signifies Preset Entry Mode **[S]**
- M12** signifies Limit #1 Tolerance Entry Mode **[S]**
- M23** signifies Limit #2 Tolerance Entry Mode **[S]**
- M13** signifies Digital Resolution Selection Mode **[S]**
- M3** signifies Multiplier Mode
- M1 X1** signifies Difference mode operation
- M2 X1** signifies Dynamic mode operation
- M3 X1** signifies Data output operation
- M123** signifies Calibration Mode

5.1 Changing Measurement Direction (M1) [S]

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 1).

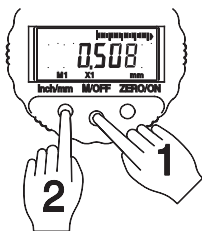


Figure 1 - Entering the Set-Up Mode

- 2) Press and release **ZERO/ON** to select the desired measurement direction signified by the “R” icon for reverse mode and no icon for the normal mode (Figure 2).

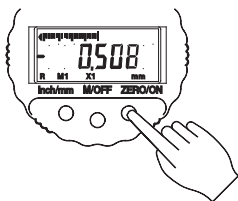


Figure 2 - Changing Measurement Direction

- 3) Press and release **M/OFF** until it returns to the gaging mode. No “Mx” icon is displayed. Where “x” could be 1, 2, 3, 12, 23, etc.

5.2 Changing Analog Magnification (M1) [S]

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).

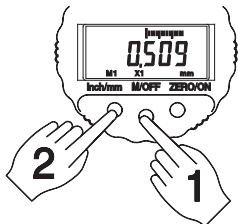


Figure 3 - Entering the Set-Up Mode

- 2) Press and release **inch/mm** to select the desired Analog Magnification signified by the X1, X5, X10, X50, or no icon (blank) - no scale displayed (Figure 4).

Display Icon	uMaxum//	
	± Full Scale (in/mm)	Grad Value (in/mm)
no icon	bar graph disabled	
X1	0.040 / 1.00	0.0020 / 0.050
X5	0.020 / 0.20	0.0010 / 0.010
X10	0.010 / 0.10	0.0005 / 0.005
X50	0.002 / 0.02	0.0001 / 0.001

- 3) Press and release **M/OFF** until it returns to the gaging mode. No "**Mx**" icon is displayed. Where "**x**" could be 1, 2, 3, 12, 23, etc.

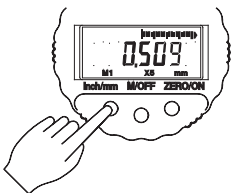


Figure 4 - Changing Analog Magnification

5.3 Entering a Preset (M2) [S]

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
- 2) Press and release **M/OFF** once to enter the Preset Mode (**M2** appears in the lower left corner of the display) (Figure 5).
- 3) A cursor appears above the leftmost digital position for the sign. Press and release **ZERO/ON** to toggle between “-” and blank “+”.

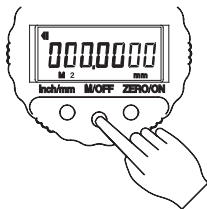


Figure 5 - Entering the Preset

- 4) Press and release **inch/mm** to move the cursor to the position above the digital character to be changed. Continuous use of inch/mm will cause the cursor to move one space at a time to the right and then begin again at the leftmost position (Figure 6).

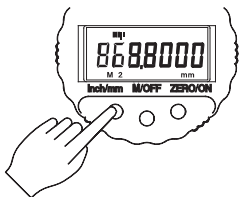


Figure 6 - Moving the Cursor Position

- 5) To select and change the digital value, position the cursor above the digit location to be changed. Press the **ZERO/ON** to select the digital value. Press and release the **ZERO/ON** key to advance to the available digits of 0 through 9 (Figure).

NOTE: Continuous use of this key will cause the digits to repeat.

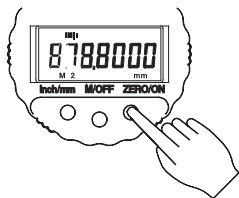


Figure 7 - Entering Preset Value

NOTE: There are two ways to clear the PRESET VALUE to zero. One way is to set each digit value to zero or, (to simultaneously clear all digits) press and hold the inch/mm and then press and release ZERO/ON.

- 6) Press and release **M/OFF** until it returns to the gaging mode. No “**Mx**” icon is displayed. Where “**x**” could be 1, 2, 3, 12, 23, etc.

5.4 Entering Tolerances (M12, M23) [S]

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
- 2) Press and release **M/OFF** to display the **M2** icon (Figure 5).
- 3) Press and release **M/OFF** to display the **M12** icon signifying that the unit is in the limit #1 tolerance entry mode. A cursor appears above the leftmost digital position (Figure 8).

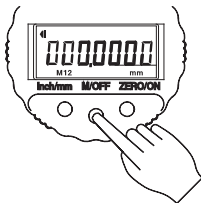


Figure 8 - Entering Tolerances (Limit #1)

5.5 Changing Digital Resolution (M13) [S]

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
- 2) Continue to press and release **M/OFF** until the **M13** icon is displayed, signifying the unit is in the selectable resolution mode.
- 3) Press and release **inch/mm** to toggle through the menu of available resolutions. See the following table:

	<i>μMaxμm/l</i>
<i>RESOLUTION</i>	±0.040in / ±1.0mm
<i>(in / mm)</i>	
0.01 / 0.2	
0.005 / 0.1	
0.002 / 0.05	
0.001 / 0.02	•
0.0005 / 0.01	•
0.0002 / 0.005	•
0.0001 / 0.002	•
0.00005 / 0.001	•
0.00002 / 0.0005	•
0.00001 / 0.0002	•

Digital Resolution Table

- 4) Press and release **M/OFF** until it returns to the gaging mode. No "**Mx**" icon is displayed. Where "**x**" could be 1, 2, 3, 12, 23, etc.

5.6 Multiplier Entry (M3)

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
- 2) Continue to press and release **M/OFF** until the **M13** icon is displayed, signifying the unit is in the selectable resolution mode.
- 3) Press and hold **M/OFF** for 2 seconds until the M3 icon appears signifying that the unit is in the Multiplier Mode. (Figure 10) (Default Value 1.000).

