

User Instructions for Ligno-Scanner SD Moisture Meter



Lignomat USA Ltd.
14345 NE Morris Ct
Portland, OR 97230

E-mail: sales@lignomat.com
www.lignomat.com
Tel: 503-257-8957
800-227-2105
FAX: 503-255-1430

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Ligno-Scanner SD - Meter Functions

If the display is blank and the SET/HOLD key is pressed, the active setting is displayed:

- wood species #30-100
- or reference scale #0

If the display shows a measured value and the SET/HOLD key is pressed repeatedly:

- Scanner is put into Hold mode
- Scanner is put into Set mode,
- wood species setting can be changed.

On the left side of the display, the active wood species setting and measuring depth are indicated.

For measurements press the READ key. Automatic shut-off after 3 minutes.

Two measuring pads are mounted on the back of the meter. The measuring pads cover an area of:
2.75" L x 1.75" W
(6.8 x 4.2 cm)

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

Measured value.

% sign is only present, if the indicated value is a moisture percentage. If % sign is missing, the value is a reference number (setting #0).

Press up or down key to change settings for Wood Species.

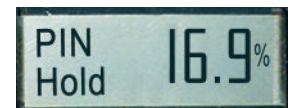
Battery cover is located at the back of the meter. Battery: One 9V battery.

A low battery symbol will appear on the display, when the battery is drained to 25%.



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.



Warranty: All Lignomat meters have a 2-year warranty.

Accessories have a 1-year warranty. Battery and pins are excluded.

Ligno-Scanner SD

The Scanners SD is a capacitance-type meter for wood with a reference scale for other materials. The sensor plates on the back emit and pick-up very low-powered electro-magnetic signals.

The readings generated by the Ligno-Scanner SD are average values for 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.



All Lignomat meters internally check and adjust the calibration. Manual recalibration is not needed.

Wood Range 5*-60%. Readings above 25% fiber saturation point are less accurate. *To check the lowest possible reading, hold the meter in the air and push the READ key. The range for hardwoods with high specific gravity is lower than 5%. The range for softwood with low specific gravity is higher than 5%.

Settings: #30-100. The most common wood species are listed on the laminated pocket guide included with each Scanner. Gravity Range is 0.3 to 1.0. For unlisted species the specific gravity can be entered as species setting. Example, for specific gravity of 0.42 the setting is #42. Values for specific gravity can be found on the internet by entering <specific gravity...> followed by the name of the wood. For calculating the specific gravity see page 9.

For unlisted species or new products we offer testing to determine the correct setting.

Reference scale:

Code #0: Sensitivity level for laminates and products made out of wood.

Selectable Measuring Depths: 1/4" (7mm) and 3/4" (20mm)

Battery: One 9V battery (included). To exchange battery, slide battery cover off on back of instrument. A low battery symbol will appear on the display, when the battery has been drained to 25% of its capacity.



Size of meter: 2"W x 5.5"L x 1"H (12 x 6 x 2.5cm)

Size of measuring pads: 2 1/2"L x 1 1/2"W (65 x 40mm)

Warranty: All Lignomat meters have a two year warranty. Battery excluded.

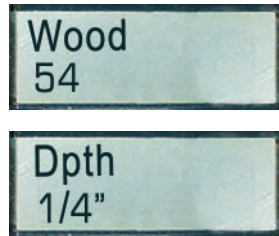
First Step Check and Change Settings

Settings for wood species are listed on the laminated pocket guide included with each meter. To recall active settings push the SET/HOLD key repeatedly.

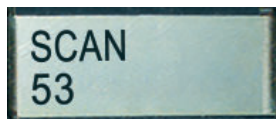
1st: Active Material settings for wood

2nd: Active settings for Measuring Depth
for 1/4" or 3/4" (7mm or 20mm).

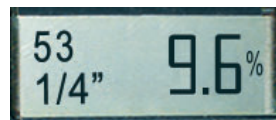
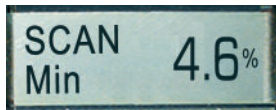
Use ▲ or ▼ keys to change settings.



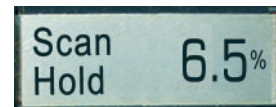
Taking Measurements



After settings have been checked / changed, press the READ key to obtain moisture readings. The active settings appear briefly. Then, if the measuring pads are not in contact with any material, the lowest possible value for the active wood setting appears: SCAN/min is 4.6 for setting #53.



