



PIN/PINLESS DEEP SENSING MOISTURE METER WITH SPHERICAL SENSOR AND REMOTE PROBE

USER'S MANUAL



MMD950

Please read this manual carefully and thoroughly before using this product.

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INTRODUCTION

Thank you for purchasing General Tools & Instruments' MMD950 Pin/Pinless Deep Sensing Moisture Meter with Spherical Sensor and Remote Probe. Please read this user's manual carefully and thoroughly before using the meter.

The MMD950 is designed for use in woodworking, water damage restoration, building construction and home renovation. Examples include:

- Checking for moisture on or below the surface of carpets and sub-flooring
- Measuring the moisture content of wood, drywall or concrete before painting, wallpapering, sealing or treating
- Locating water leaks above ceilings, below floors or behind walls
- Selecting dry lumber

The meter senses the moisture level of a material using either of two techniques:

1. **Inferring the material's electrical conductivity** from the current flow induced between a pair of steel pins placed on or into the material. The wetter a material, the higher its conductivity. The MMD950 comes with a remote probe consisting of a pair of replaceable stainless steel test pins at the end of a 46 in. long cable.
2. **Measuring the change in the material's capacitance** produced by the slight spreading of an electric field generated by the meter. When the meter is powered on, the spherical sensor at its top generates a three-dimensional electromagnetic wave at radio frequency that extends about 4 in. (100mm) from the meter. When the spherical sensor is placed against a wet material, the increased capacitance of the material distorts the wave's electric field to an extent that can be measured. This distortion—called the fringing field effect—is proportional to the material's moisture level.

WHICH SENSOR SHOULD YOU USE?

It depends on the application. The spherical sensor is the only choice for estimating the surface or internal moisture level of materials like finished wood, paint or wallpaper that cannot be marred by pinholes. If accurate readings are important, the remote pin-type probe is the only option because the spherical sensor can only provide *relative* readings.

The distinction between absolute and relative readings is important to understand. The moisture level measurements made by the remote probe's test pins are displayed in units of %WME (Wood Moisture Equivalent) simultaneously on a 0-99.9 count digital LCD and a 40-LED analog bar graph. These pin measurements are accurate within 3% of the reading plus 5 digits.

By contrast, readings made by the spherical sensor are simultaneously displayed with *no* units on the LCD and on a second scale (called REL) of the bar graph. Although the readings from the spherical sensor have no accuracy specification, they are nonetheless useful for quickly comparing the moisture levels of materials, or the wetness of different areas of the same material. Two possible uses for the relative readings are:

1. Determining whether two pieces of wood to be joined have roughly the same moisture content (which means they will dry out at the same rate without warping).
2. Locating the source of a water leak above a ceiling, by comparing the REL readings at various points on it. If the ceiling is level, the point with the highest REL reading is below the source of the leak.

The biggest advantage of the spherical sensor is its ability to sense moisture up to 4 in. below or behind the surface of a material. The remote probe's pins can also sense moisture just below the surface of some materials. However, for hard materials like wood or concrete, measurements made by pins mostly represent surface moisture content because: 1) Moisture close to the surface has a greater effect on a reading than moisture deep below it; and 2) The 10mm (0.4 in.) long pins on the remote probe are too short to be driven deep into a hard material.

For softer materials like soil, paper or powders, the pin measurements are more likely to reflect the average moisture level of the material between its surface and the penetration depth of the pins (usually far less than 0.4 in.).

Other features of the MMD950 include the following:

- Any reading (%WME or REL) can be held by pushing a front-panel button. Doing so—called locking or “freezing” the reading—makes it possible to make a measurement in a dark place, hold it, and display it later in a better-lighted area.
- The 40-LED analog bar graph groups LEDs of three different colors (green, yellow and red) into low, medium and high moisture bands. Each readout (%WME or REL) can be accompanied by a beeper that can be

programmed to sound in different ways in response to different moisture levels or operations. The correlations make it easy to use sight and/or sound to pinpoint areas of peak or relative wetness. The beeper can be disabled without affecting measurements.

- An auto power off function that can be triggered by three, five or 10 minutes of inactivity.
- The meter can be set up to check its calibration automatically each time it is powered on. Alternatively, it can be programmed to allow you to check its calibration manually at any time.
- A display icon indicates when the meter's 9V battery is low on charge.

