User Instructions for Ligno-VersaTec Moisture Meter

Lignomat USA Ltd.

14345NE Morris Ct

Portland OR 97230

E-mail: sales@lignomat.com

www.lignomat.com

Tel:503-257-8957

800-227-2105

FAX: 503-255-1430

Table of Contents

Ligno-VersaTec: a multitask meter

The Ligno-VersaTec is used by professionals in many fields, from timber processing to furniture making to hardwood flooring installation, inspection, construction and restoration. This top of the line meter is loaded with features to make your job easier. Three modes of operation are possible:

Pin and Scan	Calibrations are built-in for different wood species, bamboo, panel products, sheetrock and a reference scale for concrete and other building materials.
RH	With RH BluePeg sensor for measurements of relative humidity,temperature, dew point Temp and GGP. Accessories are available for moisture testing of concrete slabs and wall cavities.

Accessories for Ligno-VersaTec:

Slide-Hammer Electrode E12 surface / core

Drive-in Electrode E10 (with EL pins)

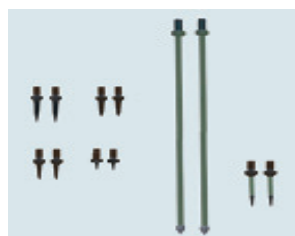Electrode E14V: extra slim for corners. Extended with standard broom handle

Specialty Electrode E16 for concrete
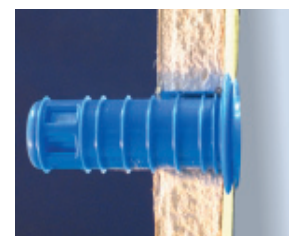

RH testing for concrete. Complies with ASTMF-2170-11.

Insulated pins: DZ, DA, DB pins for E12

Pins for E10, E14, E16: Non-insulated pins: EV, EA, EB, EC up to 5 / 8 ”
Insulated pins: EG, EL (7”)

RH BluePeg to measure RH, T, DP and GPP. Connect via RH Cable or RH Adapter

Sleeves for moisture measurements ofwall cavities with and without insulation.

Calibration Check Blocks for Pin/Pinless and RH Probes are available :

All meters from Lignomat including the Ligno-VersaTec internally check and adjust the calibration. Therefore manual recalibration is neither needed nor possible.

TP Block for Pin Measurements:

Checks Ligno-VersaTec pin mode, Cable and Electrode (from tip of pins to display).

TS Block for Pinless Measurements:

Checks Ligno-VersaTec pinless mode for both measuring depths 1/4" and 3/4".

RH Salt Solutions for RH BluePeg Probe:

Checks calibration of RH Probe and functioning od Cable and Meter. Available for 75% and 33%.

Checking and Changing Settings

Before taking readings, check and change settings according to the codes listed in the laminated pocket guide. To recall the active settings push the SET/HOLD key repeatedly. Then use ▲ or ▼ keys to change settings.
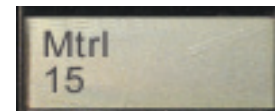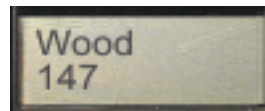
1st Active Pin or Pinless Mode Settings:
Use ▲ or ▼ keys to change mode settings.
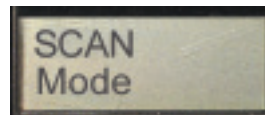
2nd Active Wood and non-wood Material (Mtrl) Settings:
Check graph on next page and pocket guide for available settings.

3rd Active Wood Temperature Setting:
For accurate readings in Pin Mode the wood temperature has to be adjusted
if needed. It is difficult to determine the wood temperature at the depth of measurement, therefore we suggest to use the ambient temperature.
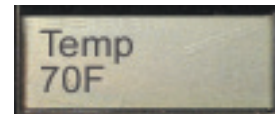
4th Active Depth Setting:
Only necessary for Scan Mode. Depth 1/4" is for thinner boards or measurements close to the surface. 3/4" requires at least a 3/4" thick board, otherwise the material underneath the board is included in the measurement.
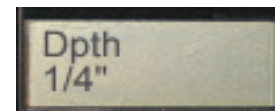
SUMMARY OF AVAILABLE SETTINGS	code #	PIN	SCAN
Scales for moisture measurements of individual wood species	**111-230**	x	x
Scales for EMC measurements with Lignomat's EMC sensor	5, 105	x	
Scales for wood moisture measurements of wood groups 1-4	1-4, 101-104	x	
Scales for wood measurements of species with known specific gravity	30-100		(x)
Scales for strand bamboo, other bamboo within wood settings	26-29	x	x
Reference Scale for concrete, based on relative humidity	25	x	x
Scale for moisture measurements of sheetrock and gypsum	15	x	x
Reference Scale for building materials other than concrete or sheetrock	10		x
Reference Scale for laminates and composites made of wood	0	x	x

