

User Instructions for Ligno-Tec RH Humidity Meter

Ligno-Tec RH for:

- Relative Humidity Thermometer Mode
- RH in-situ Concrete Moisture Testing



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Ligno-Tec RH

RH The Ligno-Tec with RH BluePeg probe and adapter RH can measure relative humidity, temperature, dew point and GPP. Accessories are available for in-situ RH moisture testing of concrete slabs and wall cavities.

1. Use as Thermo-Hygrometer: Add fast-responding, precision RH BluePeg probe. Connect with Adapter RH or an extension cable. Ligno-Tec RH indicates ambient relative humidity, temperature, GPP and dew point.



2. Use for in-situ RH Testing in Concrete: Add RH cable, sleeves and the removable RH probes for in-situ RH testing. The Lignomat system complies to ASTM F2170. Page 15.



Accessories for RH Mode

To use as thermo-hygrometer add:
RH cable / RH Adapter and RH BluePeg probe.

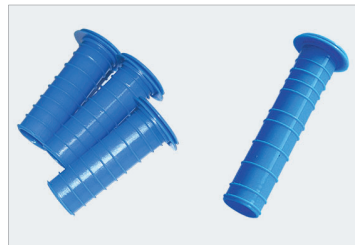
For concrete moisture testing add:
RH BluePeg Probes, RH Cable with sleeve-seal-plug, RH Sleeves 1.8" and 3" long



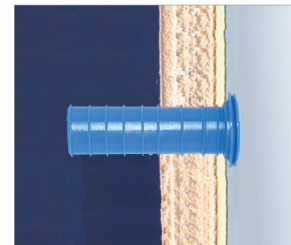
RH BluePeg probes for concrete test and relative humidity of air.



RH extension cable RH adapter.



Sleeves 1.8" and 3" long for in-situ moisture testing in concrete.



Sleeve with RH probe to measure moisture in wall cavities with or without insulation.



RH-CC cable with sleeve-seal for in-situ concrete testing to measure RH probes inside sleeves.



RH-DA Depth Adapter to make RH probe longer. Used as probe extension to measure RH in sleeves over 2.4" long
RH-EX top extenders to cover RH probes in shorter sleeves.



RH-DA Depth Adapter to make RH probe longer. RH probes



Calibration Check:
Salt solutions are necessary to check RH BluePeg probes. 33% and 75%.

More info on page 10.

Ligno-Tec RH, Meter Functions and Warranty

If RH probe is not connected and the READ button is pressed

Cnct (Connect)

Snsr (Sensor)

appears briefly on the left side of the display. Then, the display goes blank.

3.5mm Stereo connector for RH BluePeg using

- RH Adapter

- RH cables

The RH probe needs to be connected to obtain measurements.

Active modes:

RH or Temp or DTP or GPP

Individual RH probe number

For measurements press READ button. The value for the active, previously chosen mode appears: RH or Temp or DTP or GPP

Press HOLD and use up or down keys to change mode.

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



Measured value.

Once a measurement appears, the HOLD button can be pushed to obtain the corresponding values for T or DTP or GPP.

Use up or down keys to scroll through all mode.

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

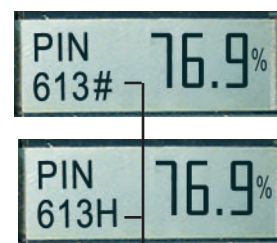
A low battery symbol will appear on the display, when the battery is drained to 25%.

Hold Function

The HOLD key is used (while taking readings) to "freeze" measured values for three minutes. During that time you can use the up and down keys to scroll through all RH modes and get the corresponding values for: RH - Temp - DTP - GPP.

At any time press READ to continue measuring. 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.



While the HOLD feature is active, "#" and "H" toggle.

RH Technology

The Ligno-Tec RH functions as an RH meter or a thermo-hygrometer, when the RH BluePeg probe is connected. The RH BluePeg probe uses a single micro-chip sensing element factory calibrated to NIST standard. The sensing elements were chosen for their precision and fast response time.

The Ligno-Tec RH measures

- relative humidity
- ambient temperature
- grains per pound
- dew point temperature.