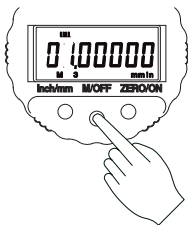


Figure 10 - Multiplier Mode

- 4) Position the cursor by pressing and releasing **inch/mm** and moving the cursor to a position above the character to be changed (Figure 11).



Figure 11 - Position the Cursor

- 5) Change the selected character by pressing and releasing **ZERO/ON** (Figure 12).

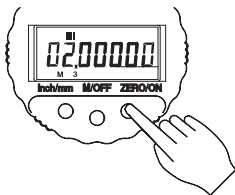


Figure 12 - Changing the Digital Character

- 6) To return to the gaging mode, press and release **M/OFF** once. If a multiplier other than 01.000 has been entered, an “**M**” will be visible in the display (Figure 13).



Figure 13 - Multiplier Ratio

5.7 Changing Operation to Difference Mode (M1 X1)

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
- 2) Continue to press and release **M/OFF** until the **M13** icon is displayed, signifying the unit is in the selectable resolution mode.
- 3) Press and hold **M/OFF** for 2 seconds until the **M3** icon appears signifying that the unit is in the Multiplier Mode (Default Value 1.000).

5.8 Changing to Dynamic Max, Min or TIR Operation (M2 X1)

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
- 2) Continue to press and release **M/OFF** until the **M13** icon is displayed, signifying the unit is in the selectable resolution mode.
- 3) Press and hold **M/OFF** for 2 seconds until the **M3** icon appears signifying that the unit is in the Multiplier Mode (Default Value 1.000).
- 4) Press and release the **M/OFF** button until the display shows the **M2 X1** icon. The display shows the current setting.

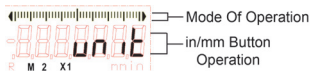


Figure 17 - Mode of Operation Select Display

The indicator arrives in the live static mode of operation. This is indicated by the full analog bargraph as shown above. There are four selections available all determined by the analog bargraph format. The four selections are:

- a live static display of the reading (normal)
 - a dynamic maximum of the reading (max)
 - a dynamic minimum of the reading (min)
 - a dynamic (max-min) of the reading (TIR)
- 5) Press and release the **ZERO/ON** button to sequence through the four modes of operation options:



Normal Mode

max Mode

Bargraph Indicates:

min Mode

TIR Mode

Figure 18 - Max, Min and TIR Modes

- Operating mode set to dynamic maximum reading. This is indicated by the partial bargraph segments from the center to the right.
 - Operating mode set to dynamic minimum reading. This is indicated by the partial bargraph segments from the center to the left.
 - Operating mode set to dynamic TIR reading. This is indicated by the partial bargraph segments from the center to the left and right.
- 6) Once selected, press and release the **M/OFF** button to advance to the next menu option. To exit the Setup mode press and release the **M/OFF** button until it returns back to the gaging mode (no **M** icon is displayed - the **M** icon is displayed in Gaging Mode if a multiplier is set).

5.9 Changing Dynamic Hold Operation (M2 X1)

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
- 2) Continue to press and release **M/OFF** until the **M13** icon is displayed, signifying the unit is in the selectable resolution mode.
- 3) Press and hold **M/OFF** for 2 seconds until the **M3** icon appears signifying that the unit is in the Multiplier Mode (Default Value 1.000).
- 4) Press and release the **M/OFF** button until the display shows the **M2 X1** icon. The display shows the current setting.

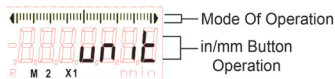


Figure 19 - Mode of Operation Select Display

The indicator arrives so that the units are selectable by using the inch/mm button. The inch/mm button may be disabled and re-assigned to the Hold function. The Hold function is used to freeze a reading on the display.

- 5) Press and release the **inch/mm** button to enable the hold function. The display shows the new setting.

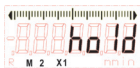


Figure 20 - hold Display

The selection is toggled to assign the inch/mm button for the Hold function or for changing the units in the gaging mode.

- 6) Once selected, press and release the **M/OFF** button to advance to the next menu option. To exit the Setup mode press and release the **M/OFF** button until it returns back to the gaging mode (no **M** icon is displayed unless multiplier factor is other than 1.000).

5.10 Changing Data Output Configuration (M3 X1)

- 1) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
- 2) Continue to press and release **M/OFF** until the **M13** icon is displayed, signifying the unit is in the selectable resolution mode.

- 3) Press and hold **M/OFF** for 2 seconds until the **M3** icon appears signifying that the unit is in the Multiplier Mode (Default Value 1.000).
- 4) Press and release the **M/OFF** button until the display shows the **M3 X1** icon. The display shows the current setting.

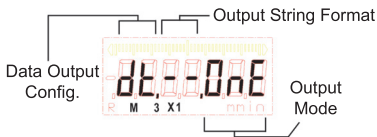


Figure 21 - Data Output Configuration - displays current setting

The indicator arrives set for a single reading data output triggered by the **M/OFF** button. The reading is the value shown on the display and does not include the internal serial number in the output.

- 5) Press and release the **inch/mm** button to include the indicators serial number in the data output. The display shows the new setting.



Figure 22 - New Setting Display

The selection is toggled using the inch/mm button.

- 6) Press and release the **ZERO/ON** button to enable the continuous data output mode. The display shows the new setting.



Figure 23 - Continuous Data Output Mode displays new setting

The selection is toggled using the ZERO/ON button.

NOTE: The continuous output operation may inhibit use of certain data collection cables, devices, or software.