If only one mode is available for the selected material setting, the Ligno-VersaTec switches to that mode automatically. Example: Setting 30 is only available for SCAN Mode.

Change ºC to ºF and mm to inches:

The settings for temperature and measuring depth can be indicated in ºF or ºC and in inches or mm. To change, disconnect battery and press the SET key twice. Connect battery again. The display pictured below will appear after the battery is reconnected.

The setting for ºF is indicated in the upper right corner of the display.

The setting for ºC is indicated in the lower right corner of the display.
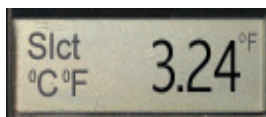
To change the setting from ºF to ºC, use ▼ key.

To change the setting from ºC to ºF, use ▲ key.

The number 3.2x represents the software version.

Taking Measurements

The READ key is used to turn the Ligno-VersaTec on and obtain measurements. The meter turns itself off after 1 minute. All three modes can be accessed by pressing READ: Pin - Scan - RH Mode
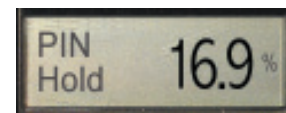
Hold Function:

The HOLD key is used (while taking readings) to "freeze" measured values for one minute . 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.

Pin Mode

In Pin Mode the Ligno-VersaTec functions as a resistance-type meter. 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 teflonized tip of the pins.

Before taking readings the active settings should be checked by repeatedly pressing the SET key and changed with p or q keys. The laminated pocket guide lists the most common wood species. 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.

> If you want to change from **Pin** ↔ **Scan** mode, press the ▲ or ▼ key while a moisture value is displayed.

Available Settings for Pin Mode:

Material   111-230: MC for individual wood species (5-99.9%)* .

              0: reference scale for laminates and composites out of wood (0-99.9)   15:   MC for sheetrock and gypsum (0-22%).

          25: reference scale for concrete with E16 (0-99.9).

  1-4, 101-104: MC for wood groups 1-4 (5-99.9%)*.

      5, 105: EMC with Lignomat's EMC sensor (5-25%).

Wood Temperature:

The necessary correction is for the wood temperature only. If the wood temperature is the same as the ambient (air) temperature, use the ambient temperature. If the wood is not acclimated to ambient conditions, choose the average temperature over the last few hours.
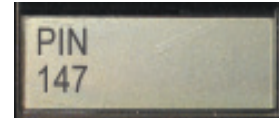
It is difficult to actually measure the wood temperature at the depth where the tips of the electrode pins are measuring.

Measuring Depth:

The settings for measuring depth do not affect readings in Pin Mode.

Measuring in Pin Mode

After settings have been checked and changed, press the READ key to obtain moisture readings. The active setting appears briefly. If no electrode is connected or if the electrode is not inserted into any material, the default reading appears. 5% is the minimum moisture percentage, which can be measured at the active setting of 147.

If an electrode is connected and inserted into the material, moisture values are indicated to the right of the display in percent. To the left, the active material and temperature settings are displayed.
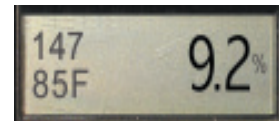
If the material is too dry to be measured, the meter will show the lowest possible reading indicated by PIN/min to the left side of the display. If the material is too wet to be measured, the highest possible reading is indicated by PIN/max to the left side of the display.

Readings above fiber saturation point (25-30%) are less accurate.

> If you want to change from **Pin ↔ Scan** mode, press the ▲ or ▼ up key while a moisture reading is displayed

Wood:

The Slide-Hammer Electrode E12 is most commonly used for wood. Hammer the insulated pins into the 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 Electrode E12 with teflon-insulated pins is the industry standard for quality control.

