

USER'S MANUAL

EXTECH

INSTRUMENTS

MODEL 407777

Heavy Duty Moisture Meter



Introduction

Congratulations on your purchase of Extech's Heavy Duty Moisture Meter. This meter measures the moisture content of wood. Measurements are made using the supplied remote intrusive sensor.

Warranty

EXTECH INSTRUMENTS CORPORATION warrants the basic instrument to be free of defects in parts and workmanship for three years from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 for authorization. **A Return Authorization (RA) number must be issued before any product is returned to Extech.** The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

Calibration and Repair Services

Extech offers complete repair and calibration services for all of the products we sell. For periodic calibration, NIST certification or repair of any Extech product, call customer service for details on services available. Extech recommends that calibration be performed on an annual basis to insure calibration integrity.



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Specifications

General Specifications

Circuit	Custom LSI microprocessor circuit
Display	Dual function 0.5" (13mm) 1999 count LCD display
Measurement Range	9% to 30% Moisture Content
Memory Table	9 memory groups for approx. 150 species of wood
Data Hold	Front Panel push-button
Sample Rate	Approx. 0.8 seconds
Sensor Structure	Remote two-prong intrusive sensor
Memory Record / Recall	Records Max/Min readings for later recall
Power off	Auto shut off after 10 minutes
Data Output	RS 232 PC serial interface
Operating Temperature	32°F to 122°F (0°C to 50°C)
Operating Humidity	Max. 90% RH
Power Supply	9V battery
Power Current	Approx. DC 5.8 mA.
Weight	0.73 lbs (330g) (including batteries & probe)
Size	Main instrument: 7.1 x 2.8 x 1.3" (180 x 72 x 32 mm) Probe: 0.9 diameter x 6.54" (23 x 165mm)
Accessories	Spare pins (10) and protective rubber holster

Range Specifications

Measurement	Range	Resolution	Accuracy
Moisture content	9 to 30%	0.1 %	± (4% + 5d)
Temperature compensation 32°F to 122°F (0°C to 50°C)			

Meter Description



Operating Instructions

Preparation

1. Insert the sensor into the sensor input jack on the meter top
2. Ensure that a fresh 9V battery is installed by powering the unit, observing that the LCD illuminates, and that the "LBT" (low battery indicator) is not illuminated on the LCD.
3. Remove the rubber pin protector on the sensor tips before measurements are performed.

Auto Shutoff Feature

The meter will automatically turn OFF if no function button is pressed in any 10 minute period. To disable this feature, press the RECORD key to engage the record function.

Measurement Procedure Selection

Follow the procedure below that most suits your application. Procedure I is used when the wood under test is of a known type. Procedure II is used when the wood type under test is unknown.

Measuring Procedure I (for use on known wood species)

1. Turn ON the meter.
2. Select the material group (1 through 9) by pressing the Material Select button. Refer to the Appendices at the end of this manual for groups and species listings.
3. According to Table I in the Material Group Appendix, select Material Groups 1 through 9 for the general woods listed or Group 9 for Chipboard (for unknown materials with paper or paint covering, refer to Procedure II).
4. Insert the sensor's test pins into the wood under test.
5. Insertion should be to at least a 2mm depth for highest accuracy. If this is not possible, carefully insert the test pins as far as possible without using undue force.
6. The meter display will now indicate moisture content in %.
7. If the moisture content is greater than 30% the display will indicate: " - - - - - "
8. If the moisture content is less than 9% the display will indicate: " _ _ _ _ _ "

Measuring Procedure II (for use on unknown wood sources)

1. Turn ON the meter.
2. Select Material Group 1 by pressing the Material Select button.
3. Insert the sensor's test pins into the material under test.
4. Insertion should be to at least a 0.08" (2mm) depth for highest accuracy. However, if this is not possible, carefully insert the test pins as far as possible without using undue force.
5. The meter display will now indicate moisture content in %.
6. This method is useful for reference only and cannot match the higher accuracy provided by Method I. However, a fair approximation is obtained for measuring materials whose make up is not known or not on the lists provided in this manual's appendices.

Temperature Compensation

This meter is calibrated for use at ambient temperature: 68°F (20°C). When the ambient temperature is above or below this value, manual temperature compensation should be performed to maintain accuracy. Follow these steps to manually compensate for ambient temperature differences:

1. Check that the RECORD function is not engaged (REC/MAX/MIN icons are not on the display).
2. Press the left TEMP. ADJ key to increase or the right key to decrease the temperature display from the 20°C default to the new ambient temperature (in °C). The temperature can be adjusted in 1 degree steps.
3. The value will be stored after 4 seconds. Temperature compensation adjustments are not stored in memory when the meter is turned OFF however.

Data Hold

Press the DATA HOLD key to freeze the displayed value on the LCD. Press the HOLD key again to release the data hold function.

MIN / MAX Recording

When selected, the RECORD function records the Minimum and Maximum readings.

