# User Instructions for Lignometer K Moisture Meter



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# **Table of Contents**

Accessories	3
Lignometer K - the Meter	4
First Step in Pin Mode - Check and Change Settings	6
Summary of Available Wood and Material Settings	6
Check Software Version	6
Changing from US to Metric System (°F to °C)	6
Checking Calibration	9

#### Pin Mode

Pin Technology	5
Measurements	7
Measuring Wood, Sheetrock, Concrete and other Building Materials	7
Monitoring using the Lignometer K	8
Function and Calibration Test - Pin Meters	9
Relative Humidity, Wood Moisture and EMC Chart	10

### Lignometer K

The Lignometer K is used by professionals in many different fields, from timber processing to furniture making to hardwood flooring installation, inspection, construction and restoration.

**Pin** Calibrations are built-in for different wood species, bamboo, panel products, sheetrock and a reference scale for concrete and other building materials.

### Accessories for Lignometer K:



Slide-Hammer Electrode E12 measures surface and core up to 2" deep. Detects a moisture gradient within the board. **Pins:** DZ, DA, DB



Drive-in Electrode E10 shown with EL pins up to 7" deep.

**Pins:** EG, EL coated EV, EA, EC uncoated



Electrode E14V, EG pins slim to reach corners. Can be extended. For hard materials (bamboo). **Pins:** EG, EL coated EV, EA, EC uncoated



Specialty Electrode E16 for hard building materials (concrete)

Pins: same as for E14V



Electrode E12: Coated pins: DZ, DA, DB up to 2" deep



Electrodes E10, 14, 16: Coated pins: EG up to 3/4" deep EL up to 7" deep



Electrodes E10, 14, 16: Uncoated pins: EA, EV, EC up to 5/8" deep.



TP check block for all Lignomat pin meters.

#### Calibration Check:

Pin meters including the Lignometer K internally check and adjust calibration before each reading.

Check blocks are used to confirm calibration and function of pin meters, cables and electrodes.



### Lignometer K, the Meter

If the display is blank and the SET/HOLD key is pressed repeatedly, active settings are displayed for: - pin mode

- wood or material setting.
- wood temperature

If the display shows a measured value and the SET/HOLD key is pressed repeatedly, the meter is put into HOLD mode first. Then, the active settings are displayed: See above.

Press  $\blacktriangle$  or  $\blacktriangledown$  key to change settings.

Overall size of Meter: -4.5" x 2.4" x 1" (12 x 6 x 2.5 cm)



#### **Hold Function**

The HOLD key is used (while taking readings) to "freeze" measured values for three minutes. During that time you can switch back to measuring by pressing the READ key again. This feature is helpful when taking notes or when measuring in areas, where the display cannot be read.

**Warranty:** All Lignomat meters have a 2-year warranty. Accessories have a 1-year warranty. Battery and pins are excluded.



# Pin Technology

The Lignometer K functions as a resistance-type meter in pin mode. The conductivity between the pins is measured and the moisture content is calculated according to the active wood species and wood temperature settings. The meter indicates the highest moisture value within the small measuring area between the tip of the teflon-insulated pins.

The Lignometer K pin measurements have to be corrected for:

- (1) Wood species or other materials being measured.
- (2) Wood temperature.

(1) The settings for the most common wood species, bamboo products and different building materials are listed in the laminated pocket guide included with the meter. For unlisted species or new products call customer service at 800-227-2105.

If no listing is available, Lignomat offers testing to determine the correct setting.

Pin mode (Unlisted code numbers do not work in pin mode)						
Moisture measurements of individual wood species, 5-99.9%						
Bamboo in pin mode within wood settings, 5-99.9%	170-180					
Reference scale for lamintates and composites made of wood, 0-99.9	0					
Moisture measurements of sheetrock and gypsum, 0.1-22%	15					
Settings for wallboards: interior, exterior, and water resistant						
Reference scale for concrete and other similar materials, 0-99						
Reference scale for building materials other than concrete or sheetrock	10					
Wood groups used in older Lignomat pin meters, 5-99.9%	101-104					
EMC measurements with Lignomat's EMC sensor, 5-27%	129					

**Code # for Pin Mode** (Unlisted code numbers do not work in pin mode, this is indicated by meter alternating between Pin and Scan mode)