If measurements are taken, the measured value (9.6%), the active wood species setting (53) and the measuring depth is displayed. (1/4" or 3/4")



The HOLD key is used to freeze the indicated value for one minute. Helpful when taking notes or when measuring in places, where the display cannot be read while measuring. At any time you can switch back to measuring by pushing the READ key again.

While taking measurements:

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

The lowest possible moisture percentage is different depending on wood species, for hardwoods the value is below 5%, for softwoods the value is above 5%.

HOLD function can be activated at any time during measurements. The meter turns off automatically after three minutes.

To obtain accurate measurements:

Turn the meter on and place it on the test sample (for wood in the direction of the grain). **Press down lightly**, holding the outer sides of the meter without touching the test sample with your hand. It is important to put light pressure on the meter towards the test sample.

For accurate measurements:

- The test sample should be big enough to cover both measuring pads. (If seams cannot be avoided when measuring flooring, seams should run parallel to long edge of meter.)
- The test sample should be at least as thick as the selected measuring depth.
- If the surface is not smooth and flat, several readings should be taken.

Select the highest value.

Note, all materials within the measuring field contribute to the value indicated. If the test sample is composed of different materials, the value indicated may not be a true moisture percentage, but may only be a reference number. Page 9: Find Settings for Composite and Engineered Boards.

To make sure the material underneath the test sample is not influencing the measurements, arrange an air space underneath the test sample. For example: Elevate one end of the test board to create an air space underneath the board.

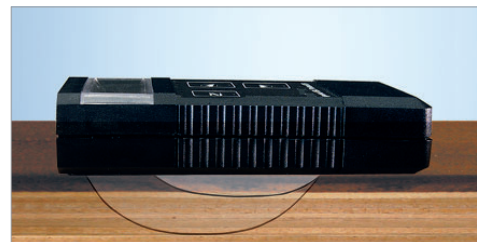


Measuring Depth Selectable 1/4" and 3/4"

Selectable dual-depth 1/4" and 3/4" is a unique feature only available in Lignomats dual-depth meters: Ligno-Scanners SD and SDM, Ligno-DuoTec BW and Ligno-VersaTec. All dual-depth meters from Lignomat have 2 independent sets of calibrations, one for 1/4" deep and one for 3/4" deep.

Measuring depth is crucial for all pinless meters. Most pinless meters are calibrated for a fixed material thickness of 3/4". That means, accurate measurements can only be taken if the material is at least 3/4" thick and no more than 1.5" thick. If test samples are thicker than 1.5", core measurements are only possible with a pin electrode. If test samples are thinner than the measuring depth, readings may be inaccurate:

- If not enough test material is underneath the measuring pads, values will be too low.
- If material underneath the test sample is included in the measuring field, values could be too high.



New ways to use the dual-depth capability of the Ligno-Scanner SD

- **Measuring products less than 3/4" thick:** Many panel and floor products are only 5/8" thick, which does not work well for a 3/4" measuring depth. One example: When floor planks 5/8" thick are installed and measured with a pinless meter set for a 3/4" measuring depth, you cannot be sure that the subfloor or concrete underneath is not affecting the readings. With the Ligno-Scanner SD on the 1/4" depth setting, you definitely only measure the floor planks .
- **Measuring engineered products:** You can find the moisture content of the thin top layer made from hardwood by using the corresponding species setting and 1/4" depth. Using those results, a setting can be found for the entire floor plank. Page 9.
- **Toggle function:** The measuring depth can be changed with up or down keys without moving the meter. This allows you to compare surface and core moisture. Toggling can also be used to diagnose floor failures or to monitor acclimation.
- **1/4" depth setting** allows for checking dryness of waterbased finishes. Works great for veneer or for measuring moisture close to the surface.



Toggle Between 1/4" and 3/4"

While measuring, you can toggle between the two measuring depths.

Push the ▲ key to switch to 1/4" (20mm).

Push the ▼ key to switch to 3/4" (7mm).

One hand can hold the meter, the other hand can activate the up or down key. You do not have to move the meter at all.

This is a great way to compare surface with core moisture.

Measuring Veneer

Measuring Veneer: We recommend placing a lite-weight (non-weight) material such as styrofoam underneath the test sample when measuring veneer or other thin materials. It not only prevents inaccurate readings, but also helps to create a flat measuring platform. To obtain accurate readings for very thin veneer it may be necessary to make a stack of several sheets.

