

BD-2100

owner's manual

For 65 years Delmhorst Instrument has been the leading manufacturer of high quality, US-made moisture meters and thermo-hygrometers. Today we offer a wide range of meters for applications including water damage restoration, construction, flooring, lumber/woodworking, paper, and agriculture.



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WHEN ACCURACY IS THE POINT.™

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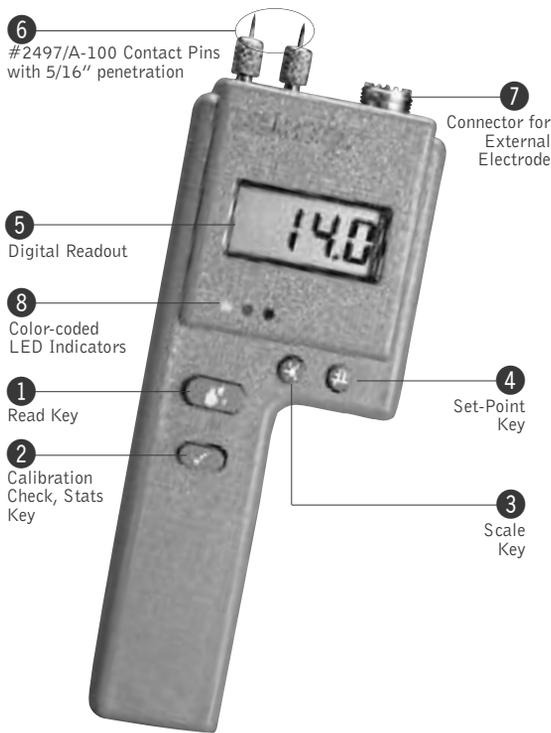
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Species and Temperature Correction Tables and Pin Correction Chart can be found in the back of the owner's manual.

DELMHORST BD-2100



BD-2100 FEATURES

- ▶ Designed to check moisture levels in wood, concrete, EIFS, drywall, and other materials
- ▶ Resistance technology recognized around the world as the most accurate method for measuring moisture
- ▶ Proven microcontroller circuit
- ▶ 6%-40% MC range on wood
- ▶ 0.2%-50% MC range on gypsum
- ▶ 0 to 100 reference scale for other non-wood materials
- ▶ Easy one-hand operation
- ▶ Includes (1) 9-Volt Battery
- ▶ Includes sturdy carrying case
- ▶ One-year warranty

The operating instructions for the model BD-2100 are divided into two sections. Section A is a step-by-step guide to the different features and basic use of your moisture meter. Section B contains information on how the meter is used for testing different materials.

Please read the instructions carefully. If you require additional information, please contact Delmhorst for assistance.

SECTION A BEFORE YOU BEGIN

KEY FUNCTIONS

- 1 **Read Key** - This key reads the Percent Moisture Content or relative moisture value in the material under test.
- 2 **Calibration Check Key** - This key, (when pressed with the read key) checks the meter calibration. It also displays the number of readings in memory (up to 100), the average, and the highest stored reading. It also clears the memory.
- 3 **Scale Key** - This key sets the display scale to #1 (Wood), #2 (0-100 Reference scale), and #3 (Gypsum). It also acts as a scroll key, depending on the function.
- 4 **Set-Point Key** - This key programs the set-point value. A buzzer will alert you if the meter reads higher than the selected value. It also acts as a scroll key, depending on the function.

CHECK CALIBRATION

- ▶ Press the read key **1** and calibration check key **2** simultaneously. Meter is in calibration if it displays 12% (+/- 0.2). Make sure the pins are not in contact with anything when checking the calibration.

If you check the calibration and the meter does not display 12%, it is likely an indication of a low battery. If this occurs, replace the battery with a new one immediately. Continued use with a low battery may cause the meter to go out of calibration. If you have a fresh battery and the instrument still does not indicate a correct calibration, return it to DELMHORST for service. See **Service for Your Meter** section.

Note:

When the battery is removed and then reconnected, the meter displays its software version for one second and then turns itself off. After replacing the battery, you must reset the meter as described in **Resetting the Meter** section.