#### # 111-230: Moisture measurements for individual wood species (5-99.9%)

- 170-180: Bamboo in pin mode within wood settings.
  - 0: Reference scale for laminates and composites out of wood (0-99.9).
  - 15: Sheetrock and gypsum (0-7%) (also 109, 9)
  - 8 Interior and exterior wall boards (also 108)
  - 7: Water-resistant Backer Board (also 107)
  - 25: Reference scale for concrete with E16 (0-99.9).
  - 10: Reference scale for building materials other than concrete or sheetrock (0-99.9).
- 101-104: Wood groups used in older Lignomat meters, #2 and 3 is used in all mini Lignos.
  - 1-4: Wood groups used in older Lignomat meters, #2 and 3 is used in all mini-Lignos.
  - 129: EMC with Lignomat's EMC sensor (5-28%).
- (2) The meter needs to be set for the correct wood temperature. Different ambient air temperatures do not affect the readings. However, measuring hot or cold wood will affect the readings. The Lignometer K has corrections for different wood temperatures built-in. Once you set the meter for the wood temperature and for the wood species, the corrected moisture value is displayed. Temperature adjustments are not necessary if meter is set for a wood temperature of 70°F and the lumber is within 55-85°F

It is difficult to actually measure the wood temperature at the depth, where the tips of the electrode pins are measuring. If the wood has been acclimated to the ambient (air) temperature, use the ambient temperature. If the wood is not acclimated, choose the average temperature over the last few hours.

## First Step for Pin Operation: Check and Change Settings

Before using the Lignometer K, the active (previously chosen) settings in the meter need to be checked and if necessary changed to fit the job to be done. To recall active settings, press the SET/HOLD key repeatedly.

Use  $\blacktriangle$  or  $\checkmark$  keys to change settings:

1st Setting for wood and non-wood materials (Mtrl): # 0-250. Corrections for different wood species and non-wood materials are needed in pin mode. Check table below and pocket guide for available settings for pin mode.



**2nd** Setting for wood temperature: Wood temperature corrections are only needed in pin mode. It is difficult to determine the temperature of the wood at the depth of the pins. See next page 7(2).



SUMMARY OF AVAILABLE WOOD AND MATERIAL SETTINGS	PIN
Settings for moisture measurements of individual wood species	111-230
Settings for measurements of wood species with known specific gravity	-
Settings for EMC measurements with Lignomat's EMC sensor	129
Settings for wood moisture measurements in wood groups #1-4	101-104
#1- 4 is used in old Lignometers. #2 and #3 is used in all mini-Lignos.	1-4
Settings for bamboo, vertical, horizontal, strand and engineered, 1/4" depth	170-180
Settings for wallboards: interior, exterior, and water resistant	107-109
Settings for moisture measurements of sheetrock and gypsum	15
Reference Scale for concrete and other similar materials	25
Reference Scale for bldg materials other than concrete or sheetrock	10
Reference Scale for laminates and composites made of wood	0

### Check Software Version. Change from US to Metric System

Temperature is indicated in °F or °C. Measuring depth is indicated in inches or mm. To change, disconnect the battery and press the SET key twice. Connect the battery again. Display shows software version as a 3-digit number (Example 3.19).

The active °C or °F setting appears on the right side of the display in the upper or lower corner. °C or °F setting can only be changed, while the software version is displayed.



To switch the setting from °F to °C, use down key ( $\mathbf{\nabla}$ ) To switch the setting from °C to °F, use up key ( $\mathbf{\Delta}$ )

The setting for inches or mm cannot be changed manually, it follows the temperature setting:

- If °C is set, the measuring depth is automatically indicated in mm.
- If °F is set, the measuring depth is automatically indicated in inches (").

After settings have been checked and changed, press the READ key to obtain moisture readings. The active settings appear briefly. Then, if no electrode is connected or if the electrode is not inserted into any material, the lowest possible reading for the active material and temperature settings appears. Example: PIN/ Min is 5% for setting 147 for 70° F. If an electrode is connected and inserted into the material, the moisture value and the active settings for material and wood temperature are displayed, Example: Wood species 147, wood temp 85° F, moisture value 6.9%. While the pins of the Electrode are hammered into the wood, friction heat is generated around the pins, which may result in dropping moisture values by about 0.3-0.5%. Within a few seconds of hammering the pins into the wood, there should be no more dropping of indicated moisture values.

While taking measurements:

- If the material is too dry to be measured, the meter will show the lowest possible value indicated by PIN/Min on the left side of the display.
- If the material is too wet to be measured, the highest possible value is indicated by PIN/Max on the left side of the display.