KEY FEATURES

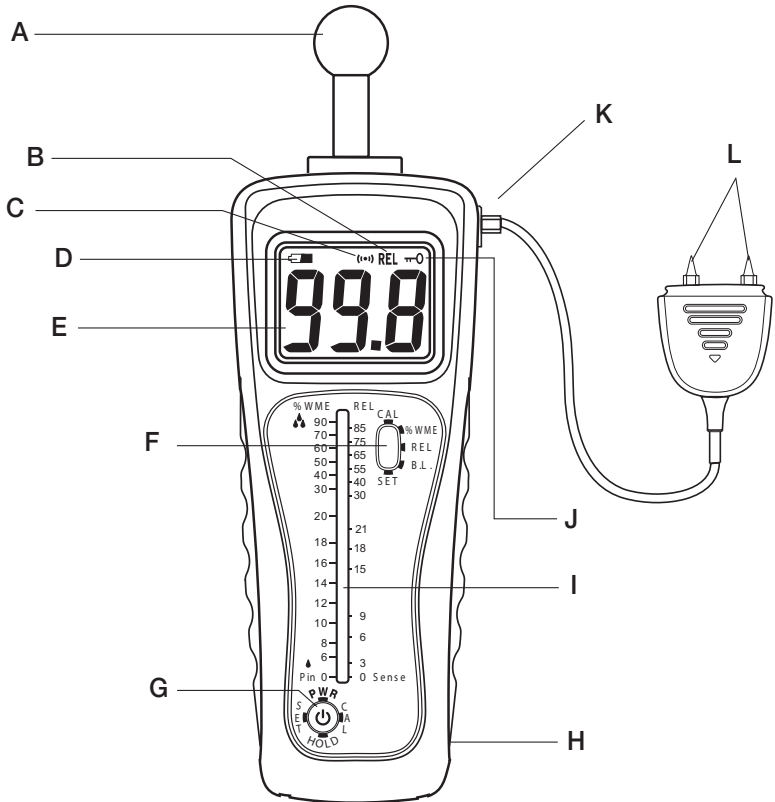
- Two measurement modes: Pin (conductivity-based) and pinless (based on the fringing field effect)
- Spherical sensor gauges moisture level up to 4 in. below a surface
- Conventional test pins at end of 46 in. remote cable
- Pin measurement accuracy of $\pm 3\%$
- Displays %WME and relative readings simultaneously on two displays: 0 to 99.9 count jumbo LCD with 0.9 in. (23mm) digits, and 40-dot tri-color LED bar graph
- Manual or automatic calibration checking
- Data hold (display lock or "freeze" function)
- User-programmable beeper function, backlight function and auto power off time
- Low battery warning
- Includes two pairs of replacement test pins
- Spare pins storage compartment





WHAT'S IN THE CASE

The MMD950 comes in a custom molded plastic case along with a remote pin-type probe and cable, a 9V battery, two pairs of replacement pins and this user's manual.

PRODUCT OVERVIEW

The figure shows all of the controls, indicators and physical features on the front, bottom, top, back and right side of the MMD950. Familiarize yourself with their positions and functions before moving on to the Setup Instructions.



- A. Spherical sensor
 - B. Measurement mode indicator (REL shown)
 - C.  Indicates beeper is enabled
 - D.  Indicates battery is weak
 - E. Jumbo LCD display
 - F. Five-function Mode button
 - G. Four-function  button
 - H. Battery/spare pins compartment cover (on back of meter)
 - I. Tri-color 40-LED analog bar graph
 - J.  Indicates display is locked (frozen)
 - K. Jack for remote probe
 - L. Remote probe with 10mm test pins (shown with protective cap off)
-

SETUP INSTRUCTIONS

INSTALL BATTERY

To open the battery compartment, turn the meter over and lift the tab on the bottom of the battery compartment cover. Remove the cover and set it aside. Then plug the included 9V battery into the wired socket inside the compartment. The terminals of the battery and the socket mate in only one way, with the smaller male terminal plugging into the larger female terminal. Close the battery compartment by replacing its cover and snapping it shut.

OPERATING INSTRUCTIONS

To power on the meter, press the  button and hold it for at least three seconds. (To power off the meter, follow the same instruction.)

You can use the meter immediately to measure moisture levels using the factory-set defaults for beeper and backlight operation and auto power off activation time. By default:

- The beeper is enabled, and beeps faster the higher the readout above 17%WME in pin measurement mode (17 in REL mode).
- The auto power off function is disabled.
- The backlight is off.

To change the default settings for the beeper, backlight or auto power function, follow the Advanced Setup Instructions beginning on p. 9. At a minimum, General recommends changing the default for the auto power off function to “enabled”. If you leave the auto power off function disabled, you run the risk of discharging the meter’s battery if you forget to power the meter off when you are finished using it.

MEASURING MOISTURE LEVELS

Surface moisture levels should be measured by the test pins of the remote probe if the surface can tolerate pinholes. If it cannot, use the meter’s spherical sensor. Internal moisture levels can be gauged by the spherical sensor for comparison purposes.