The ability to measure a moisture gradient up to 2"deep is one important reason why customers still use the pin electrode. In Scan Mode you can only obtain two measuring depths with the Ligno-VersaTec. However, if high moisture levels are suspected to be further into the material than 3/4", the only option are pin electrodes. With the EL pins you can measure up to 7"deep.

Building Materials:

For sheetrock: Connect Inspector Electrode E14 or Electrode E10 to Ligno-VersaTec. Insert pins into the sheetrock. Teflon-insulated pins EG and EL allow pin-pointing the source of a moisture problem, differentiating between moisture close to the surface and moisture coming from behind the sheetrock. Select the pins from 1/4" to 7" long according to the job on hand.

- The Electrode E14 is extra slim to fit into tight places, around pipes, in corners, etc.
- The Electrode E10 is extra sturdy and can be hammered on directly to insert pins.

For Concrete: Instant readings can be obtained with the Electrode E16. These readings do not give moisture percentages. However, problem areas can be located instantly by comparing readings from different areas with each other. A chart is enclosed with the Electrode E16, which lists readings and corresponding values given in weight-percent.

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-depth probe test is recommended. NWFA ruling.

Obtain stable readings:

- Minimize electro-magnetic interference. If you measure close to computers, power tools or electrical wires, 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 placed on the board to be measured.

Performance Tests:

Step 1: When the READ key is pressed and nothing is touching the pins of the electrode, a low moisture value of 5.0 is indicated with a blinking decimal point for material code 147 and
 wood temperature of 70ºF.

Step 2: When the READ key is pressed and both pins are touched with two fingers at the same time, a reading higher than at least 12% should be indicated.

Step 3 optional: Lignomat offers an external test block to check calibration and operation of any Lignomat pin meter, including cable and electrode. All Lignomat meters internally check and adjust the calibration. Therefore manual recalibration is not necessary and not possible.

If steps 1, 2 or 3 fail either the battery needs to be replaced or the electrode, the cable or the meter is defective.

Scan Mode

In Scan Mode the Ligno-VersaTec functions as a capacitance-type meter, using the relationship between the dielectric properties and the moisture content of the material to be measured. The readings generated by the Ligno-VersaTec are the average of the entire measuring field between the surface and the maximum depth of penetration. Moisture closer to the surface has
a greater effect on the average than the moisture closer to the maximum depth of penetration.

Before taking readings the active settings should be checked by repeatedly pressing the SET key and changed with p or q keys. The laminated pocket guide lists the most common wood species. If the wood setting is not listed in the pocket-guide, the specific gravity can be used. Example: The setting is 85 for a gravity of 0.85. The specific gravity for most wood species can be found on the Internet: Enter "specific gravity" followed by the wood species.

Specific gravity values can also be calculated with the following equation:

$$\frac{\text{Weight} \times 1.73}{\text{Length} \times \text{Width} \times \text{Heights}}$$ - Dry Weight in **ounces**

- Length, Width and Heights in inches

$$\frac{\text{Weight}}{\text{Length} \times \text{Width} \times \text{Heights}}$$ - Dry Weight in **grams**

- Length, Width and Heights in centimeters

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.

> If you want to change from **Pin ↔ Scan** mode, press the ▲ or ▼ key, while a moisture value is displayed.

Available Settings for Scan Mode:

Material 111-230: **MC for individual wood species (5-60%).**

30-100: MC for wood species with known specific gravity (5-60%)*.

15: MC for sheetrock, plaster and gypsum (0-2%).

0: reference scale for laminates and composites made of wood (0-99.9).

10: reference scale for building materials other than sheetrock or concrete (0-99)

25: reference scale for concrete (0-99.9), comparable to relative humidity.

Wood Temperatures: The settings for wood temperature does not affect readings in Scan Mode. Corrections for the wood temperature are not necessary for pin less meters.

Measuring Depth: Two selections are possible, 1/4" (5mm) and 3/4" (20 mm) deep.

Measuring in Scan Mode

After settings have been checked and changed, press the READ key
to obtain moisture readings. The active setting appears briefly.
If the measuring plate is not in contact with any material, the
default reading appears. 4.6% is the minimum moisture
percentage, which can be measured at the active setting of 158.
If measurements are taken, moisture values are indicated to the
right of the display in percent. To the left, the active material and
depth settings are displayed.

