# Operating Instructions

# HYDROMETTE BL

## A plus


EN

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## 0.1 Publication Statement

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GANN Mess- u. Regeltechnik GmbH, Gerlingen, Germany, 10/04/2019

## 0.2 General Notes

This measuring device fulfils the requirements of the applicable European and national directives (2004/108/EC) and standards (EN61010). Appropriate declarations and documentation are held by the manufacturer. To ensure trouble-free operation of the measuring device and operational reliability, the user must carefully read the operating instructions. The measuring instrument may only be operated under the specified climatic conditions. These conditions can be found in chapter 3.1 "Technical Data". This measuring device may also only be used under the conditions and for the purposes it has been designed for. Operational reliability and functionality are no longer ensured if the device is modified or adapted. Gann Mess- u. Regeltechnik GmbH shall not be liable for any damage arising from such modifications or adaptations. The risk is borne solely by the user.

The device must not be stored or operated in air that is corrosive or contains solvents!

Static charge - At low humidities, aided by external circumstances (friction during material transport, high insulation value of the

surrounding area), static electricity can build up with high voltage, which can cause strong fluctuations in measured values. The operator of the measuring instrument can also unintentionally contribute to the build-up of static charge from his clothing. A significant improvement can be achieved by ensuring the operator and the measuring instrument remain completely still during the measurement process and by earthing (by touching conducting metal, water or heating pipes, etc.).

Frozen wood cannot be measured. Wood or other materials should not be measured on conductive surfaces.

The notes and tables in these instructions regarding permitted or normal humidity conditions in practice and the general definitions of terms have been taken from the specialist literature. No responsibility can therefore be taken by the manufacturer for the correctness of this information. The conclusions to be drawn from the measurement results are related to the individual conditions and the knowledge gained from professional experience for each user.

The measuring instrument and any accessories may only be properly used as described in these instructions. Keep the device and accessories out of the reach of children!

Gann Mess- u. Regeltechnik GmbH accepts no liability for damage resulting from non-compliance with the operating instructions or from not taking proper care during transport, storage and handling of the device during operation, even if this duty of care is not specifically addressed in this operating manual.

## 0.3 WEEE directive 2002/96/EC law on electrical and electronic equipment

Disposal of packaging, battery and device must be performed in accordance with the legal requirements at a recycling centre.

The device was manufactured after 01/10/2009.

## 0.4 Safety advice

**WARNING:** There is a risk of injury from the measuring pins of the electrodes for resistance-based moisture measurement. Before inserting the electrode pins into wooden panels or similar, use suitable methods to ensure that there are no electrical wires, water pipes or other supply lines at this point.

# 1 Introduction

## 1.1 Description

The Hydromette BL A plus is an electronic wood moisture measuring instrument which can be used for both resistance-based measurements and capacitive (non-destructive) measurements. The Hydromette has a high quality measurement amplifier and an OLED display.

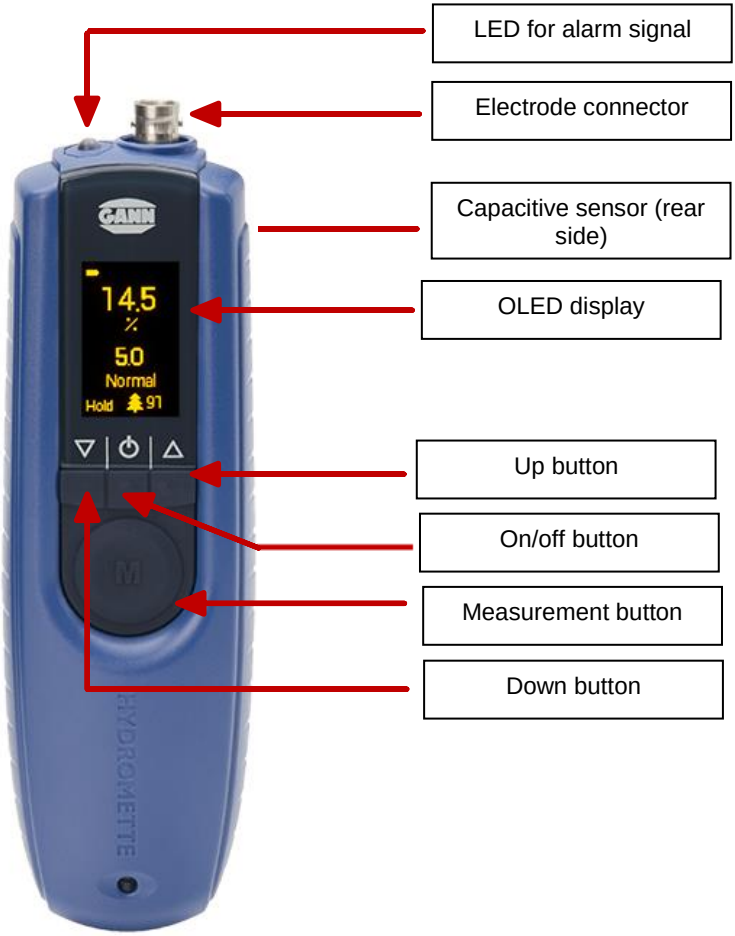
The Hydromette is suitable for precision measurements of sawn timber (up to 180 mm thickness), chipboard and veneers.