To begin recording:

1. Press the RECORD key once. The REC indicator will appear on the display. Now begin to take measurements.
2. Press the RECALL key after measurements have been taken to enter the MAX mode. The MAX indicator along with the maximum measurement value will appear on the LCD display.
3. Press the RECALL key again and the MIN indicator along with the minimum measurement value will appear on the LCD display.
4. To return to normal operation, press the RECORD key again. The display indicators REC/MAX/MIN will disappear.

Maintenance

Battery Replacement

The LBT (low battery) icon appears when the battery is weak. To replace the battery:

1. Remove the meter's rubber protective holster.
2. Remove the battery compartment cover on the rear of the meter using a small coin or screwdriver.
3. Replace the 9V battery.
4. Reinstall the battery compartment cover and holster.

Sensor's Test Pin Replacement

10 Spare pins are provided with the meter. If the Test Pins are damaged (oxidized, bent, etc.) they must be replaced in order to continue obtaining reliable readings. Follow the replacement steps below:

1. Loosen the lock nuts at the base of the test pins.
2. Remove and replace the existing pins and tighten the lock nuts.

RS-232 PC Interface

The meter's RS-232 serial port (3.5mm phono jack) is located at the top of the meter next to the sensor input jack. This interface is for use with the Extech Data Acquisition Software/Hardware kit (Part Number 407000). For more information, contact Extech or refer to the 407000 user's manual for details on the PC interface.

Meter Calibration Check

1. Ensure that the RECORD" function is not engaged.
2. Select Material Group 1 using the Material Select button.
3. Press and hold both the **CALIBRATION** and **+** buttons.
4. The display will begin to count down from 5 to 1.
5. If the meter's existing calibration is correct, the LCD will display "good"
6. If the meter's existing calibration is incorrect, the LCD will display "Err".
7. If the calibration is incorrect follow the steps in the next section to recalibrate.

Meter Recalibration

1. Remove the Meter's protective rubber holster.
2. Select Material Group 1 via the Material Select button.
3. Remove the rear battery compartment cover and locate the VR1 potentiometer that sits inside the battery compartment on the left side.
4. Press and hold the **+** Calibration button.
5. Adjust VR1 for a display of "18.0".
6. For any problems with calibration contact the Extech Repair Department.

Appendix 1 - Alphabetized Table of Material Groups (Material & Group)

Abura	4	Erimado	5	Meranti, Red (light or dark)	2	Pine, Ponderosa	3
Afara	1	Fir, Douglas	2	Meranti, white	2	Pine, Radiata	1
Afromosia	6	Fir, Grand	1	Merbau	2	Pine, Carribean, pitch	3
Azelia	4	Fir, Noble	8	Missanda	3	Poplar, Black	1
Agba	8	Gegu, Nohor	7	Muhuhi	8	Pterygota, African	1
Amboyna	6	Greenheart	3	Muninga	6	Pyinkado	4
Ash, European	1	Guarea, Black	8	Musine	8	Queensland Walnut	3
Ash, Japanese	1	Guarea, White	7	Musizi	8	Queensland Kauri	8
Ash, American	2	Gum, American Red	1	Myrtle, Tasmanian	1	Ramin	6
Ayan	3	Gum, Saligna	2	Niangon	3	Redwood, Baltic (Europe)	1
Baguacu, Brazilian	5	Gum, Southern	2	Oak, Japanese	1	Redwood, Californian	2
Balsa	1	Gum, Spotted	1	Oak, Tasmanian	3	Redwood, Baltic (Europe)	1
Bange Wanga	1	Gurjun	1	Oak, Turkey	4	Rosewood, Indian	1
Basswood	6	Hemlock, Western	3	Oak, American Red	1	Santa Maria	7
Bech, European	3	Hickory	5	Oak, American white	1	Sapele	3
Berlina	2	Hyedunani	2	Oak, European	1	Seraya, Red	3
Binvang	4	Iroko	5	Obeche	6	Silky Oak, African	3
Birch, European	8	Ironbank	2	Odoko	4	Silky Oak, Australian	3
Birch, Yellow	4	Jarrah	3	Okwen	2	Spruce, Norway (European)	3
Bisselon	4	Jelutong	3	Olive E. African	2	Spruce, Sitka	3
Bitterwood,	5	Kapur	1	Olivillo	6	Sterculia, Brown	1
Blackbutt	3	Karri	1	Opepe	7	Stringybar, Yellow	3
Bosquiea	1	Kauri, New Zealand	4	Padang	1	Stringybark, Messmate	3
Boxwood, Maracaibo	1	Kauri, Queensland	8	Padauk, African	5	Sycamore	5
Cahoma	1	Keruing	5	Panga Panga	1	Tallowwood	1
Camphorwood, E. African	3	Kuroka	1	Persimmon	6	Teak	5
Canarium, African	2	Larch, European	3	Pillarwood	5	Totara	4
Cedar, West Indian	8	Larch, Japanese	3	Pine, Maritime	2	Turpentine	3
Cedar, Western Red	3	Larch, Western	5	Pine, Nicaraguan Pitch	3	Utile	8
Cherry, European	8	Lime	4	Pine, American Long Leaf	3	Walnut Queensland	3
Chestnut	3	Loliondo	3	Pine, Corsican	3	Walnut, European	3
Chipboard	9	Mahogany, West Indian	2	Pine, Yellow	1	Walnut, African	8
Coachwood	6	Mahogany, African	8	Pine, Hoop	3	Walnut, N. Guinea	2
Cordia, American light	5	Makore	2	Pine, Kauri	4	Walnut, American	1
Cypress, E. African	1	Mansonia	2	Pine, Huon	2	Wandoo	8
Danta	3	Maple, Pacific	1	Pine, Scots	1	Wawa	6
Douglas Fir	2	Maple, rock	1	Pine, Lodgepole	1	Whitewood	3
Elm, English	4	Maple, Queensland	2	Pine, Sugar	3	Yew	3
Elm, Rock	4	Maple, Sugar	1	Pine, New Zealand, White	2		
Elm, White	4	Matai	4	Pine, Parana	2		