5.11 Calibration Mode (M123) [S]

- 1) Fit the indicator into a calibration device so that it is “on-scale”. The indicator should remain “on-scale” throughout calibration. Select the inch or metric units while in the gaging/measurement mode.
- 2) To enter Calibration Mode from the Gaging/Measurement Mode:
 - a) Simultaneously press and hold **M/OFF** (1), then quickly press and release **inch/mm** (2) once to enable the setup mode. (**M1** icon appears in the lower left corner of the LCD) (Figure 3).
 - b) Press and release **M/OFF** to enter **M2**, Preset Mode.
 - c) Again, press and release **M/OFF** to enter M12, Limit #1 Tolerance Entry Mode.
 - d) Again, press and release **M/OFF** to enter M23, Limit #2 Tolerance Entry Mode.
 - e) Again press and release **M/OFF** to enter M13, Resolution Mode.
 - f) Press and hold **M/OFF** for 2+ seconds until M3 is displayed.
 - g) Press and release **M/OFF** to enter the M1 X1.
 - h) Press and release **M/OFF** to enter the M2 X1.
 - i) Press and release **M/OFF** to enter the M3 X1.

j) Press and hold **M/OFF** for 2+ seconds until M123 is displayed.

M123 is the Calibration Mode.

The unit will be in the True Spindle Position Mode.

3) Mechanically position the indicator to read zero against a zero master or reference and lock into place. Make sure indicator reads exactly zero.

The calibration min prompt is indicated by the analog bargraph segments displayed on the left. (refer to Figure 24).



Figure 24 - Calibration Min Step Display

- 4) Replace the zero reference with the min reference to displace the indicator to -.030 for inch mode.
 - a) Press and release **inch/mm** to make digits count down to the number desired.
 - b) Press and release **ZERO/ON** to make digits count up to the number desired.
- 5) Press **M/OFF** to accept the new reference setting and advance to the max step.

The calibration max prompt is indicated by the analog bargraph segments displayed on the right. (refer to Figure 25).



Figure 25 - Calibration Max Step Display

- 6) Replace the min reference with the max reference to displace the indicator to +.030 for inch mode.
 - a) Press and release **inch/mm** to make digits count down to the number desired.
 - b) Press and release **ZERO/ON** to make digits count up to the number desired.
- 7) Press **M/OFF** to accept the new reference setting and exit back to the gaging mode.
- 8) Replace the max reference with the zero reference.
- 9) Press and release **ZERO/ON** to zero the indicator.

The indicator may be displaced through its measuring range to verify that calibration has been set.

NOTE: Calibration, once achieved, is valid in both inch and metric modes.

6.0 User Operation

6.1 Measurement Direction [S]

The $\mu\text{Max}\mu\text{m II}$ Series indicator has two measuring directions; normal and reverse. When set for reverse operation an **R** icon is displayed on the indicator. The reverse operation is typically used for ID (internal diameter) type measurements.

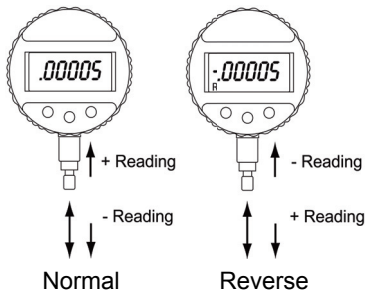


Figure 26 - Measuring Directions

6.2 Analog Magnification [S]

The $\mu\text{Max}\mu\text{m II}$ Series indicator has five analog magnification settings; X1, X5, X10, X50, and no bargraph display. The icon on the display indicates which magnification is in use.

No icon indicates that the bargraph is disabled. Analog bargraph range and graduation resolution are shown in the table below:

<u>Display Icon</u>	uMaxumII	
	<u>± Full Scale</u> (in/mm)	<u>Grad Value</u> (in/mm)
no icon	bar graph disabled	
X1	0.040 / 1.00	0.0020 / 0.050
X5	0.020 / 0.20	0.0010 / 0.010
X10	0.010 / 0.10	0.0005 / 0.005
X50	0.002 / 0.02	0.0001 / 0.001

Figure 27 - Analog Magnification Table

6.3 Preset [S]

The μ Max μ m II Series indicator has the ability to read actual dimension size or comparative size from a master. When the preset is set to all zeros the indicator displays a comparative size, which is the difference between the master and the part. When a preset is entered it is typically entered as the actual size of a certified nominal master.

A press and release of the **ZERO/ON** button will show the preset that was entered in the setup mode on the display.

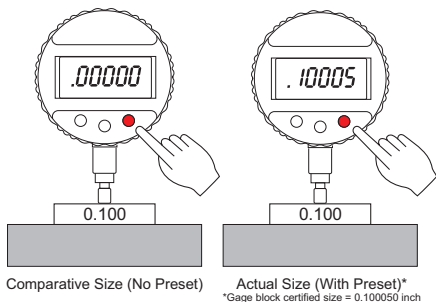


Figure 28 - Presets

6.4 Tolerances [S]

The μ Max μ m II Series indicator has the ability to show an out-of-tolerance (**OOT**) condition on its display in two formats. One format uses the analog bargraph and the other format uses the digital readout.

6.4.1 Analog Bargraph Operation [S]

The center bargraph line blinks when tolerance value(s) have been entered in the setup mode. If the center line is solid (not blinking) then there is no tolerance value(s) entered into the indicator and tolerance indication is disabled.

The left and right arrows of the bargraph are used to indicate the tolerance condition as shown here:

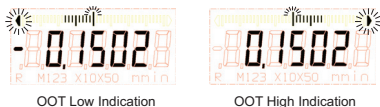


Figure 29 - Analog Bargraph

6.4.2 Digital GO/NOGO operation [S]

GO/NOGO operation requires that tolerance values have been setup in the indicator. The inch/mm button is used to sequence through four display choices:

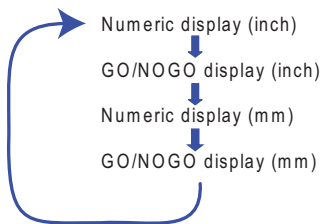


Figure 30 - Digital GO/NOGO Operation



Figure 32 - Multiplier

In the gaging mode the **M** icon signifies that the indicator is not set to 1:1 ratio. This means that the reading displayed is a ratio of the actual mechanical movement of the spindle.