For the resistance-based measurement, the electrical resistance of the wood between two electrodes is measured and thus the moisture in sawn timber, chipboard, veneers and wood fibre materials up to a maximum thickness of 180 mm (with electrode M 18) is determined. The device has a wood type selector switch to automatically correct measurement values for over 300 types of wood as well as wood temperature compensation. In addition, characteristic curves for further materials are stored in the meter (resistance-based measurement).

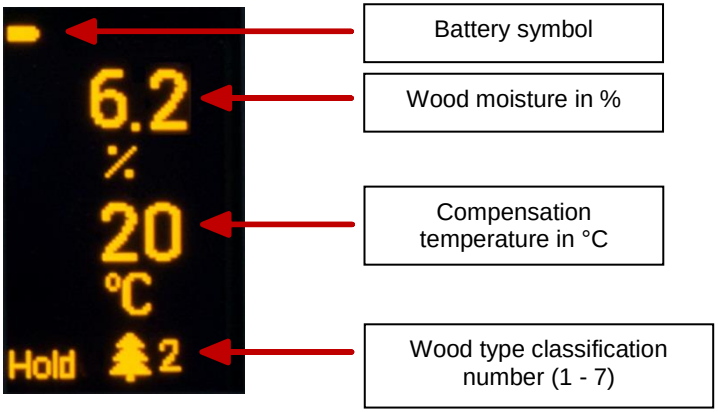
The ten-step wood type setting of the capacitive measuring method is carried out in 0.1 steps as default.

The device has an LED for a visual alarm if a set limit value is exceeded.

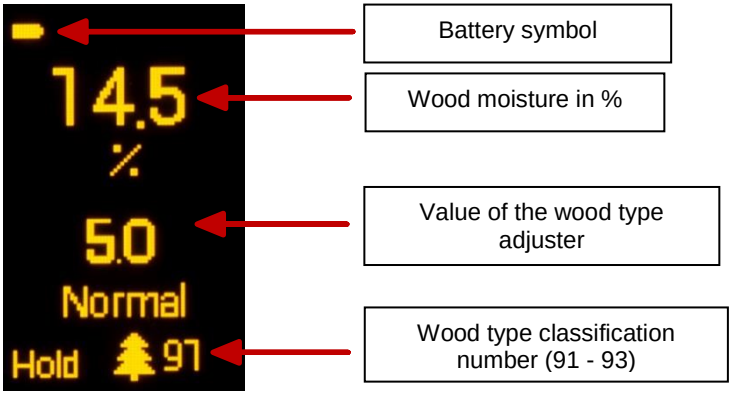
## 1.2 Device layout and button assignment



## 1.3 Display symbols for the resistance-based measurement




## 1.4 Display symbols for the capacitive measurement



# 2 Basic Functions

## 2.1 Switch on device

The device is switched on by pressing the "On" button.

The menu that was open during the last operation or the measuring mode is displayed. In the measuring mode, the last measured value in the last operation is displayed.

## 2.2 Display in measuring mode


**Measured value in %**

**Compensation temperature in °C**

**Wood type 2**

"Hold" symbol indicates readiness to make a measurement

**Figure 2-1: Display of the resistance-based measurement**


**Measured value in %**

**Value of the wood type adjuster**

**Wood characteristics: Normal (91),**

**rough sawn surface (92) or low material thickness / thin (93)**

"Hold" symbol indicates readiness to make a measurement

**Figure 2-2: Display of the capacitive measurement**

A measurement process is started by pressing the **"M"** button. The "Hold" symbol disappears during the measurement and the values are updated. After releasing the measurement button, the "Hold" symbol is displayed again and the last measured values remain unchanged.

The device is now in Standby mode. Press the measurement button again to start a new measurement.