The Ligno-Tec RH meter has a 3.5mm stereo connector mounted in the top of the meter, where the RH probe is plugged in. The connection is made via the RH adapter or 3.5mm stereo cables for remote measurements. If the reach of the probe has to be extended further, longer cables are available. The RH depth-adaptor can be used to extend the length of the RH probe, see photo.

Applications:

- Meter can be used as thermo-hygrometer with RH BluePeg probe
 - Meter can be used for in-situ RH concrete testing with probes, cable, sleeves.
- Complies with ASTM F2170 standard.

Specification of RH BluePeg Probe:

Relative Humidity: Range 0% to 99.9%

±2% for 10% to 90%

±3% for below 10% and above 90%

Temperature: Range 5°F to 160°F (-15°C to 70°C)

±0.5°F for 32°F to 120°F (±0.3°C for 0°C to 50°C)

±1°F for 5°F to 32°F (±0.5°C for -15°C to 0°C)

±1°F for 120°F to 160°F (±0.5°C for 50°C to 70°C)

Measuring Range for DPT: -17.8°F to 160°F (-27°C to 70°C)

Measuring Range for GPP: 0-99.9

Resolution for entire range for all values is 0.1

Size: Ø 0.5 inches (1.27cm), length 1.35 inches (3.8cm)



3" long sleeve with
RH-DA depth adapter.

Take Measurements

As soon as the RH BluePeg probe is connected to the Ligno-Tec RH, the meter is ready to measure. All values for RH, temperature, Dew Point and GPP can be obtained by first pressing READ, then HOLD and then using the up or down key to scroll between the corresponding RH/T/DP/GPP values.

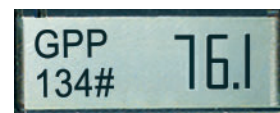
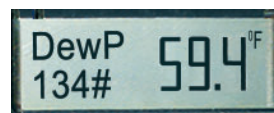
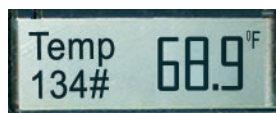
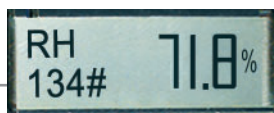
RH: relative humidity

Temp: ambient temperature

DewP: dew point temperature

GPP: grains per pound

#: RH probes have individual 3-digit numbers, that allows different probes to be indentifiable.



All values for RH, temperature, Dew Point and GPP can be obtained by first pressing READ, then HOLD and then using the up or down key to scroll between RH/T/DP/GPP. The number sign “#” and the letter “H” toggle, while the HOLD function is active. See page 4.

The connection between the Ligno-Tec RH meter and the RH BluePeg probe can be made by the male-male 3.5mm RH adapter (only available from Lignomat) or an extension cable (3.5mm stereo). Standard length 6 ft, upon request we make shorter and longer cables.

Note: When using the Ligno-Tec RH as thermo-hygrometer, the accuracy rating of the RH BluePeg probe with +/-2% is far above the over-the-counter available thermo-hygrometers. Over-the-counter hygrometers usually have a rating of +/-5% for RH. The RH probe was not built into the meter, because the non-embedded probe adapts faster to the ambient conditions and is less influenced by heat created by the meter or the person holding the meter.



RH accessories for measuring and monitoring air humidity and in-situ probe testing for concrete moisture.

Measuring Ambient Conditions Thermo-Hygrometer

Measuring RH is the first step to solve moisture problems. The Ligno-Tec RH offers accuracy at an affordable price. Applications include all industries and day by day occurrences. From wood floors to restoration, water damage repair and maintenance to mold that may grow in an apartment or in a basement or crawl space.

Measuring is very simple, connect RH adapter to RH BluePeg probe and plug RH adapter into the jack mounted in the top of the meter. Push the READ key and the RH is indicated instantly.

When the RH probe has been stored at a different temperature and at a different humidity allow a minute for the probe to acclimate to the present conditions. The acclimation time can cut short, when the meter is waived through the air backwards and forwards a few times to increase the airflow around the sensing element at the bottom of the RH probe.