6.7 Difference Mode

The $\mu\text{Max}\mu\text{m II}$ indicator has the ability to read the difference and centerline of two measurements. The measurements are manually collected in a sequence and the difference result polarity is set by the first reading collected. For example, if the 1st reading is greater in value than the 2nd reading then the difference result is displayed as a positive value. If the 1st reading is less than the 2nd reading the result is displayed as a negative value.

When the difference mode is set for operation the display will show a flashing “1” icon. This is the prompt to collect the reading for the 1st measurement (Figure 33, Step 1).

- 1) Press and release the **M/OFF** button (step 1) to collect the first measurement into memory. The indicator will then flash the number “2” icon. Move the indicator to the 2nd location to be measured. See Figure 33.

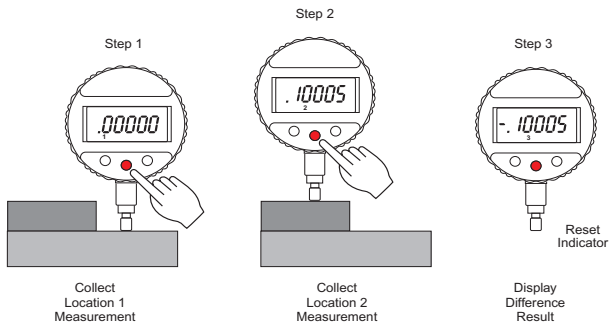


Figure 33 - Difference Mode

- 2) Press and release the **M/OFF** button (step 2) to collect the second measurement into memory. The indicator will then flash the number “3” icon and display the difference result (Reading 1 - Reading 2).
- 3) Pressing and releasing **ZERO/ON** toggles between difference result and the centerline result $[(1+2)/2]$. The indicator will flash the “123” icon for the centerline result and the “3” icon for the difference result.
- 4) Press and release the **M/OFF** button (Step 3) to reset the indicator for the next set of measurements. The indicator will then flash the number “1” icon and return to a live display.

NOTE: The indicator remains in the Difference mode cycle until it is disabled by changing the setting in the setup menu (M1 X1).

NOTE: Depending on the output configuration each M/OFF button press sends each measurement and result or just the result data.

6.7.1 Dynamic Max, Min, TIR

The $\mu\text{Max}\mu\text{m II}$ Series advanced indicator has the ability to display dynamic measurements. The dynamic modes are max, min, and TIR (total indicated reading or max-min).

- **Dynamic max** displays the most positive (maximum) reading relative to its reset/starting location.
- **Dynamic min** displays the most negative (minimum) reading relative to its reset/starting location.
- **Dynamic TIR** displays the difference between the maximum reading and the minimum reading relative to its reset/starting location. The TIR reading will always be an absolute or positive reading (max is always greater than min).

In the gaging mode each dynamic feature is identified by the analog bargraph as shown here:



Figure 34 - Dynamic Feature Displays

NOTE: The dynamic settings appear similar to the tolerance indication used in the indicators static mode. In the dynamic mode the line segment next to the arrow is also displayed and both segments are solid (not flashing). The analog bargraph holds the dynamic position and a reverse blinking segment is the actual position of the indicator.

The left and right arrow segment will blink when the reading is out of tolerance and the line segment next to it remains solid. This only occurs if the tolerance feature is enabled.

- 1) Position and lock the indicator on the part or surface to be measured.
- 2) Press and release the **ZERO/ON** button to reset the indicator and start the dynamic data collection.
- 3) The reading on the indicator will hold the dynamic reading until it is reset again for the next measurement (step 2).
- 4) To turn the dynamic feature off enter the setup mode and go to menu item M2 X1 to change or disable the feature.

6.8 Hold Function

The $\mu\text{Max}\mu\text{m II}$ Series indicator has the ability to Hold or freeze the current measurement on the display. This is useful when the reading isn't collected immediately but still has to be processed. There are no icons used to indicate that the hold feature is active since it is obvious by the use of the inch/mm button and the condition of the reading on the display.

When the Hold feature is active the inch/mm button no longer changes the units on the indicator. The inch/mm button is used to toggle the condition of the displayed reading between a live reading or one that is held.

- 1) Press and release the **inch/mm** button to freeze the displayed reading.
- 2) Press and release the **inch/mm** button again to unfreeze the displayed reading.
- 3) To turn the dynamic feature off enter the setup mode and go to menu item M2 X1 to change or disable the feature.

6.9 Display Messages

6.9.1 Battery Low Signal



Figure 35 - Battery Low Display

When the Message "**bAt Lo**" is displayed on the digital display it indicates that the battery power is too low for dependable readings and the indicator will no longer operate. Replace batteries to resume use of the indicator. Refer to Section 7.2 for battery replacement.

6.9.2 Lockout

When the message **LOC.0000** is displayed it indicates the feature is locked out and requires a password to access it (see special options, Section 10).

- 1) Using a small flat blade screw driver (Figure 36) carefully slide the blade into the slot above the tray and pry out to release the battery tray from its locked position enough to grasp with fingers (Figure 37).

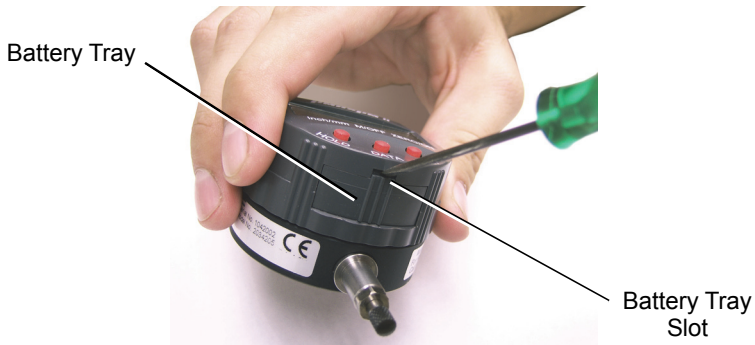


Figure 36 - Releasing the Battery Tray

- 2) Grab the tray with your fingers and firmly pull out the battery tray (Figure 37).