Approx. 3 minutes after releasing the measurement button, the device switches off automatically to save battery power. When the device is switched on again, the last measured value is shown on the display.

If the current measured value of the wood moisture is greater than the stored maximum value, the **"Max"** symbol flashes on the display. The maximum value is automatically stored in the memory.

If the current measured value of the wood moisture is smaller than the stored minimum value, the **"Min"** symbol flashes on the display. The storage method corresponds to that of the maximum value.

# 3 Menu Guidance


Pressing the "Up" or "Down" button in standby mode takes you to the main menu. Use the "Up" button and the "Down" button to navigate through the menu. A menu item is selected by pressing the measurement button. The three dots at the top and bottom of the screen indicate that further selection items are available that are displayed when scrolling.

**Figure 3-1: Main menu**

1. Back to the **measurement menu** (standby mode): the measurement process can be performed here

2. **Settings:** settings can be defined here (section 2.3.2)

3. **Data Menu:** the last 5 measured values can be retrieved here, and minimum and maximum values can be queried (chapter 2.3.9 to chapter 2.3.11)

## 3.1 Settings

Among other things, the desired measuring method and the wood type can be selected in this menu.

### 3.1.1 Measuring methods, "Type" menu

The Hydromette BL A plus provides two methods for determining the moisture content of wood. The types 1 to 7 are used for resistance measurement. The corresponding material assignment takes place via the wood type table. Type 91 corresponds to capacitive measurement with a standard smooth material surface. The material selection is performed in the submenu Wood Type Adjuster using the table in chapter 6: Wood types table for the capacitive measurement . If the wood is uneven and rough sawn, we recommend changing to type 92 in order to achieve a better measurement result for capacitive measurement. Type 93 is used for thin material thicknesses between 10 mm and 20 mm.

### 3.1.1.1 Material Selection for Resistance-Based Measurement

| Type | Material ID | Type | Material ID |
|---|---|---|---|
| Type 1 | 1 | OSB3 / OSB4 | 541 |
| Type 2 | 2 | OSB schwer entflammbar | 542 |
| Type 3 | 3 | Wood Fibre Insulants / 110 | 543 |
| Type 4 | 4 | Wood Fibre Insulants / 140 | 544 |
| Type 5 | 5 | Wood Fibre Insulants / 135-170 | 545 |
| Type 6 | 6 | Wood Fibre Insulants / 180-200 | 546 |
| Type 7 | 7 | Wood Fibre Insulants / 220-240 | 547 |
| Larch | 212 | Wood Fibre Insulants / 250-270 | 548 |
| Pine | 207 | LVL 21mm | 549 |
| Spruce Eur. | 373 | LVL 39mm | 550 |
| Douglas | 158 | LVL 69mm | 551 |

**Table 3-1: Material Selection for Resistance-Based Measurement**

### 3.1.1.2 Material Selection for Capacitive Measurement

| Type | Material ID |
|---|---|
| Standard Capacitive Measurement | 91 |
| Capacitive Measurement of unplaned timber | 92 |
| Capacitive Measurement of thin timber (10-20 mm) | 93 |

**Tabelle 3-3: Material Selection Capacitive Measurement**

### 3.1.2 Resistance-based Measurement

The resistance measurement involves a seven-stage wood type correction, the selection of which is made via a wood type table with over 300 different wood types. In addition, characteristic curves for further materials are stored in the meter (resistance-based measurement). The optimum electrodes for the respective measuring task can be connected to the BNC socket using a coaxial cable. A coaxial cable with special insulation should be used to avoid measurement errors. A compensation temperature can be set manually in steps of 1 °C for temperature compensation of the measured values.

Main menu → Settings → Type

### 3.1.3 Capacitive Measurement

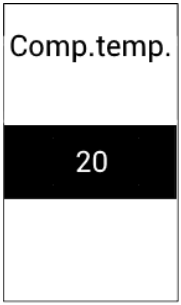
The ten-step wood type setting of the capacitive measurement is carried out in 0.1 steps as default.

In the default setting (type 91) the measuring instrument displays a too low measured value for both rough sawn timber as well as thin material thickness of ≥ 10 mm to < 20 mm. The selection of type 92 compensates for this in the case of rough sawn timber. Type 93 is selected for compensation for thin material thicknesses.

The menu can be reached as follows:

Main menu → Settings → Type

### 3.1.4 Temperature Compensation (resistance-based measurement)




This menu is only available if a resistance-based measurement method is selected (types 1 to 7).

The input of the material temperature is performed in steps of 1 °C. The temperature compensation of the measured value is always performed using the temperature displayed in the measuring mode.