A hard Reset is required if, after changing the battery, the display is frozen. This is sometimes caused by the interruption of contact between the battery and battery lead wire. Resolve this as follows:

Disconnect the battery. Press and hold the Read key for 15 seconds. Release the Read key. Press and hold the Check key for 15 seconds. Release the Check key. Connect a fresh battery to the lead wire in a single action, making sure to align the poles properly and without interrupting contact. If the display remains frozen, repeat the procedure. If this procedure does not solve the problem, refer to the Service for Your Meter section.

SET THE SCALE

Set the scale for #1 Wood, #2 0-100 Plaster/Concrete Reference) scale, or #3 Gypsum (Drywall).

- ▶ **To change the scale**, press the scale key **3**. The meter will display the current scale for one second.
- ▶ **To scroll forward through the scales** hold the scale key **3** while the current scale is displayed and scroll to the scale desired.
- ▶ **To scroll backward through the scales**, press and hold the set-point key **4** within one second of pressing and releasing the scale key **3**. Continue to hold the set-point key **4** and the scale number will decrease.
- ▶ **When scrolling in either direction**, release the key to stop at your desired scale.

Changing the scale will automatically reset the set-point value to the default setting for that particular scale. Default settings are as follows:

#1 Wood Scale - 15%

#2 0-100 Reference Scale - 85

#3 Gypsum Scale - 1%

CHANGE THE SET-POINT

- ▶ **To change the set-point value** press the set-point key **4**. The meter will display the current set-point value for the scale you have chosen for one second.
- ▶ **To scroll forward** to a higher value for that scale hold the set-point key **4** while the current set-point is displayed and scroll to the set-point value desired.

- ▶ **To scroll backward** through the set-point values, press and hold the scale key **3** within one second of pressing and releasing the set-point key **4**.
- ▶ **Continue to hold the scale key 3** and the set-point value will decrease.
- ▶ **When scrolling in either direction**, release the key to stop at your desired set-point.

INFORMATION ABOUT YOUR READINGS

The meter will accumulate up to 100 readings in memory. After all 100 readings are "stored" it will continue to display the number of readings, the average, and the highest as a reminder that the memory is full. It will not add new readings until the memory has been cleared.

- ▶ **To add a reading** to the sum of all the previously stored readings, release the read key **1** within 2 seconds. To avoid storing a reading, keep the Read key depressed until the pins are no longer in contact with the material.

When taking and storing readings of a specific material, be sure to "clear" the meter before switching to the next scale if you do not want to group all of the readings together.

Readings below 6% will be displayed as -5.8 and readings above 40% will be displayed as a flashing 40.0. Neither of these types of readings will be added to your accumulated readings.

TO CHECK ACCUMULATED READINGS

This feature allows you to view the total number of all accumulated readings for the selected material, the average of those readings, and the highest stored reading.

- ▶ **To view the readings** press and release the calibration check key **2**. First the meter displays the number of accumulated readings for one second, then the average of those readings for two seconds. Then it displays the highest stored reading for two seconds. The total "cycle" time is five seconds.
- ▶ **To erase readings** hold the calibration check key **2** for 5 seconds. All accumulated readings will be erased and the meter will display "0".
- ▶ **To keep the accumulated readings in memory**, release the calibration check key **2** before the meter finishes the above cycle.

TO RESET METER

- ▶ Press and release the calibration check key ②.
- ▶ Within one second press the scale key ③.
- ▶ The meter will reset itself the default setting of Scale #1 (wood) and 15% set-point, and clear all the readings stored in memory.
- ▶ Resetting the meter will erase any previously stored readings.

SECTION B PRACTICAL APPLICATIONS

TESTING WOOD

- ▶ Set the scale to #1 Wood
- ▶ Align the contact pins ⑥ parallel to the grain and push them into the wood to their full penetration, if possible. If using an external electrode, attach it to the connector ⑦ and also align the pins parallel to the grain before driving them into the wood.
- ▶ Press the read key ①. The meter displays the %MC for two seconds.

If the displayed reading is above the set-point value the set-point buzzer will sound. Also, one of the LEDs on the front panel will light up as follows:

Wood Scale #1

Green - 6% to 15% **Yellow** - 15% to 17% **Red** - > 17%

The LEDs are a visual aid to help quickly determine the moisture level that each reading indicates. Readings that activate the green light indicate a sufficiently dry moisture level, those that activate the yellow light indicate a borderline situation, and those that activate the red light indicate material that is too wet for most applications. Use the color-coded ranges as a guideline. Specific applications may require different MC thresholds.