To use the remote probe, remove the small rubber yellow plug from the jack on the right side of the meter (callout K of the figure). Then insert the white plug at the end of the cable into the jack.

To make a surface moisture level measurement, press the Mode button as many times as necessary until **%WME** appears on the top line of the LCD. Then press the test pins against the target material. The material’s surface moisture level will be displayed as a percentage on both the LCD and the LED bar graph.

The bar graph uses LEDs of three different colors (green, yellow and red) to indicate different moisture level ranges (low, medium and high, respectively). Readings below 17% are considered low, readings between 17% and 30% medium, and readings above 30% high. If the beeper is enabled with the factory-default setting, it will beep faster the higher the moisture level rises above 17%.

To gauge the internal or surface moisture level of a material, enter REL mode by pressing the Mode button as many times as necessary until **REL** appears on the top line of the LCD. To establish a baseline for relative readings, press the spherical sensor against a material known to be completely dry. This should produce a reading of 0 on both the LCD and LED bar graphs. Then press the spherical sensor against one or more points on the target surface and compare the readings.

Some measurement tips:

1. The spherical sensor's accuracy is not affected by its angle relative to the target surface. Press the sphere against the material at the angle that makes the LCD easiest to read.
2. Never use force to drive the test pins into a hard surface.
3. Measurements of wood are skewed by two variables: ambient humidity and the density of the wood species. The best way to compensate for the effect of these variables is to develop your own moisture level curves, based on your experience working with different species of wood on a day-to-day basis.

To scan a material for an area of peak wetness in either measurement mode (%WME or REL), first make sure that the beeper is enabled (indicated by the **(••)** icon on the top line of the LCD). If the icon is present, scan the material while paying attention to the beeper's frequency. The faster the beeper beeps, the wetter an area is. Near the high end of the meter's measurement range, the beeping sounds almost constant.

If the beeper has been disabled, to re-enable it you must power off the meter and then change the beeper's default setting using the Advanced Setup instructions in the next section.

To hold a measurement, press the **⏻** button briefly. The display will "freeze" with the held value, along with a **🔒** (lock) icon at upper right. **To unlock the display**, press the **⏻** button briefly again.

ADVANCED SETUP INSTRUCTIONS

In Setup mode, you can change the default settings for the meter's beeper and backlight and the auto power off and calibration functions.

To enter Setup mode, power off the meter by pressing the **⏻** button and holding it for at least three seconds. Then power the meter back on in a special way by simultaneously pressing the **⏻** and Mode buttons and holding them for at least three seconds. Doing this will cause the beeper to sound, the backlight to come on and the word **SETUP** to scroll across the LCD.

After a few seconds, the LCD will read out **0 = 0**. In this format, the left digit is the Option No. and the right digit is the current setting for that option. For example, **0 = 0** is shorthand for Option 0, Setting 0.




The table below details the five function options available to you in Setup mode.

Function	Option No. (Left Digit)	Setting (Right Digit)	Action
Default Settings Source	0	0	Loads factory default settings
		1	Loads user's default settings Backlight comes on for 30 seconds
Beeper	1	0	Programs beeper to beep faster the higher the moisture level above 17%WME (17 in REL mode)
		1	Programs beeper to beep faster the higher the moisture level
		2	Programs beeper to sound when switching between measurement modes
		3	Disables beeper. Removes (●●) icon from display
Auto power off	2	0	Disables auto power off function
		1	Sets auto power off interval to 3 minutes
		2	Sets auto power off interval to 5 minutes
		3	Sets auto power off interval to 10 minutes
Backlight	3	0	Disables display backlight
		1	Enables display backlight
Calibration Check	4	0	Enables manual calibration checking by user
		1	Programs meter to automatically check its calibration each time it is powered on

The factory default setting for all five functions—including the source of the default settings—is 0.

To change any or all settings to your choice(s), you must first change the setting of Option 0 from 0 to 1. Opportunities to change the settings of the other four functions from their factory defaults are then made available in order, from Option 0 to Option 4. As each Option is presented, you can change its setting or leave the existing setting unchanged. In either case, you must confirm the setting to allow the sequence to continue.


It's important to understand that in **Setup mode you have 30 seconds to confirm the setting of each Option**. If you take longer than 30 seconds to confirm any setting, the MMD950 will automatically exit Setup mode and enter Measurement mode.

To change any setting, use the Mode button to cycle through the choices (0 or 1 for Options 0, 3 and 4; 0, 1, 2 or 3 for Options 1 and 2). When the setting you want appears as the right digit on the display, press the  button to save it. Each time you save a setting, the display advances to the next Option. To leave a setting unchanged, press the  button to advance to the next Option. Once a setting has been chosen for Option 4, the meter will automatically exit Setup mode and enter Measurement mode. You cannot access the Options out of sequence. For example, if you have disabled the beeper (by pressing the  button with 1 = 3 on the display, you cannot change the setting without powering off the meter and re-entering Setup mode.