For actual measurements, place the meter on the test sample (for wood in the direction
of the grain) and press down slightly, holding outer sides of the meter without touching
the sample with your hand.
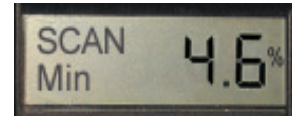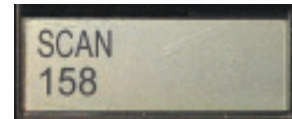
The test sample should be big enough to cover both sensor plates.
The measuring depth has to be chosen according to sample thickness.
If the surface is not smooth, several measurements should be taken. Select the highest
value.

If the material is too dry to be measured, the meter will show the lowest possible
reading indicated by PIN/min to the left side of the display. If the material is too wet
to be measured, the highest possible reading is indicated by PIN/max to the left side of
the display.

Readings above fiber saturation point (25-30%) are less accurate.

> If you want to change from **Pin** ↔ **Scan** mode, press the ▲ or ▼ up key, while a
> moisture reading is displayed

The selectable measuring depth is a unique
feature:

- All thicknesses from veneer to boards 1.5"
thick can be measured with the Ligno-VersaTec.
- The top layer of laminates or engineered floors
   can be measured without including the core.
- Panels and Hardwood floors thinner than 3/4"
can be measured without including the concrete
or the subfloor underneath.
- Moisture can be measured close to the surface versus deeper down
- When measuring the same spot, surface and core moisture can be compared with-
out pins.
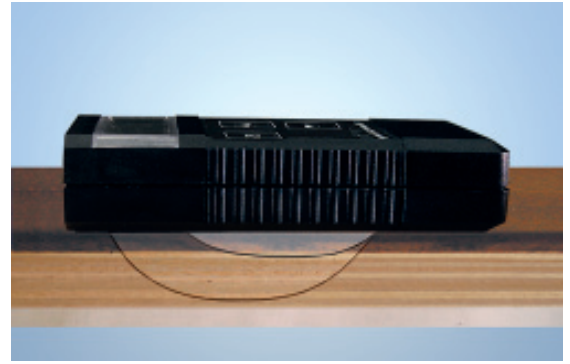
**The thickness of the sample and the chosen measuring depth of the
meter are crucial.** Moisture readings are wrong for samples thinner than the
measuring depth:

 -Readings could be too low if there is not enough test material underneath the
   sensor plates.
 -Readings could be too high if moisture from the material underneath the sample is
   included in the measuring field.

Influence from the material underneath the test sample can be eliminated by creat-
ing an air space underneath the board.

Veneer: Place a lightweight material such as Styrofoam under the veneer. It not only prevents inaccurate readings, but helps to create a flat measuring platform for the veneer. To obtain accurate readings in very thin veneer make a stack of several sheets.

If the sample to be measured is **composed of different materials** (linoleum glued on to wood, plywood, bamboo flooring with a wood core, etc...) the best way to obtain measurements is to use a dry sample board and determine a setting. The dry sample board could come from a sample you keep in your office, from an area that has already dried out or from a place where excess moisture never reached. Estimate the moisture content. An acclimated sample from your home, office or showroom should be at around 6-7%.

Set the meter on setting #50. Take measurements and change the setting:

- If the reading was below 7.5%, choose a setting lower than #50.
- If the reading was above 7.5%, choose a setting higher than #50. Change settings until you have found a setting, which gives a moisture value of 7.5%. This setting can be used in the future for the same product.

Even if no moisture value for a dry sample is available, you can establish a base value and compare future readigns to the base value. Trouble spots and areas of high moisture can be determined and are indicated by higher moisture values.

Wood:

For actual measurements, place the meter on the test sample (for wood in the direction of the grain) and press down slightly, holding outer sides of the meter without touching the sample with your hand.

For hardwoods (high specific gravity) the Ligno-VersaTec can read lower than 5%.

For softwoods (low specific gravity) the Ligno-VersaTec starts reading above 5%.

Readings above fiber saturation point (25-30%) are less accurate.

Building Materials: Press the meter slightly onto the material. If surfaces are uneven, try different orientations of the meter and use highest value.

For sheetrock: Setting 15 (0-2.0%). Moisture readings are indicated in percent.