Meter readings taken on construction-grade lumber material can be taken at face value, without “corrections” for many applications.

If your application requires a higher level of accuracy (ex. finish flooring, furniture-making) Delmhorst recommends applying the following corrections:

Temperature –As wood temperature increases, its electrical resistance decreases and indicated moisture content rises. Lower wood temperatures result in lower indicated moisture content. If the wood temperature, which is typically the ambient temperature, is between 50°F/10°C and 90°F/32°C, there is no need to apply a correction. Refer to the temperature correction table at the end of the manual.

Pin (insulated vs non-insulated) – The reference calibration of the meter was made with non-insulated pins that penetrate 5/16 inch. Insulated pins read slightly lower than non-insulated ones. When using an electrode with insulated pins, such as the 26-ES, refer to the correction at the end of the manual.

Species – Delmhorst uses Douglas Fir, the USDA standard, as the basis for all wood calibrations. Because the electrical characteristics of different species vary, all species read differently at the same moisture content. For this reason, a species correction is required. Refer to the species correction table at the end of the manual.

Paint Failure and Moisture

Moisture is by far the most frequent cause of paint failure. The key to preventing paint failure is to make certain that moisture is not absorbed through the wood to the back of the paint film. In order to insure quality paint jobs, wood must remain dry after the application of paint.

Outdoor wood can be safely painted without danger of peeling if the %MC is 15% or less. In drier climates, the maximum reading should be 10% to 11%. Indoor wood should be between 7% to 8% prior to painting.

The following conditions may cause high moisture content in wood:

- ▶ Leaky gutters and down spouts
- ▶ Leaky pipes or condensation on cold water lines in attic or hollow walls
- ▶ Faulty flashing around windows, doors and where porch and dormer roofs meet sidings
- ▶ End-grain wood that is not sealed with paint at all joints around windows, corners, and butt joints
- ▶ Porch columns that do not have good drainage and ventilation where they rest on porch floors
- ▶ Siding or any other wood that is in contact with the ground

- ▶ Siding and shingles without sufficient lap so that water is forced up through cracks by wind pressure
- ▶ Ice dams
- ▶ Condensation of vapor within hollow walls

EIFS (Exterior Insulation & Finish Systems)*

Moisture intrusion problems in EIFS (also known as synthetic stucco) stem from leaking window frames, improper use or lack of sealant, and faulty installation of flashing.

If you suspect a problem take a visual inspection. Look for gaps around windows, doors, air conditioning units, light fixtures, hose bibs, dryer vents and other areas of potential penetration. Also look for visible signs of water damage. If a problem exists, use the **BD-2100** with a **#21-E electrode**. This electrode includes the #608 insulated pins that penetrate 3 1/4". Also available - #608/001 insulated pins with 6in. penetration.

Procedure:

- ▶ Using a drill or the available **HP-1 hole punch**, make 2 (1/4") holes about 3/4" apart at an upward 450 angle.
- ▶ Push the **#21-E Electrode** into the holes through the polystyrene and into the substrate.
- ▶ Set the meter to the wood scale #1 if the sheathing is plywood. If gypsum sheathing is used, refer to the gypsum scale #3.
- ▶ Press read button **1** and read the moisture content on the display.

TESTING GYPSUM/DRYWALL

- ▶ Set the scale for #3 Gypsum (measures gypsum %MC over the range of 0.2% - 50%).
- ▶ Push the contact pins **6** into the gypsum to their full penetration, if possible.
- ▶ Press the read key **1**, and read the moisture content on the display. The meter displays the reading for 2 seconds.

The set-point buzzer will sound if the displayed reading is above the set-point value. Also, one of the LEDs on the front panel will light up as follows:

| Gypsum Scale #3 | | |
|--------------------|--------------------|------------|
| Green - 0% to 0.5% | Yellow - 0.5 to 1% | Red - > 1% |

The LEDs are a visual aid to help quickly determine the moisture level that each reading indicates. Readings that activate the green light indicate a sufficiently dry moisture level, those that activate the yellow light indicate a borderline situation, and those that activate the red light indicate material that is too wet for painting or wallpaper.