#### **Obtain stable Readings at low Moisture Contents:**

- Minimize electro-magnetic interference: If you measure close to computers, electrical wires or power tools in use, readings could become erratic. To avoid the interference, take measurements in a different location.
- Reduce static electricity: In dry climates and at low moisture contents static electricity may cause erratic readings. The wood, the meter and the person holding the meter should not move while taking measurements. Best results are achieved, when the meter is turned on and placed on the board, which is being measured.

#### **Measuring Wood**

Choose the correct setting for wood species and wood temperature. Page 6. Wood Range is 5-99%. Measurements above fiber saturation point (25-30%) are less accurate.

The slide-hammer electrode E12 with teflon-insulated pins is most commonly used for wood. As the pins are hammered towards the core, consecutive readings indicate any changes between surface and core moisture. For core readings at least a third of the board needs to be penetrated.

The ability to measure a moisture gradient up to 2" deep is one important reason why customers still use pin electrodes. In pin-less mode you can measure only up to 3/4" deep. If high moisture levels are suspected deeper down, the only option to measure deeper than 3/4", are pin electrodes:



-Electrode E12 with DB pins can measure up to 2" deep. -Electrode E14V, E10, or E16 with EL pins can measure up to 7" deep.

If the pins for the electrode E12 do not seem strong enough for hammering into hard wood or strand bamboo, use the electrode E14V with EG pins, because the E14V and the EG pins are built strong enough for hard







# **Measuring Building Materials**

Sheetrock: Select material code #15.

- Range: 0-22% (based on oven dry weight)
- Dry sheetrock ranges from 0.1% to 0.7%.
- Values of 0.8% and 0.9% are questionable.
- Any value 1% and higher is considered wet.

Values of 8-12% for dry sheetrock are WME percentages (Wood Moisture Equivalent).

Use the inspector electrode E14V or electrode E10. Teflon-insulated pins EG and EL allow pin-pointing the source of moisture problems, differentiating between surface moisture and moisture coming from behind the sheetrock. Select pins from 1/4" to 7" measuring depth.



- The electrode E14V is the ideal tool for water restoration jobs. Designed extra slim to fit into tight places, under baseboards, around pipes, in corners, etc. The handle can be extended to reach ceilings without a ladder or floors without crouching. You can hammer on top of the electrode to insert pins in a precise location at a precise depth.
- The electrode E10 is another option. Sturdy enough to hammer on top to insert pins.

**Concrete and Other Hard Building Materials:** Select material code #0. Instant readings can be obtained with electrode E16. The readings do not give moisture percentages. However, problem areas of high moisture can be located instantly by comparing readings from different areas. A chart is enclosed with E16, which lists readings and corresponding values in weight-percent.

- The electrode E16 consists of two separate posts, which makes inserting into hard materials easier. Page 21.

<u>Warning:</u> Test results from pin or pinless meters are not accurate enough to decide whether or not to lay a wood floor over a concrete slab. An RH in-situ probe test and/or a Calcium-Chloride test is recommended by most wood floor manufacturers.

#### Monitoring using the Lignometer K

Extension cables and probes can be installed to monitor remote areas, which are otherwise unreachable. Install probes, connect cable and leave the open cable end easily accessible. Lignometer K can be connected via adapter H, and measurements can be obtained at any time to check for changes in moisture content.

**Restoration:** Drying progress and leak surveillance. **Wood Floor:** Acclimation and long-term monitoring. **Lumber Drying, Air Drying, Storage:** Teflon coated PK probes are placed inside a lumber stack for measuring the center of a kiln charge without entering a hot kiln.

Lignomat offers everything necessary to monitor and control lumber drying from one-cable in-kiln monitor to a fully automatic kiln control system. Call customer service at 800-227-2105 to find a solution for your application.





# **Function and Calibration Test**

All pin meters from Lignomat including the Lignometer K are built with high-quality components, microprocessor based to guarantee stable calibrations for many years of usage. All meters from Lignomat internally check and if necessary adjust the calibration before each reading. Therefore, the meters are not set up to be re-calibrated manually by the user.

Before the battery is drained completely and the meter will not give any more values, a warning sign appears in the middle of the display, indicating the battery should be replaced soon.