At 65% relative humidity and 70ºF (20ºC) sheetrock will reach an equilibrium moisture content
between 0.7-0.9% depending on board manufacturer. For comparison, at 65% relative humidity and 70ºF (20ºC) wood will reach an equilibrium moisture content of 12%. Note: True moisture per-centages for sheetrock range between 0.3-0.7 for dry and from 0.8 to 22 for questionable and wet.

Since moisture closer to the surface has a greater effect on the read-out than the moisture closer to the maximum depth of penetration, and the measuring depth is limited to 3/4"deep, it may be necessary to investigate moisture problems deeper down with a pin electrode.

For concrete: Setting 25 (0-99.9). Moisture readings are given on a relative scale comparable to relative humidity readings in concrete. Readings indicate high and low moisture levels. The mea-surements with non-invasive meters are not accurate enough to establish absolute moisture values.

Warning: Test results from pin or pinless meters should not be used to decide whether or not to lay a wood floor over a concrete slab. An RH in-depth probe test is recom-mended. NWFA ruling.

For the floor installer:

Throughout the installation process a floor installer should use a moisture meter.First,when the floor is delivered, to make sure the floor is dry. Next, before and after acclimation, to make sure the floor is acclimated to the ambient conditions at the place of installation. It is best to mark selected sample boards and take readings throughout the acclimation process until the moisture content of the wood matches the relative humidity (See EMC chart below.) After the installation is finished and the customer is ready to sign off on the floor, the moisture condition of the floor should be documented. Select several moisture sensitive areas. Take readings on both depth levels and note the readings with species setting, measuring depth and location where the readings were taken. Maybe even take a photo to pinpoint the location. If you ever have to go back to check out a complaint, you can measure the same areas again and compare with the original readings. Keeping track of moisture conditions may in the end protect you from unwarranted claims and help find the source of the problem. The dual-depth readings may indicate if moisture was absorbed from the down-side of the floor or from the up-side of the floor.

Relative Humidity, Temperature and EMC Chart (from the US Dept of Agriculture "Wood Handbook, Wood as an Engineering Material")

Humidity recommendations range from 30%-50% in a building. Temperature recommendations range from 60°F - 80°F in a building.

If you stay within the recommendation the amount of expansion and contraction is limited.

Temp.	Relative Humidity																			
	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

For example: When a dry floor with the perfect moisture content of 6.2% is exposed for a long time to air with a relative humidity of 60%, the wood will absorb moisture and expand until 11% has been reached. Depending on wood species, the 5% change in moisture content can be accompanied by a substantial amount of expansion.

RH Mode

RH Mode: As soon as one of Lignomat's RH BluePeg sensors is plugged into the Ligno-VersaTec either using the RH Adapter or the RH Cable, the meter automatically is in RH Mode. The different values for RH, Temperature, Dew Point and GPP (grains per pound) can be obtained by pressing the ▲ or ▼ keys repeatedly.

Measuring range for **relative humidity**: 0-100%

Accuracy for RH:

10% to 90%: +/-2%

below 10% and above 90%: +/-3%

at 0% and at 99.9%: +/-4%

Measuring range for **temperature**: -40°F to 248°F (-40°C to 120°C)

Accuracy for T:

32°F to 104°F: +/-0.5°   (0°C to 40°C): +/-0.5°

at -5° F and at 50°F : +/-1°   at -20° C and at 70°C : +/-1°

at -40° F and at 207°F : +/-1.5°   at -40° C and at 97°C : +/-1.5°

Measuring range for **GPP**: 0-999

Take Readings in Concrete using in-situ Probes: See separate instructions for RH BluePeg.

Predrill a hole with a 5/8"drill bit. After cleaning and vacuuming out the hole, insert the sleeve into the hole. Sleeve should be flush with the surface. Insert the RH BluePeg after 72 hrs of acclimation. Note, by opening up the sleeve to insert the sensor, the climate inside the sleeve has been disturbed and it takes time for the inside of the sleeve and the sensor to come up to the condition before opening the hole. If the sensor is inserted at the time the hole is drilled, the drilling heat will affect the readings. Therefore, we suggest to insert the sensors between 1 hr -48 hrs after the sleeve has been installed. Then once the 72 hrs have passed the RH BluePeg sensors can be read instantly. Open cap, connect cable and read.

Dual depth Ligno-VersaTec

Hole liner for concrete measurement or moisture detection inside walls

RH Probe for ambient and concrete conditions

Electrode E12 for depth measurement in Pin Mode