USING THE 0-100 REFERENCE SCALE

When taking a reading on materials such as concrete, plaster, or masonry, use Scale #2 to determine a **qualitative reading**.

Tests should be made on areas that are known to be dry, followed by readings on areas that are wet. These readings can be used as standard or reference points, against which subsequent readings are compared. All readings should be evaluated in the light of factors such as type of paint, floor coverings, construction, and climatic conditions.

The set-point buzzer will sound if the displayed reading is above the set-point value. Also one of the LEDs on the front panel will light up as follows:

| 0-100 Reference Scale #2 | | |
|--------------------------|----------------|-----------|
| Green - 0-85 | Yellow - 85-95 | Red - >95 |

The LEDs are a visual aid to help quickly determine the moisture level that each reading indicates. Readings that activate the green light indicate a sufficiently dry moisture level, those that activate the yellow light indicate a borderline situation, and those that activate the red light indicate material that is too wet for most applications.

Testing Plaster Walls

Under normal drying conditions and proper application of plaster (sufficient drying time between coats), surface readings give accurate results. However, if rapid drying occurs, the surface of the plaster may be dry, but moisture is still present below the surface and will eventually affect the paint or wallpaper. This condition occurs when there is high temperature or exceptionally good air circulation, or where brown scratch and white coats are applied within a few days. Take several readings on each wall. Pay special attention near the base, around doorjamb, electrical and plumbing fixtures, and other places where the plaster is thicker than normal.

Taking a Surface Reading:

- ▶ Drive the contact pins **6** into the plaster to their full penetration, if possible.
- ▶ Press read key **1** and read the meter.

Taking a Reading Below the Surface:

- ▶ Drive a pair of nails into the plaster at least 1/3 of the total thickness of the plaster. If you are applying plaster to a material of unknown dryness, such as brick or concrete, drive the nails through the plaster and into the brick or concrete.
- ▶ Touch the heads of the nails with the contact pins 6 and read the meter.

Testing Concrete Slabs for Flooring Applications

Moisture meters are an effective tool to check comparative moisture conditions in concrete slabs. They can tell you where there may be excess moisture and help determine if you need to conduct further testing, and identify specific areas on which that testing should be performed. Meters do not provide quantitative results as a basis for acceptance of a slab for installation of moisture-sensitive flooring systems. ASTM Test Method F2170 (RH using in situ probes), F1869 (calcium chloride), and F2420 (RH on surface using insulated hood) provide quantitative information for determining if moisture levels are within specific limits.

It is important to test both the surface and mid-section of the slab, especially if the slab is on or below grade. This will help determine if there is continuous moisture migration toward the surface. If this condition exists, the moisture movement may be so slow that once it reaches the surface, moisture evaporates and causes a "dry" reading when a surface test is made.

However, if a sub-surface test is made, the meter may read "wet" indicating the presence of moisture. When the slab is covered and the upward movement of moisture continues, moisture will move into a hygroscopic (wood) floor, or build-up pressure under a non-breathing resilient floor, causing floor failure.

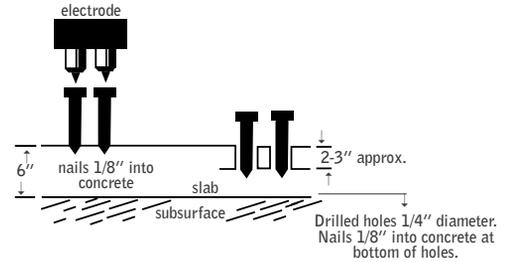
Taking a Surface Reading:

- ▶ Drive two hardened-steel masonry nails about 3/4" apart into the finish coat of concrete slab. Drive them about 1/8" deep so they make firm contact with the concrete and do not move when touched.
- ▶ Touch the nails with the contact pins 6 .
- ▶ Press read key 1 and read the meter. If the meter reads in the red or "wet" area, it shows the floor is not satisfactory for covering. If meter reads in

the green or "dry" area, the surface is dry. However, subsurface tests should be made to verify if the slab is dry throughout.

Subsurface Test:

- ▶ Drill two 1/4" holes, 3/4" apart and 1/2" to 2" deep.
- ▶ Drive the masonry nails into the bottom of the holes and make the tests as described above. Nails must not touch sides of drilled holes.