NOTE: When battery power is removed from this unit the current setup will be retained in memory. When battery power is re-enabled this setup is what will be operating.



Figure 37 - Removing the Battery Tray

- 3) The Battery tray contains two CR2450 style batteries, Mahr Inc. Part number EBY-1018. Remove the two expired batteries and replace with new ones with the large diameters (+ Positive) facing **away** from the tray. Snap into place (Figure 38).

Positive (+)

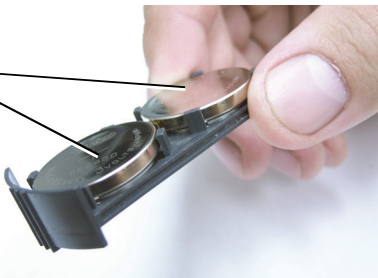


Figure 38 - Changing the Battery

- 4) With the Indicator display facing up, orient the Battery Tray with the batteries facing away from display. Firmly slide the tray in until it locks into position (Refer to Figure 37). An initialization routine should be observed on the LCD display.

7.3 Data Output

The μ Max μ m II Series indicator has available three standard output formats based on the cable connected to it.

***NOTE:** Disconnect cable when not in use. Leaving it connected may reduce battery life.*

- **USB** (Universal Serial Bus)
- **Opto RS232C** (simplex and duplex)
- **Digimatic** (Binary Coded Data)

***IMPORTANT:** Anytime a cable is connected to the data output port the indicator should be turned off, otherwise the cable may not be recognized and will not output correctly.*

The *μMaxμm II* Series indicator has the ability to output one reading at a time or continuous readings all the time. It can also have the serial number as part of the data output with each specific reading that is sent.

When the indicator is set for single data output the data is triggered manually by the M/OFF Data button.

When the indicator is set for continuous data output no manual trigger is needed.

When the data output is set to include the indicators serial number (S/N) the S/N will be sent first then the reading delimited by a comma.

The Data Stream for the *μMaxμm II* is as follows:

NNNNNNN,±(D)DD.DDDD(D)_inch<CR>

There will be only one leading zero

- _ Represents Spaces
- <CR> Represents Carriage Return
- N Represents Serial Number Digit
- D Represents Digit on Display
- inch Units represented by inch or mm
- (D) Represents a possible digit depending on preset and resolution

The serial number identifies the unique indicator on the production line. It also can be monitored for calibration or certification service requirements by use of a system software program.

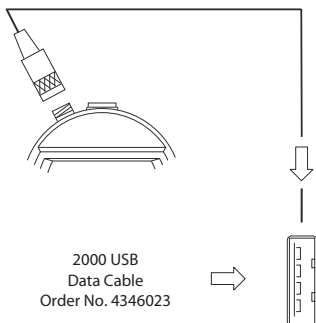


Figure 39 - USB Data Cable 2000 SB

Virtual COM-Interface Driver:

The Driver emulates for every connected cable an additional virtual COM-Port. The application software communicates to the instrument in exactly the same manner as a normal hardware COM-Port.

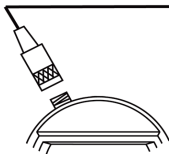
NOTE: *When Used with Marcom Software:*

Make sure serial number feature is off. Preset value should be six numeric digits or less.

Opto RS232C Data Cable

Detailed description of Duplex commands available on demand.

RS232C Duplex:



Opto RS232C Duplex
Data Cable (without adapter)
Order No.: 4346020

PIN No.		
1		
2	Txd	Out
3	Rxd	In
4	V+	
5		
6		
7	V-	
8		
9		

Opto RS232C
Duplex



4800 Baud, 1 Start bit, 7 Data bits,
even parity, 2 stop bits
request for measuring value: ? CR

Figure 40 - RS232C Duplex Cable

RS232C Simplex:

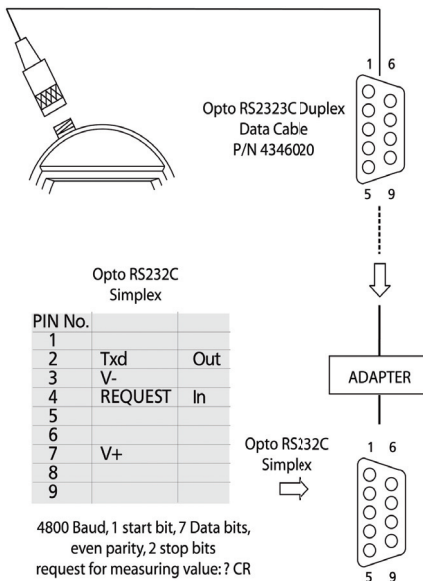


Figure 41 - RS232C Simplex Cable

Digimatic Data Cable

ATTENTION: Digimatic interfaces can only transmit 6 digits. 7-digit displays do not show the highest decimal place.

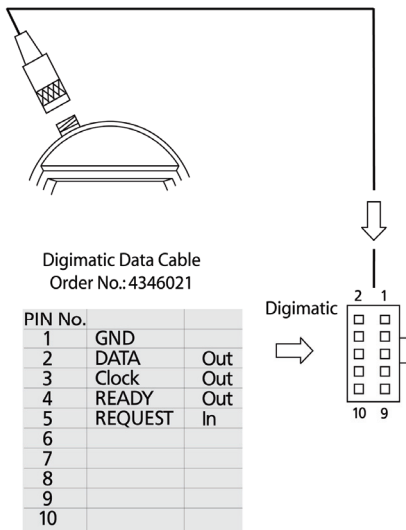


Figure 42 - Digimatic Cable

8.0 Parts and Service

μMaxμm II Series Indicator parts and service are available from Mahr Inc, Providence RI USA. Contact your Mahr Inc. representative or Mahr Inc. in Providence.

- Carefully pack items to prevent damage in shipment.
- Include a brief description of the problem and the name, address and telephone number of the person to contact if we have any questions.