You can also find a calibration setting for single veneer sheets, see "Find Settings for Composite and Engineered Boards" page 9:

Start with **Step 2**, if you know the moisture content of the veneer sheet. Otherwise, start with **Step 1b**, if you have a sheet acclimated to a known relative humidity.

Wood Floor Installation

Wood moisture meters and thermo-hygrometers are essential tools for floor installers. Lignomat offers the Thermo-Hygrometer PN or a combination meters: pin/pinless/RH:

Ligno-Versatec

Ligno-DuoTec BW. (Summary last pg)



First: Take measurements when the floor is delivered, make sure the floor is dry.

Next: Take measurements (moisture and RH) before, during and after acclimation. Mark sample boards and take readings of the same spot repeatedly.

Last: The moisture content of a floor should be documented at the time the customer signs off on the installation. Select several moisture sensitive areas, under windows, inside doors, by the refrigerator, etc. Take readings with both depth levels and document the measurements with moisture content, species setting, measuring depth and location. Take a photo to pinpoint the location. Use a thermo-hygrometer to take relative humidity and temperature measurements.

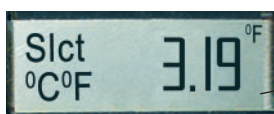
Keeping track of moisture conditions may in the end protect you from unwarranted claims and help find the cause of a problem. If you ever have to go back to check out a complaint, you can measure the same areas again and compare with the original measurements. The dual-depth readings can indicate if moisture was absorbed from the down-side of the floor or from the up-side of the floor. See EMC chart on page 10 for equilibrium moisture contents and the corresponding relative humidity and temperature. If EMC and MC are kept in close range, wood floors are absolutely stable.

Change Measuring Depth from US to Metric System Check Software Version

To change from US to metric system, 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. To the right side of the software number in the upper or lower corner °C or °F appears. By changing from °F to °C, the measuring depth will change from mm to inches.

Use ▲ or ▼ keys to change settings.

The setting can only be changed, while the 3-digit software number is displayed.



To switch the setting from °F to °C, use down key.

To switch the setting from °C to °F, use up key.

Find Settings for Composite and Engineered Boards

Follow steps 1 and 2 to find settings for products not listed on the species card.
For best results, the test sample should be acclimated to a uniform moisture content.

1: Determine the moisture content (MC value) of the test sample using 1a) or 1b).

- 1a)** If the top layer is wood, find the MC value by taking readings. Set the meter to the wood species of the top layer at 1/4" depth, even if the top layer is thinner than 1/4".
- 1b)** If the top layer is not wood or the product is less than 1/4" thick (veneer), the test sample has to be well acclimated in a known relative humidity. Then you can find the MC value in the EMC chart. Moisture measurements with the meter are not needed.

Look up the relative humidity and find the corresponding EMC value. For a test sample acclimated in 40-50% rel. humidity, the MC value is 8.5% . Page 10.

2: Determine the new setting using the MC value found in step 1. Take a measurement with setting # 50 and 3/4" depth. Use depth 1/4" for a test sample less than 3/4" thick.

--If the reading is lower than the MC value found in step 1, choose a setting lower than 50.

--If the reading is higher than the MC value found in step 1, choose a setting higher than 50
Then, take another measurement. Change the setting, until you get a reading close to the MC value determined in step 1.

The new-found setting can be used in the future for the same type of boards.

If the reading is higher than the MC value found in step 1, choose a setting higher than 50.
Then, take another measurement. Change the setting, until you get a reading close to the MC value determined in step 1.

The new-found setting can be used in the future for the same type of boards.

Calculating Specific Gravity

Specific gravity can be found on the Internet by entering <specific gravity> followed by the wood species. Specific gravity can be calculated by dividing:

<u>Dry Weight x 1.73</u>	—————>	enter Dry Weight in ounces
Length x Width x Heights	—————>	enter Length, Width and Heights in inches
<u>Dry Weight</u>	—————>	enter Dry Weight in grams
Length x Width x Heights	—————>	enter Length, Width, Heights in centimeters

If the specific gravity is 0.42, the Ligno-Scanner SDM should be set to #42 in pinless mode. 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.

Relative Humidity, Wood Moisture and EMC Chart

Recommended ambient conditions in buildings are 30-50% relative humidity at 60-80°F. If ambient conditions stay within this range, the amount of expansion and contraction of wood floors and furnishings at 6-9% moisture content is limited. (Table from US Dept of Agriculture "Wood Handbook, Wood as an Engineering Material")

EMC CHART

Temp.	Relative Humidity in %																			
	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

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

Dimensional Stability of Wood: Wood moisture and relative humidity are crucial factors for dimensional stability of wood. Use moisture meter and thermo-hygrometer to measure both. If wood shrinks, warps, cups, checks or delaminates, it always has to do with changes in wood moisture and/or relative humidity. No shrinking and warping occurs, when an equilibrium (see EMC chart) with the surrounding air has already been reached, which means wood is not losing or absorbing any more moisture.