If the meter still indicates green or "dry," the floor should be ready for covering. Tests should only be made in newly drilled holes, since the inside surface of the holes can dry out while the rest of the slab is still wet.

Even readings in the red or "wet" area can indicate relatively low moisture content in concrete. For example, readings in the 85-95 range on the reference scale indicate approximately 2% to 4% moisture content.

Note: Perform minimum three tests for the first 1000 ft² and at least one additional test for each additional 1000 ft².

Select test locations to provide information about moisture distribution across the entire concrete slab, especially areas of potential high moisture, or if the slab is thick (>4 in) and air circulation is poor. For slabs on-grade and below-grade, include a test location within 3 ft of each exterior wall.

Key Factors to Consider:

- ▶ The age of the slab. Wait at least 30 days after the slab is laid before checking moisture content.
- ▶ Is the slab on grade or suspended? If the slab is on grade, is there an effective vapor barrier under the slab?
- ▶ How thick is the slab?
- ▶ What is the drainage condition of the ground?
- ▶ History of other structures in the area

Testing Brick or Concrete for Paint Application

Brick, stucco, or concrete surfaces must be dry at the time of application and must remain dry after paint is applied or failure of the paint film may occur. These materials are frequently exposed to unusual moisture conditions that allow them to absorb moisture through some exposed surface or some structural defect. This is why it is important to check the moisture levels of the brick or concrete when it has been exposed to conditions that permit it to absorb moisture.

Procedure:

- ▶ Drive two hardened steel masonry nails about 3/4" apart into the brick or concrete. Drive them about 1/4" deep so they make firm contact and do not move when touched.
- ▶ Touch the nails with the contact pins 6.
- ▶ Press read key 1 and read the meter.

Normally, dry concrete or brick will read in the green or "dry" portion of scale, indicating a safe condition to apply paint. Meter readings should be evaluated in relation to other factors — knowledge of the structure, type of paint used, expected weather conditions in the near future, etc. Paint should not be applied if readings are in the red or "wet" portion of the scale.

Do not be misled by surface appearance of masonry materials. Short exposure to rain may thoroughly wet the surface while the interior is still dry. In this instance, we recommend repeating the test on the masonry **below the surface** as mentioned above.

Key Areas to Check:

- ▶ The rear side of brick parapet walls — generally are not waterproof above the flashing line and frequently absorb moisture during rains.
- ▶ Painted concrete floors on grade — subject to peeling as they absorb moisture from the earth, unless an effective vapor barrier has been installed.

Tests on these materials should be made a day or so after they have been exposed to rain or other high moisture conditions to verify to what extent they absorb moisture.

Tracing Leaks

The BD-2100 can help trace leaks in masonry material. Normally, dry plaster, brick, or concrete will contain so little moisture it cannot be detected by the meter. If the meter indicates the presence of moisture you can trace the moisture to its origin.

To trace the origin of a leak:

- ▶ Drive a nail into an area that is known to be wet and attach an insulated wire between the nail and one of the contact pins 6.
- ▶ Apply the other pin to various parts of the wall where you suspect the leak originates. If the meter indicates red or "wet", the material is wet between the points of contact. If the meter reads green or "dry", the material along this line is not in the path of a leak.

To confirm if a brick wall is waterproof:

Perform the following procedure after storms to verify if a brick wall is waterproof, or if waterproofing repairs have been properly performed:

- ▶ Drive pairs of nails into the brick wherever it is necessary to make the tests and leave them in place until after all the tests are completed.
- ▶ Take readings after each storm, and record the readings. The pattern of these readings will indicate if the brick is gradually drying out or is moistened again by each storm.

Detecting Moisture in Insulation

Use the BD-2100 with the #21-E Electrode and #608 insulated pins to detect moisture in insulation. These pins penetrate 3 1/4" and are insulated, except at the tips. Only the uninsulated tips make contact with the material, providing information as to the depth at which moisture is present. Also available - #608/001 insulated pins with 6" penetration.

Procedure:

- ▶ Drill two 3/16" diameter holes, one inch apart through the siding or drywall.
- ▶ Using the #21-E, insert the #608 contact pins into the holes so that you make contact with the insulation.
- ▶ Press the read key 1 and take a reading. Take readings at various depths of penetration to determine the location of moisture.
- ▶ Seal holes with an appropriate filler at the conclusion of the test.