The one exception to this rule is the setting of the display backlight. You can turn the backlight on or off by pressing the Mode button and holding it for at least three seconds.

CHECKING CALIBRATION

Option 4 gives you two choices for checking the meter's calibration. Setting 0 lets you check the calibration manually whenever the meter is powered on. Setting 1 automatically checks the calibration of the meter each time it is powered on.

To check the meter's calibration manually, follow the Advanced Setup Instructions in the previous section to choose Setting 0 for Option 4. Next, be sure the meter is operating in REL mode. Then press and hold the  and Mode buttons at the same time, making sure that no part of your hands and fingers is within 4 in. of the sphere. This will cause **CAL** to flash twice on the display and the beeper to sound twice (if it is enabled). If the meter is in calibration, the readout will change to 0 from its previous value and remain at **0** for 10 seconds. After 10 seconds, the display will resume showing real-time readings in Measurement mode.

To program the meter to automatically check its calibration each time it is powered on, follow the Advanced Setup Instructions in the previous section to choose Setting 1 for Option 4.


That is all you need to do. To confirm that the automatic calibration check function is enabled, enter REL mode and power the meter off. Then power it on and note that the sequence of initial displays includes two flashes of the letters **CAL** and two soundings of the beeper (if it is enabled). If the meter is in calibration, the display will show **0** for 10 seconds and then begin displaying REL measurements.

If either calibration check produces a non-zero reading for 10 seconds, and the meter is still under warranty, call General's Customer Service Department at 212-431-6100 to arrange to return the meter for service or replacement.

SPECIFICATIONS

Measurement Ranges	0 to 99.9% WME and 0 to 99 REL
Measurement Accuracy	$\pm 3\%$ of reading + 5 digits in pin mode
Length of Test Pins	10mm (0.4 in.) on remote probe; 10mm and 15mm (spares)
Length of Remote Probe Cable	46 in. (1.168m)
Measurement Depth (pinless mode)	4 in. (102mm)
LCD Range/Size	99.9 count with 0.9 in. (23mm) high digits
LCD Resolution	0.1%
Bar Graph Composition	40 LEDs of 3 colors: green (0 to 17%), yellow (17 to 30%) and red (>30%)
Bar Graph Resolution	± 1 LED ($\pm 2.5\%$)
Auto Power Off	After 3, 5 or 10 minutes (user selectable) with 0% reading
Low Battery Warning Level	<6.5VDC
Current Consumption	<70mADC
Operating Temperature	32° to 122°F (0° to 50°C) @ <80% relative humidity
Dimensions	9 x 2.75 x 1.625 in. (229 x 70 x 41mm)
Weight	8 oz. (249g)
Power Source	9V battery (included)

MAINTENANCE TIPS

When the  icon appears at the upper left of the LCD, it's time to replace the 9V battery that powers the meter (although measurements will remain valid for several hours after the icon first appears). To replace the battery, follow the Setup Instructions on p. 7.

When the tips of the remote probe's 10mm test pins show signs of wear, replace them with a pair of 10mm or 15mm pins included in the case.

Remove the battery when storing the meter for an extended period of time.

Never drop or disassemble the meter or immerse it in water.

WARRANTY INFORMATION

General Tools & Instruments' (General's) MMD950 Pin/Pinless Deep Sensing Moisture Meter with Spherical Sensor and Remote Probe is warranted to the original purchaser to be free from defects in material and workmanship for a period of one year. Subject to certain restrictions, General will repair or replace this instrument if, after examination, the company determines it to be defective in material or workmanship.

This warranty does not apply to damages that General determines to be from an attempted repair by non-authorized personnel or misuse, alterations, normal wear and tear, or accidental damage. The defective unit must be returned to General Tools & Instruments or to a General-authorized service center, freight prepaid and insured.

Acceptance of the exclusive repair and replacement remedies described herein is a condition of the contract for purchase of this product. In no event shall General be liable for any incidental, special, consequential or punitive damages, or for any cost, attorneys' fees, expenses, or losses alleged to be a consequence of any damage due to failure of, or defect in any product including, but not limited to, any claims for loss of profits.

RETURN FOR REPAIR POLICY

Every effort has been made to provide you with a reliable product of superior quality. However, in the event your instrument requires repair, please contact our Customer Service to obtain an RGA (Return Goods Authorization) number before forwarding the unit via prepaid freight to the attention of our Service Center at this address:

General Tools & Instruments
80 White Street
New York, NY 10013
212-431-6100

Remember to include a copy of your proof of purchase, your return address, and your phone number and/or e-mail address.



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Specifications subject to change without notice

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