When the relative humidity is indicated, and you want to get the corresponding temperature value, push the HOLD key and the down key. Pushing the down or up key repeatedly will allow to scroll through all modes: RH - Temp - DPT - GPP.

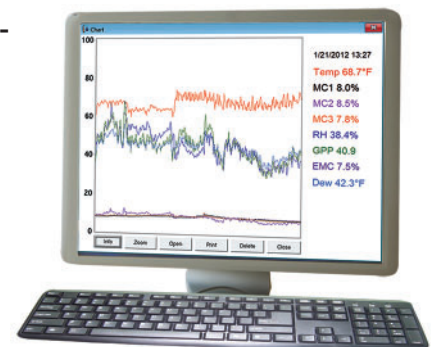


Checking on a basket ball court, which was badly damaged by moisture infiltrating through the walls. Now, the relative humidity level is within acceptable ranges.

Monitoring RH and MC with Data Loggers

The Ligno-Tec RH can be used as a very accurate and reliable thermo-hygrometer as described above. However, a thermo-hygrometer provides only at-the-moment measurements. For continuously monitoring longterm we offer the BL 2 data logger. Lignomat's data loggers and wireless probes use the same RH BluePeg probes as the Ligno-Tec RH.

The BL2 data logger comes with the precision RH BluePeg probe. 32000 Data sets can be sampled in time intervals of 30 seconds to 24 hours. Audible alarms can be set. A great watchdog for restoration work, floor installation, job-site surveillance, long term recordings of storage facilities.



Adding the MC Tracker to the BL2 allows recording wood moisture content and relative humidity. It is like continuously taking readings with

3 wood moisture meters and 1 thermo-hygrometer.

Lignomat also offers **wireless** transmitters for measuring moisture, humidity, temperature.



In-Situ RH Test for Moisture in Concrete

The in-situ RH test gives the most reliable results for concrete moisture testing, when you have to determine whether or not to install a floor covering or apply adhesive or epoxy. See separate instructions for in-situ probe test with RH BluePeg probes on line or as booklet from Lignomat (800-227-2105).

ASTM standard F2170 describes equipment and procedure. The test duration is now 24 hours, a time limit set by the ASTM standard. All of Lignomat's RH parts comply with the latest standard F2170.

The in-situ RH concrete test has gained recognition over the past few years. Many floor covering manufacturers have added the RH concrete test to their warranty requirements. Check the floor manufacturers manual to guarantee the manufacturer's warranty.

Measurements with non-invasive, pinless moisture meters provide a preliminary evaluation of moisture conditions. Moisture meters are not able to indicate absolute moisture percentages.

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 and/or a Calcium-Chloride test is recommended by most wood floor manufacturers. Follow the floor manufacturer's installation instructions and perform the required testing to guarantee the manufacturer's warranty. Pin and pinless meters, ASTM F2659, quantitative versus qualitative.



Why the RH test gives the most reliable results:

Moisture distribution within an open concrete slab is often not uniform, especially when the slab has not dried completely or when the slab is on grade. The surface shows low moisture levels, whereas higher moisture levels are found in the middle of the slab or towards the bottom (especially for slabs on grade). Once the concrete slab is covered by the floor covering, moisture will be pulled up from the bottom towards the drier surface until an even moisture distribution has been reached. The increase in moisture close to the surface can cause problems with epoxy, adhesives and floor coverings.

It has been shown, that moisture measurements taken at 40% of the slab thickness give the same results when the slab is open and later-on when the slab is covered. Therefore, test results from the open slab at 40% can be used to predict what the moisture content will be once the slab is closed. This allows manufacturers of adhesives, epoxy and floor coverings to set a permissible range for their products. If the slab is not on grade, the ASTM standard F2170 allows testing at 20% depth.

Permissible RH values are set by manufacturers of adhesives, epoxies and floor coverings. Check the floor manufacturer's installation manual.