Send correspondence to:

Mahr Inc.
1139 Eddy St.
Providence RI 02905 USA
Att: Repair Department

For expedited warranty service, contact our Customer Resource Center at:
1-800-343-2050
and obtain a Return Authorization number.

8.1 Replacement Parts

Batteries: EBY-1018 Lithium coin cell, commercial part # CR-2450.

PARTS		
<i>Refer to Figures in following pages for part locations</i>		
Part Callouts	Description	μMaxμmil
	Range:	± 0.040 in ± 1.0 mm
	Batteries:	EBY-1018 Lithium 3V CR-2450
	Contact Point:	PT-223 (3/8" Stem) EPT-1037-W1 (8mm stem) Other contact points available. See main product catalog.
	Spindle Parts:	Spindle Components Table Page 53
1	Spindle Cap:	N/A
2	O-Ring for Cap:	N/A
3	Spindle Screw:	N/A
4	O-Ring: (case & bezel)	ERG-1073
5	Gasket: (back & case)	ERG-1086
6	Screw: (back to case)	SW-329 (2-64thd)
7	Battery Tray:	2248039
8	Gasket: (battery tray)	2237453
9	Output Port Cover:	2249017
10	Output Port "O" Ring	2249475

8.1.1 μ Max μ m II

Integral Model

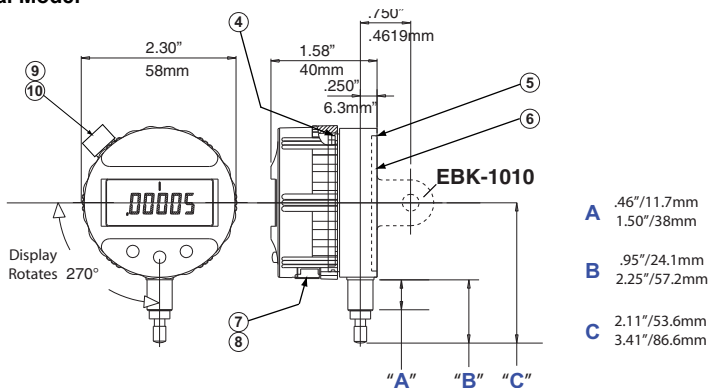


Figure 43 - Integral Model

Perpendicular Model

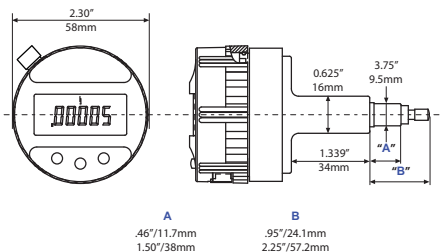


Figure 44 - Perpendicular Model

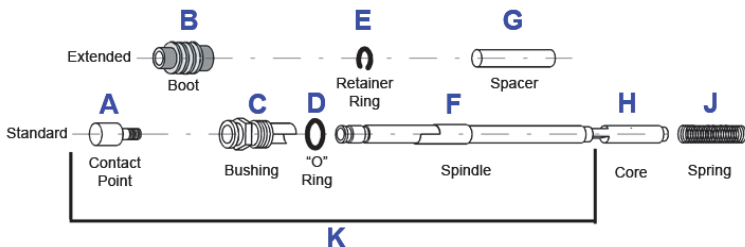


Figure 45 - Spindle Components

Spindle Components (μ Max μ m II Only)

Description		2034201	2034203	2034205	2034207
A	Contact Point	PT-233	PT-223	EPT-1037-W 1	EPT-1037-W 1
B	Boot	NONE	EGU-1022	NONE	EGU-1022
C	Bushing	EBU-1473	EBU-1478	EBU-1473	EBU1478
D	O-Ring	ERG-1042	ERG-1042	ERG-1042	ERG-1042
E	Retaining Ring	NONE	ERG-1049	NONE	ERG-1049
F	Spindle	EAS-2941	EAS-2943	EAS-2942	EAS-2944
G	Spacer	NONE	EBU-10477-W 1	NONE	EBU-10477-W 1
H	Core Assy	EAS-2884	EAS-2884	EAS-2884	EAS-2884
J	Spring	ESP-1112	ESP-1112	ESP-1112	ESP-1112
K	Spindle Assembly	EAS-3045	EAS-3046		

NOTE: (K) does not include core (H) or spring (J).

8.2 Accessories

Accessory	<i>µMaxµmII</i>
Range:	±0.040in ±1.0mm
USB Cable:	4346023
RS232 Cable:	4346020
Digimatic Cable:	4346021
Splash Cover:	ECV-1307-W2
Adaptor Bushing: (8mm to 3/8")	BU-197 (8mm stem)
Thread Adaptor: (m2.5 to 4-48thd)	AD-185 (m2.5 thread)
Spring: (lite force 35gm)	SP-351
Flat Back:	EBK-1018
Lug Back:	EBK-1010
Post Back:	EBK-1012
Screw Back:	EBK-1013
Adj. Slide Back:	EBK-1016
Adj. Rack Back*:	EBK-1014

*(adjustable rack back used with AT-28 and AT-116 Mounting Bracket - sold separately.)

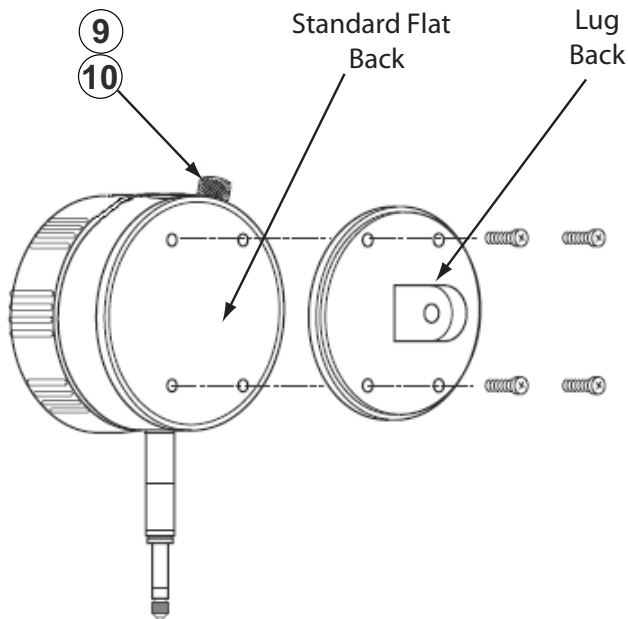


Figure 46 - Indicator Back

NOTE: Exercise care when installing Indicator Back accessories. make sure gasket seals are in good condition and properly oriented. **DO NOT OVERTIGHTEN SCREWS.**