Appendix 2 - Table of Materials Alphabetized by Group

Afara	1	Canarium, African	2	Pine, Hoop	3	Hickory	5
Ash, European	1	Douglas Fir	2	Pine, Caribbean, pitch	3	Iroko	5
Ash, Japanese	1	Fir, Douglas	2	Pine, Sugar	3	Keruing	5
Balsa	1	Gum, Saligna	2	Pine, Nicaraguan Pitch	3	Larch, Western	5
Bange Wanga	1	Gum, Southern	2	Pine, Corsican	3	Padauk, African	5
Bosquiea	1	Hyedunani	2	Pine, American Long Leaf	3	Pillarwood	5
Boxwood, Maracaibo	1	Ironbank	2	Queensland Walnut	3	Sycamore	5
Cahoma	1	Mahogany, West Indian	2	Sapele	3	Teak	5
Cypress, E. African	1	Makore	2	Seraya, Red	3	Afromosia	6
Fir, Grand	1	Mansonia	2	Silky Oak, African	3	Amboyna	6
Gum, American Red	1	Maple, Queensland	2	Silky Oak, Australian	3	Basswood	6
Gum, Spotted	1	Meranti, Red (light or dark)	2	Spruce, Norway (European)	3	Coachwood	6
Gurjun	1	Meranti, white	2	Spruce, Sitka	3	Muninga	6
Kapur	1	Merbau	2	Stringybar, Yellow	3	Obeche	6
Karri	1	Okwen	2	Stringybark, Messmate	3	Olivillo	6
Kuroka	1	Olive E. African	2	Turpentine	3	Persimmon	6
Maple, Pacific	1	Pine, New Zealand, White	2	Walnut Queensland	3	Ramin	6
Maple, rock	1	Pine, Huon	2	Walnut, European	3	Wawa	6
Maple, Sugar	1	Pine, Maritime	2	Whitewood	3	Gegu, Nohor	7
Myrtle, Tasmanian	1	Pine, Parana	2	Yew	3	Guarea, White	7
Oak, Japanese	1	Redwood, Californian	2	Abura	4	Opepe	7
Oak, American white	1	Walnut, New Guinea	2	Azelia	4	Santa Maria	7
Oak, American Red	1	Ayan	3	Binvang	4	Agba	8
Oak, European	1	Bech, European	3	Birch, Yellow	4	Birch, European	8
Padang	1	Blackbutt	3	Bisselon	4	Cedar, West Indian	8
Panga Panga	1	Camphorwood, E. African	3	Elm, White	4	Cherry, European	8
Pine, Lodgepole	1	Cedar, Western Red	3	Elm, Rock	4	Fir, Noble	8
Pine, Yellow	1	Chestnut	3	Elm, English	4	Guarea, Black	8
Pine, Scots	1	Danta	3	Kauri, New Zealand	4	Kauri, Queensland	8
Pine, Radiata	1	Greenheart	3	Lime	4	Mahogany, African	8
Poplar, Black	1	Hemlock, Western	3	Matai	4	Muhuhi	8
Pterygota, African	1	Jarrah	3	Oak, Turkey	4	Musine	8
Redwood, Baltic (Europe)	1	Jelutong	3	Odoko	4	Musizi	8
Redwood, Baltic (Europe)	1	Larch, European	3	Pine, Kauri	4	Queensland Kauri	8
Rosewood, Indian	1	Larch, Japanese	3	Pyinkado	4	Utile	8
Sterculia, Brown	1	Loliondo	3	Totara	4	Walnut, African	8
Tallowwood	1	Missanda	3	Baguacu, Brazilian	5	Wandoo	8
Walnut, American	1	Niangon	3	Bitterwood,	5	Chipboard	9
Ash, American	2	Oak, Tasmanian	3	Cordia, American light	5		
Berlina	2	Pine, Ponderosa	3	Erimado	5		