Function Test: Pin measurement functions can be tested for open and closed circuit connections manually. Calibration Test: Pin measurements can be tested for calibration accuracy with check blocks provided by Lignomat. Using the external, pin calibration check block confirms that all connections function properly:

- in pin mode from the tip of the pins to the display (including hand probe or electrode, cable, meter and all connections)

For sensitive testing we recommend to use the check block before and after a test series. very time you check, the indicated value should be within +/-1 of the test standard

#### Manual function check: Step 1 and Step 2 Calibration check: Step 3

**Step 1:** Open circuit check. Set the meter to pin mode, select code # 103 and a wood temperature of 70° F. First check the meter only. Press the READ key and a low moisture value of 5.0% should be indicated with PIN/Min on the left side of the display. Next connect the cable. Press the READ key again and a value of 5% should be indicated. Last check the meter with the cable and the electrode (do not touch the electrode pins).

Your equipment passed the open circuit check if the 5% value is indicated every time. If the 5% value cannot be confirmed at the first check, the meter is defective, at the second check the cable is defective, at the third check the electrode is defective.

**Step 2:** Closed circuit check. Connect meter, cable and electrode. When the READ key is pressed and the metal tips of both pins are touched with two fingers, a reading higher than at least 12% should be indicated. If that is not the case, disconnect the electrode (electrode is defective). To check the cable, put your thumb on the open cable end. The cable is ok, if a reading higher than 12% is indicated.

**Step 3:** Lignomat offers an external calibration check block TP. The block is used to confirm the calibration of all Lignomat pin meters. Connect meter, cable and electrode. Select code # 103 and a wood temperature of 70°F. Place pins on screws for a value of 12% and 20% (+/-1%). Test confirms that meter, cable and electrode work and the calibration is correct.

Note: Step 3 can be done instead of Step 2. However, Step 1 should always be performed.

If step 1, 2 or 3 fail either the battery needs to be replaced or the electrode, the cable or/and the meter are defective. Contact customer service at 800-227-2105.





# **Relative Humidity, Wood Moisture and EMC Chart**

Recommended ambient conditions in buildings are 30%-50% relative humidity at 60°F - 80°F. If ambient conditions stay within this range, the amount of expansion and contraction of wood floors and furnishings, which have a moisture content of 6-9% is limited.

(Table from US Dept of Agriculture "Wood Handbook, Wood as an Engineering Material")

		Relative Humidity in %																		
Temp.	5	10	15	20	25	30	(35)	40	45	50	55	60	65	70	75	80	85	90	95	98
30	1.4	2.6	3.7	4.6	5.5	6.3	7.1	7.8	8.7	9.5	10.4	11.3	12.4	13.5	14.9	16.5	18.5	21.0	24.3	26.9
40	1.4	2.6	3.7	4.6	5.5	6.3	7.1	7.8	8.7	9.5	10.4	11.3	12.4	13.5	14.9	16.5	18.5	21.0	24.3	26.9
50	1.4	2.6	3.6	4.6	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.2	12.3	13.4	14.8	16.4	18.4	20.9	24.3	26.9
60	1.3	2.5	3.6	4.6	5.4	6.2	7.0	7.8	8.6	9.4	10.2	11.1	12.1	13.3	14.6	16.2	18.2	20.7	24.1	26.8
(70)	1.3	2.5	3.5	4.5	5.4	6.2	(6.9)	7.7	8.5	9.2	10.1	11.0	12.0	13.1	14.4	16.0	17.9	20.5	23.9	26.6
80	1.3	2.4	3.5	4.4	5.3	6.1	6.8	7.6	8.3	9.1	9.9	10.8	11.7	12.9	14.2	15.7	17.7	20.2	23.6	26.3
90	1.2	2.3	3.4	4.3	5.1	5.9	6.7	7.4	8.1	8.9	9.7	10.5	11.5	12.6	13.9	15.4	17.3	19.8	23.3	26.0
100	1.2	2.3	3.3	4.2	5.0	5.8	6.5	7.2	7.9	8.7	9.5	10.3	11.2	12.3	13.6	15.1	17.0	19.5	22.9	25.6

**EMC** Chart

Example: For a realtive humidity of 35% and temperature of 70°F, the EMC is 6.9%. A wood floor at 6.9% is stable, if the surrounding air has a relative humidity of 35% and a temperature of 70°F (EMC of 6.9%). In short, a floor is stable when the MC and the EMC are the same.



#### **KPP-M Package with Accessories**

\*Included but not pictured: BNC Cable, BNC-E16 Cable