9.0 Specifications - *μMaxum II*

	<i>μMaxumII</i>
Display Range:	±0.042in ±1.067mm
Spindle Range:	0.050 to +0.060in. -1.25 to 1.50mm
Resolution:	0.00002in / 0.00001in 0.0005mm / 0.0002mm
Accuracy: (% of range)	±0.020"range: 50uin(0.25%) ±0.040"range: 200uin(0.50%) ±0.5mm range: 1.25um(0.25%) ±1.0mm range: 5.0um(0.50%)
Gaging Force:	3 to 4 Ounce - 85 to 122 grams - - at center of travel
Weight:	6 oz(ounce) 170 grams
Spindle Velocity:	Unrestricted
Temperature Operating:	40° to 130° F5° to 54°C
Storage:	0° to 140°F -17° to 60°C
Repeatability:	± 1 LSD (least significant digit)
Battery Life:	6000 Hrs ~12 months normal usage [^] <i>[^] normal usage= 12hr/day x 7day/wk, @750mA rating</i>
Contact Point:	(PT-223 radiused tip, 4-48 thread, furnished on 0.375" dia. stem model) EPT-1037-W1 radiused tip, M2.5 thread furnished on 8mm dia. stem model
Power:	3 volt Lithium-Ion (Li-Ion) coin cell (2 per unit), type CR 2450. Order#: EBY-1018
Display:	Rotates through 270°

10.0 Special Options

µMaxµm II Series Indicators may also be available pre-configured with various accessories. Contact Mahr Inc. for specific needs.

10.1 Program Codes

Some models may be factory configured with special program options. The list of programmed options is below;

<u>Display</u>	<u>Bit</u>	<u>Option Description</u>	<u>Condition Status</u>
left most	6	Lockout Advanced Mode?	0=yes/1=no
d	5	Enable Auto-Shutdown?	0=yes/1=no
i	4	Lockout Calibration (M123 mode)?	0=no/1=yes
g	3	Lockout Multiplier (M3 mode)?	0=yes/1=no
i	2	Lockout Setup mode?	0=no/1=yes
t	1	Lockout in/mm button?	0=no/1=yes
right most	0	Power-up units (batt. chg)?	0-in./1-mm

{ Left - to - Right }

Example: Special readout with program code **1010111** (left-to-right)

- 1 Advanced mode locked out
- 0 Unit turns off after 15 minutes of non-use
- 1 Calibration mode locked (accessible by password only)
- 0 Multiplier mode locked out and not accessible
- 1 Setup mode locked out (accessible by password only)
- 1 in/mm button locked out and not accessible
- 1 upon battery change, unit powers up in metric units(mm)

Program codes are factory installed and labeled left-to-right on the indicator. When ordering special indicators the program code must be specified along with the indicator order number. The program code must be clearly visible and follow the listing structure as provided here.

10.2 Lockout Password

Some program option lockout features are accessible by entering a password. The indicator will prompt for the password anytime the locked feature is being accessed. When this occurs the display appears as follows:



Figure 47 - Lockout Password Prompt

The password is entered in the same manner the preset or tolerance values are entered. The **inch/mm** and **ZERO/ON** buttons are used to change the digits. The **M/OFF** button is used to accept the entry when ready to do so.

The factory password is fixed and should not be provided to operator level personnel. The password may be obtained by calling the factory direct at 1-800-343-2050. An example of a numeric password is shown here.



Figure 48 - Password Sample

A **PASS.Err** prompt appears when the password is entered incorrectly. The indicator is designed to allow for three attempts at entering the password. Upon the third incorrect

entry the indicator will exit back to its gaging/measurement mode (for setup lockout option) or exit forward to the next “M” icon in the setup menu (for calibration lockout option).

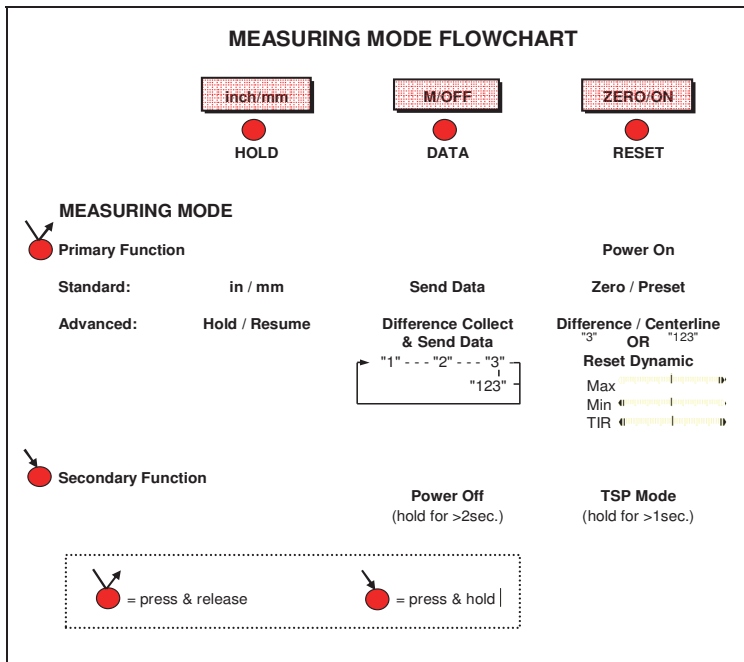


Figure 49 - Password Error

Incorrect password error (displays for 3 seconds)