Predictions and Explanations: Measure relative humidity, temperature and moisture content. Compare the measured values with the EMC chart above to predict, if wood is stable or will loose or gain moisture.

- A hardwood floor shows gaps from shrinking. The moisture content at the present time measures 6.2% and the rel. humidity is at 30%. The only explanation for the gapping is, that the floor was installed at a higher moisture content. Once exposed to the dry air, the floor dried out and the gapping occurred.
- If a dry floor with a perfect moisture content of 6.2% is exposed for a long time to air with a relative humidity of 60% at 70°F, it can be predicted that the floor will absorb moisture until 11% has been reached. Depending on the wood species, a 5% increase in moisture content can be accompanied by a substantial amount of expansion.

No more surprises! Use the EMC chart and your Ligno-Scanner to predict problems. The chart is also helpful to explain to your customers, why relative humidity in their home matters.

Function and Calibration Check for Ligno-Scanners

All pinless meters from Lignomat are built with high quality components, micro-processor 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: Pinless measurement functions can be tested for open and closed circuit connections manually without using the check block.

Calibration Verification: Pinless measurements can be tested for calibration accuracy with check block TS available from Lignomat.

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

Manual function check for pinless meters: Step 1 and 2

Calibration verification for pinless meters: Step 3

Step 1: Open circuit check. Set the meter to pinless mode, choose code # 50. Hold the meter in the air to make sure no material is touching the measuring plates. When the READ key is pressed, a low moisture value of 5.4% should be indicated with SCAN/Min to the left side of the display. For 1/4" and the 3/4" depth the same value should appear.



Step 2: Closed circuit check. Place the pinless meter on your forearm and press the READ key. A high moisture value should be indicated. An additional meter check can be performed by measuring a ream of paper. If the paper test is done repeatedly with the same setting, the indicated value should not vary significantly over the course of a year. This can be used to check consistency / accuracy of the pinless calibration.



Step 3: Lignomat offers an external calibration check block TS for all Lignomat pinless meters. The check block for pinless meters from Lignomat is a material plate which produces a defined reading, when the meter is lightly pressed against its surface.

If step 1, 2 or 3 fail either the battery needs to be replaced or the meter is defective. Call customer service 800-227-2105.

Summary of Pinless Meters offered by Lignomat.

Summary of all Pinless Meters	Item	Depth 1/4"	Depth 3/4"	Bamboo	Gypsum Sheetrock	Concrete Pinless Mode	Reference Scales	RH In-Situ Concrete	Pin Mode
Ligno-Scanner S	S	✓							
Ligno-Scanner D	D		✓						
Ligno-Scanner SD	SD	✓	✓						
Ligno-Scanner SDM	SDM	✓	✓	✓	✓	✓	✓		
Ligno-DuoTec BW	BW	✓	✓	✓	✓	✓	✓	✓	
Ligno-VersaTec	V-0	✓	✓	✓	✓	✓	✓	✓	✓

SPECIFICATIONS: Ligno-Scanner S, D, SD, SDM, Ligno-DuoTec BW and Ligno-VersaTec

All pinless meters from Lignomat indicate wood moisture in percent, corrected by 71 wood group settings or by the specific gravity between 0.3 to 1.0 (Settings 30 -100). Moisture Range: 5-60%. Resolution 0.1% . HOLD function. The calibration is internally checked and adjusted before each reading. Function and calibration can be verified with the pinless test block TS. Page

Additional calibrations for

Ligno-Scanner SDM, DuoTec BW, Ligno-VersaTec:

- Bamboo and other strand woven products
- Sheetrock scale from 0-2%
- Reference scales with 3 sensitivity levels: concrete, standard bldg materials, laminates

Size of meter: 2"x 5.5"x1/2". Weight 8 oz.

Measuring pad 1 5/8" by 2 5/8".

Test sample should be as large as the measuring pads and as thick as the measuring depth of the meter.

Ligno-VersaTec ■ Pin - Pinless- RH ■ All-in-one



- Ligno-VersaTec

- Electrode E12

- Electrode E14

- RH Thermo-Hygro probe

- in-situ concrete testing