Meter readings provide a qualitative indication of the presence of moisture. Meters are not calibrated to read the percentage of moisture content in the insulation. The meter may also help identify the pattern of distribution to help you determine if moisture is due to condensation or leakage.

The presence of moisture in insulating material greatly reduces its insulating properties. If the insulating material absorbs moisture, water will displace the air in the material. Water also transmits heat at a faster rate than air, thus reducing the efficiency of the insulation.

Side walls and roof insulation pick up moisture because of leaks in the roof or structural defects in the side walls which allow storm water to be forced in during high wind. During periods of cold weather, vapor will condense as it approaches the colder area near the outside walls, and resulting moisture will remain trapped in the insulation.

Cork, wood fiber boards, and other cellulose material read lower than glass wool and other inorganic types of insulation.

CARE OF YOUR METER

To keep your meter in good working order:

- ▶ Store your meter in a clean, dry place. The protective carrying case provided is an ideal storage place when the meter is not in use.
- ▶ Change the 9-Volt battery as needed. Continued use with a low battery may cause the meter to go out of calibration.
- ▶ Change contact pins as needed. Keep pin retainers hand tightened.
- ▶ Clean the meter and contact pins with any biodegradable cleaner. Use the cleaner sparingly and on external parts only. Keep cleaner out of the external connector 7.
- ▶ Remove the battery if the meter will not be used for one month or longer.

SERVICE FOR YOUR METER

If your meter is not working properly, replace the battery with a new one and check the calibration. If this does not resolve the problem, go to www.delmhorst.com and follow the instructions under the Product Support tab.

If you require further assistance please call 877-DELMHORST (334-6467) or 973-334-2557.

WARRANTY

Delmhorst Instrument Co., referred to hereafter as Delmhorst, guarantees its BD-2100 meter for one year from date of purchase and any optional electrodes against defects in material or workmanship for 90 days. If, within the warranty period, you find any defect in material or workmanship return the meter following the instructions in the **Service for Your Meter** section. This limited warranty does not cover abuse, alteration, misuse, damage during shipment, improper service, unauthorized or unreasonable use of the meter or electrodes. This warranty does not cover batteries or contact pins. If the meter or any optional electrodes have been tampered with, the warranty shall be void. At our option, we may replace or repair the meter.

Delmhorst shall not be liable for incidental or consequential damages for the breach of any express or implied warranty with respect to this product or its calibration. With proper care and maintenance the meter should stay in calibration; follow the instructions in the **Care of Your Meter** section.

UNDER NO CIRCUMSTANCES SHALL DELMHORST BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES OF ANY TYPE WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS OR DOWNTIME ARISING OUT OF OR RELATED IN ANY RESPECT TO ITS METERS OR ELECTRODES AND NO OTHER WARRANTY, WRITTEN, ORAL OR IMPLIED APPLIES. DELMHORST SHALL IN NO EVENT BE LIABLE FOR ANY BREACH OF WARRANTY OR DEFECT IN THIS PRODUCT THAT EXCEEDS THE AMOUNT OF PURCHASE OF THIS PRODUCT.

The express warranty set forth above constitutes the entire warranty with respect to Delmhorst meters and electrodes and no other warranty, written, oral, or implied applies. This warranty is personal to the customer purchasing the product and is not transferable.

NOTES

| TEMPERATURE CORRECTION TABLE | | | | | | | | | | | | |
|-------------------------------------|-----|---|----|----|----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| METER READINGS | | | | | | | | | | | | |
| °C | °F | 6 | 7 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 50 | 60 |
| -20 | 0 | 9 | 11 | 15 | 22 | 31 | 38 | 45 | 53 | | | |
| -10 | 20 | 8 | 10 | 14 | 20 | 28 | 34 | 40 | 47 | 55 | | |
| 5 | 40 | 7 | 8 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | | |
| 15 | 60 | 6 | 7 | 11 | 16 | 21 | 27 | 32 | 38 | 43 | 54 | |
| 30 | 80 | 6 | 7 | 9 | 14 | 19 | 23 | 28 | 33 | 38 | 47 | 55 |
| 40 | 100 | 5 | 6 | 8 | 12 | 17 | 21 | 25 | 29 | 34 | 42 | 50 |
| 50 | 120 | 5 | 5 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 38 | 44 |
| 60 | 140 | 4 | 5 | 7 | 10 | 14 | 17 | 20 | 23 | 27 | 34 | 40 |
| 70 | 160 | 4 | 4 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 30 | 36 |
| 80 | 180 | 3 | 4 | 5 | 8 | 11 | 13 | 16 | 19 | 22 | 27 | 33 |
| 95 | 200 | 3 | 4 | 5 | 7 | 10 | 12 | 14 | 17 | 19 | 24 | 28 |
| 105 | 220 | 2 | 3 | 4 | 6 | 9 | 11 | 13 | 15 | 17 | 21 | 26 |