11.0 Quick User Flow Chart

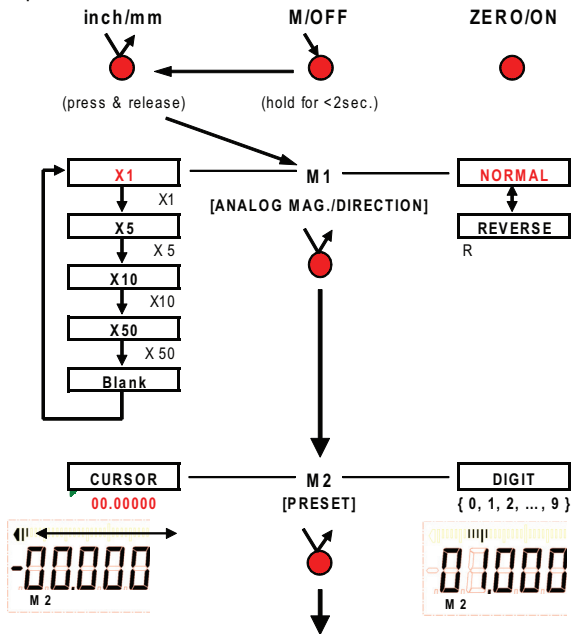
11.1 Measuring Mode Flow Chart

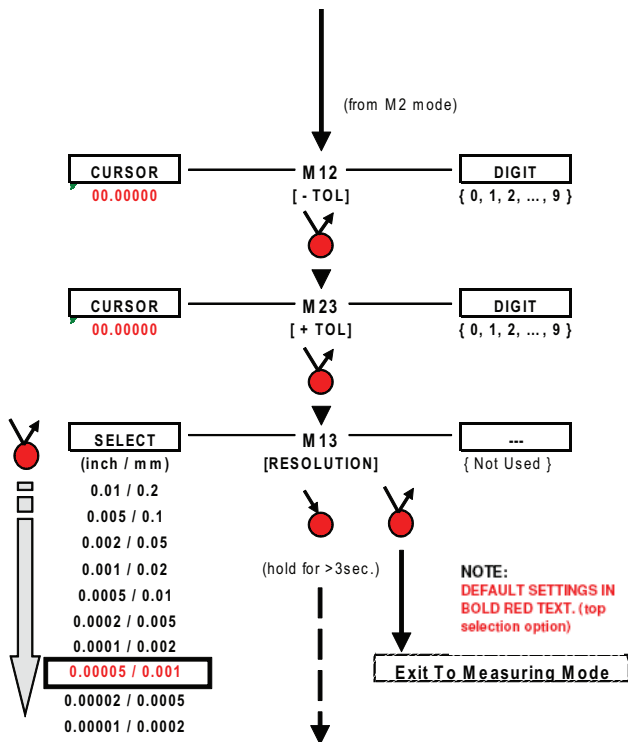


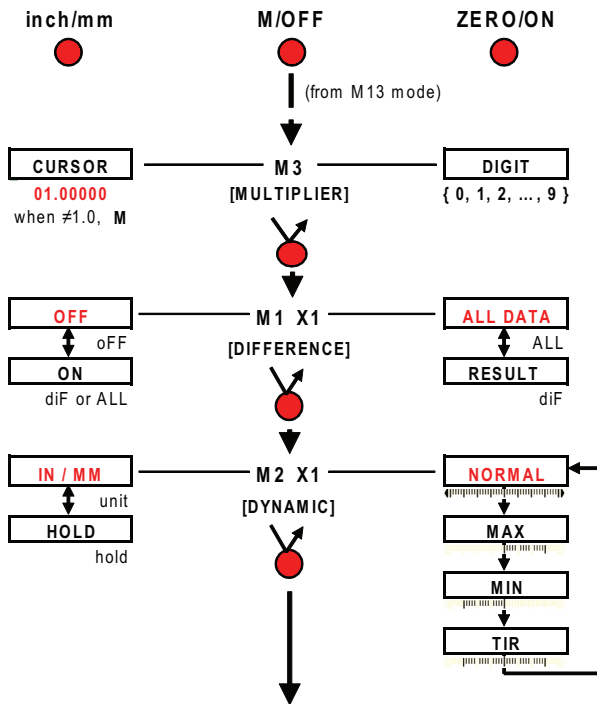
11.2 Setup Mode Flow Chart

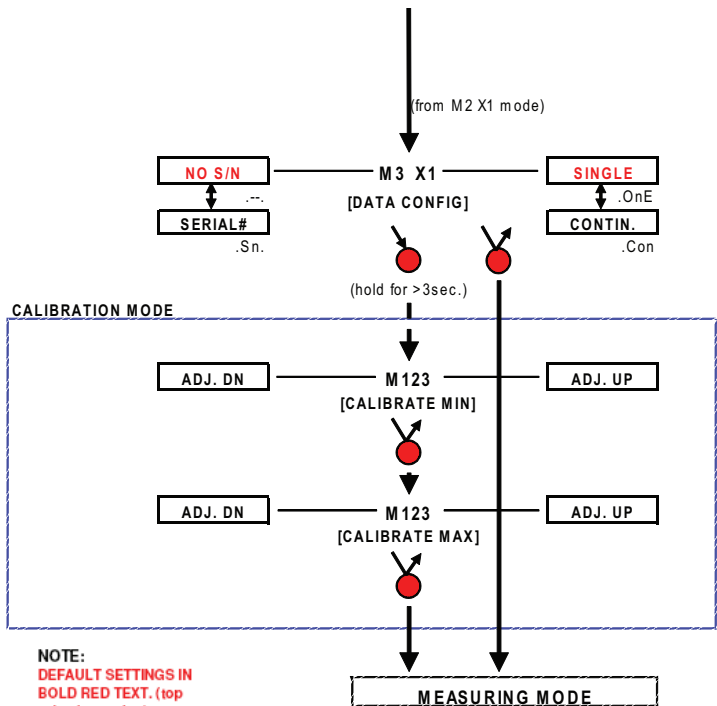
SETUP MODE FLOWCHART

To enter setup mode:









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Document Part No. 2249001 Rev. C

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