Relative Humidity, Wood Moisture and EMC Table

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 Table

Temp °C °F		Relative Humidity																			
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	98
-1	30	1.4	2.6	3.7	4.6	5.5	6.3	7.1	7.9	8.7	9.5	10.4	11.3	12.4	13.5	14.9	16.5	18.5	21.0	24.3	26.9
4	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
10	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
16	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
21	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
27	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
32	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
38	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
43	110	1.1	2.2	3.2	4.0	4.9	5.6	6.3	7.0	7.7	8.2	9.2	10.0	11.0	12.0	13.2	14.7	16.6	19.1	22.5	25.2
49	120	1.1	2.1	3.0	3.9	4.7	5.4	6.1	6.8	7.5	8.2	8.9	9.8	10.7	11.7	12.9	14.4	16.2	18.6	22.0	24.7

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.

Using a Moisture Meter and Thermo-Hygrometer

Dimensional Stability of Wood: Wood moisture and relative humidity are crucial factors for dimensional stability of wood. (Ligno-DuoTec and Ligno-VersaTec 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 with the surrounding air has already been reached, which means wood is not losing or absorbing any more moisture.

Predictions and Explanations for Wood and Wood Floors: 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 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 moisture meter to predict problems. The chart is also helpful to explain to your customers, why relative humidity in their home matters.

Restoration and Building Industry: Mold has become a great concern in the building industry. Mold can grow almost anywhere, if the relative humidity rises above 80% and temperatures are moderate (not screaming hot or icy cold). The critical moisture percentage is above 16% for mold growth in wood. (RH of 80%, check graph previous page. Some experts state mold grows already starts at 60%.

This critical humidity percentage can be exceeded, when water infiltrates a structure by leaks, floods and broken pipes or when buildings are not sealed properly. Repair work is necessary to avoid lasting damage.

Relative humidity affects all hygroscopic materials in our environment

We feel uncomfortable if the air is too dry. It is a lot worse if the air is too moist, because there is always a danger of mold growth. And mold should be avoided 2-fold.

- It is unhealthy for people. There are molds around that can damage the lungs permanently.
- It is also unhealthy for buildings. Mold destroys all carbon-containing materials from paint to wood to sheetrock to concrete.

Function and Calibration Test - RH Meters

Function Check for RH measurements: Step 1

Accuracy check for RH BluePeg probe: Step 2

Step 1: Connect the RH BluePeg probe to the Ligno-DuoTec BW using the small RH adapter and also the RH cable. Press the READ key. A value for either RH, T, DT or GPP appears. Press the HOLD key and then the up key repeatedly to recall the other values. Check if the indicated values are within the expected range. If you read a temperature of 150°F, you know something is wrong. Call customer service at 800-227-2105. Maybe your meter needs to be updated to fit the last generation of RH BluePeg probes. We recommend this test to include Adapter and cables before using the RH BluePeg probes for the first time.

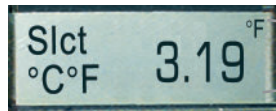


Step 2: The accuracy of the RH BluePeg probe needs to be checked periodically. This check can only be performed by exposing the sensing element on the circuitboard to a known relative humidity. For on-site checking we sell salt solutions for 75% and for 33% RH.

Accuracy check for in-situ RH probes for concrete moisture testing: The ASTM standard F2170 sets the rules for test equipment, procedure and frequency of accuracy testing. Since the standard is still modified periodically, we recommend to purchase the latest F2170 standard to be up-to-date with all requirements. Available from the ASTM web-site. Lignomat offers to check RH probes

Check Software Version. Change from US to Metric System.

Settings for temperature are indicated in °F or °C. Settings for measuring depth are 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.



To change from °F to °C, use down key.

To change from °C to °F, use up key.

Changes can only be made, when the 3-digit software number is displayed.

Summary of all RH Meters from Lignomat

Lignomat offers three RH meters:

- **Ligno-Tec RH:** RH meter only, used as thermo-hygrometer and meter for in-situ concrete test.
- **Ligno-DuoTec BW:** RH meter and pinless, dual-depth wood and concrete moisture meter
- **Ligno-VersaTec:** RH meter and pin and pinless, dual-depth wood and concrete moisture meter

Package RH-KS with Ligno-Tec RH Meter Accessories for Concrete Testing