Moisture content values shown in **bold** are only qualitative since they are above fiber saturation point (30%MC).

Pin correction:

| METER READINGS WITH INSULATED PINS (26-ES ELECTRODE) | | | | | | | | | | |
|---|-----|------|------|------|------|------|------|------|------|--|
| 7 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | |
| CORRECTED READINGS (TRUE INDICATED MOISTURE CONTENT) | | | | | | | | | | |
| 7.3 | 8.4 | 10.6 | 12.8 | 14.9 | 17.0 | 19.2 | 21.4 | 23.7 | 26.0 | |

WOOD SPECIES CORRECTION TABLE

METER READINGS WITH NON-INSULATED PINS

| METER READING ▶ | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
|-----------------------------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ALDER | 8 | 9 | 10 | 11 | 13 | 15 | 17.5 | 19.5 | 21.5 | 24 | 27 |
| APITONG | 8 | 9 | 10 | 11 | 13 | 15 | 17 | 20 | 22 | 24 | 27 |
| ASPEN | 7 | 8 | 9 | 10 | 11.5 | 13 | 15 | 16.5 | 18 | 20 | 21 |
| ASH, WHITE | 6.5 | 7.5 | 8 | 9 | 11 | 13 | 14.5 | 16 | 18 | 19.5 | 21 |
| BASSWOOD | 7 | 8 | 8 | 9 | 10.5 | 13 | 15 | 17 | 19 | 20.5 | 22 |
| BIRCH | 8 | 9 | 10 | 11 | 13 | 15 | 17 | 19 | 21.5 | 23.5 | 25.5 |
| CEDAR, EAST. RED | 8 | 9.5 | 10.5 | 12 | 14 | 17 | 19 | 21 | 23 | 25 | 26 |
| CEDAR, INCENSE | 7 | 8 | 9.5 | 10.5 | 12.5 | 15 | 17 | 19 | 21 | 23 | 25 |
| CHERRY | 8 | 9 | 10 | 11 | 13.5 | 15.5 | 18 | 20 | 22 | 24 | 26 |
| COTTONWOOD | 6 | 7.5 | 8.5 | 9.5 | 12 | 14 | 15 | 17 | 19.5 | 21 | 23 |
| CYPRESS | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 19.5 | 21.5 | 23.5 |
| ELM, AMERICAN | 7 | 7.5 | 8 | 8.5 | 10 | 11.5 | 13 | 15 | 16 | 18 | 19 |
| FIR, DOUGLAS | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| FIR, RED | 7 | 8 | 9 | 10 | 12.5 | 15 | 17 | 19 | 21 | 23 | 25 |
| FIR, WHITE | 8 | 9 | 9.5 | 10.5 | 12.5 | 15 | 17 | 19 | 21 | 23 | 25 |
| GUM, BLACK | 7.5 | 9 | 10 | 11 | 13 | 15 | 16 | 18 | 19 | 20.5 | 22 |
| GUM, RED | 7 | 8 | 9 | 10 | 12.5 | 14.5 | 16.5 | 19 | 20.5 | 22.5 | 24 |
| HEMLOCK, WESTERN | 7 | 8 | 9 | 10.5 | 13 | 15 | 17 | 19 | 20.5 | 22 | 23.5 |
| HACKBERRY | 7 | 8.5 | 9 | 9.5 | 12 | 13 | 15 | 17 | 18.5 | 20 | 22 |
| HICKORY | 8 | 8.5 | 9 | 10 | 11 | 12.5 | 14 | 15.5 | 17 | 19 | 20.5 |
| KERUING | 8 | 9 | 10 | 11 | 13 | 15 | 17 | 20 | 22 | 24 | 27 |
| LARCH | 7.5 | 9 | 10 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25.5 |
| MAGNOLIA | 7.5 | 9 | 10 | 11.5 | 14 | 16 | 17.5 | 19 | 21 | 22.5 | 24.5 |
| MAHOGANY, AFRICAN (ALSO KHAYA) | 8 | 9.5 | 10.5 | 12 | 15 | 17 | 19.5 | 22 | 24 | 26 | 28 |
| MAHOGANY, HOND. | 7 | 8 | 9 | 10.5 | 12.5 | 14.5 | 16 | 18 | 19.5 | 21.5 | 22.5 |
| MAHOGANY, PHIL. | 6 | 7 | 7.5 | 8 | 9.5 | 11 | 13 | 14 | 15.5 | 17 | 18 |
| MAPLE, HARD/SOFT | 8 | 9 | 9.5 | 10 | 12 | 14 | 16 | 18 | 20 | 22.5 | 25 |
| MERANTI, DARK RED | 8.5 | 9.5 | 10.5 | 11.5 | 12.5 | 16 | 18 | 20.5 | 22.5 | 24.5 | 26.5 |
| OAK, RED | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| OAK, WHITE | 7 | 8 | 8.5 | 9.5 | 11.5 | 13.5 | 15 | 17 | 18.5 | 20 | 22 |
| PECAN | 6.5 | 8 | 9.5 | 11 | 12.5 | 14 | 16 | 17.5 | 19 | 22 | 24 |
| PINE, LONGLEAF | 8 | 8.5 | 10 | 11 | 13 | 15.5 | 17.5 | 19.5 | 21 | 23 | 25 |
| PINE, PONDEROSA | 7.5 | 8.5 | 10 | 11 | 13.5 | 15.5 | 17.5 | 19.5 | 21 | 23 | 25.5 |
| PINE, SHORTLEAF | 7.5 | 9 | 10 | 11 | 13 | 15.5 | 17.5 | 19.5 | 21.5 | 23.5 | 25 |
| PINE, SO. YELLOW* | 8 | 9.5 | 10.5 | 12 | 14.5 | 16.5 | 19 | 21 | 23 | 25 | 28 |
| PINE, SUGAR | 7 | 8 | 9 | 10 | 12 | 15 | 17 | 19 | 21 | 23 | 25 |
| PINE, WHITE | 7 | 8 | 9 | 10 | 13 | 15 | 17 | 19 | 21 | 23 | 25.5 |
| POPLAR, YELLOW | 8 | 8.5 | 10 | 11 | 13 | 15.5 | 17.5 | 19.5 | 22 | 24 | 26 |
| RAMIN | 7 | 8 | 9 | 10 | 11 | 13 | 15 | 16 | 18 | 20 | 21 |
| RADIATA PINE | 10 | 11 | 11 | 12 | 14 | 16 | 18 | 20 | 23 | 25 | 27 |
| REDWOOD | 7 | 8 | 9 | 10 | 12 | 13.5 | 15 | 17 | 19 | 22 | 24 |
| SPRUCE, SITKA | 7 | 8 | 9 | 10 | 12.5 | 14.5 | 17 | 19 | 21 | 23.5 | 26 |
| SPF**▲ | 9 | 10 | 11.5 | 13 | 15.5 | 18 | 20.5 | 23 | 25 | 28 | 30 |
| SPF/COFI | 8 | 9 | 10 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 |
| TEAK | 7 | 8 | 8.5 | 9 | 11 | 12 | 14 | 15 | 17 | 18.5 | 20 |
| VIROLA | 6.5 | 7 | 8 | 9 | 11 | 12.5 | 14 | 16 | 18 | 18.5 | 20.5 |
| WALNUT, BLACK | 7.5 | 8.5 | 9.5 | 10.5 | 12.5 | 14.5 | 16 | 18 | 20 | 22 | 23.5 |

The species correction values shown in this table have been rounded for easy reference.

* Meter readings taken with 26-E 2-pin electrode with insulated pins. Do not apply 2-pin correction.

▲ SPF correction is based on USDA/Forintek data and can be used for the following species:
Lodgepole Pine, Alpine Fir, Eastern White Spruce, Black Spruce, Jack Pine