The menu can be reached as follows:

Main menu → Settings → Comp.temp

**Figure 3-4: Temperature Compensation Menu**

### 3.1.5 Wood Type Adjuster (capacitive measurement)


This menu is only available if a capacitive measurement method is selected (91 to 93).

The input of the wood type adjuster is made in 0.1 steps; materials can be found in the Wood types table for the capacitive measurement (chapter 6).

The menu can be reached as follows:

Main menu → Settings → Wood Type Adjuster

**Figure 3-5: Wood Type Adjuster Menu**

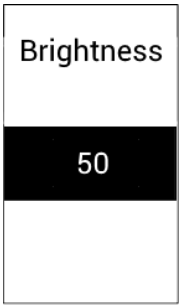
### 3.1.6 Languages Setting


The desired menu language can be selected in this menu. German and English are available. The menu can be reached as follows:

Main menu → Settings → Language

**Figure 3-6: Languages Setting Menu**

### 3.1.7 Brightness Setting




The brightness of the display can be adjusted in steps. It must be noted that the current consumption increases with higher brightness and thus the operating time reduces. The menu can be reached as follows:

Main menu → Settings → Brightness

**Figure 3-7: Brightness Setting Menu**

### 3.1.8 Alarm Limit Values


**Figure 3-8: Alarm Limit Values Menu**

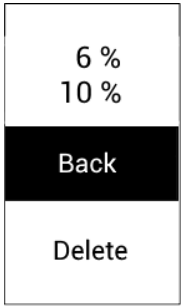
An alarm value can be set individually for each type in the "Alarm" menu. The type is selected using the "Up" and "Down" buttons. The selection is confirmed by pressing the measurement button. Any upper limit value within the selected measuring range can now be set using the "Up" and "Down" buttons. Press the measurement button to confirm. The activation or deactivation of the alarm is performed using the ON / OFF function. If the limit value is exceeded, the LED flashes red. The menu can be reached as follows:

Main menu → Settings → Alarm

## 3.2 Data

The last 5 stored measurements as well as the maximum and minimum measured wood moisture values can be displayed in this submenu.

### 3.2.1 Minimum / maximum value display



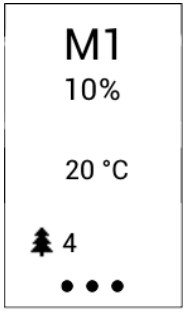

The minimum and maximum measured wood moisture values of a measurement series are displayed in this menu.

The minimum value and maximum value can be deleted using the "Delete" menu item.

Main menu → Data → Min / Max

**Figure 3-9: Min / Max Value Menu**

### 3.2.2 Memory Menu ("1-5")




The last 5 stored values can be retrieved in this menu. The menu can be reached as follows:

Main menu → Data → 1-5

**Figure 3-10: Memory Menu ("1-5")**

## 3.3 ResCap Mode

The ResCap mode provides the possibility to carry out a high-precision resistance measurement and thus to adjust the setting of the capacitive measurement to the measurement result. In this mode, a resistance measurement is first carried out on the wood to be measured and the measurement result is confirmed by the user by briefly pressing the measurement button. Then the resistance measurement electrode is removed and the instrument with the measuring surface for capacitive measurement is positioned at the same place. Now the adjustment is started by briefly pressing the measurement button. The measuring instrument automatically adjusts the setting of the wood type adjuster for the capacitive measurement until the value determined with the capacitive measuring method matches the measurement result from the resistance measurement. Now, using the determined setting of the wood type adjuster, further measurements can be carried out non-destructively for the same wood type.

It should be noted for this mode that moisture close to the surface flows more strongly into the measurement result than moisture in the core of the wood during capacitive measurement. This gives the best result with balanced moisture in the wood. In order to prevent the influence of the resistance electrode and the measuring cable on the capacitive measurement, the resistance electrode should always be removed from the wood and the measuring cable disconnected from the measuring instrument. The accuracy of the measurements decreases for wood moisture that deviates significantly from the setting point (> 10% wood moisture difference to the balance point). However, a trend statement is still possible. Areas of knots and twists, as well as bark or cambium must be avoided when using the capacitive measuring method. It is not possible to use this mode for moisture values of <5% and >45% wood moisture, as the capacitive measuring method no longer provides reliable values.

## 3.4 Other Functions

### 3.4.1 Automatic switch-off

If no button is pressed within approx. 3 minutes, the device switches off automatically. The current values are retained and are displayed again after the device is switched on again.

### 3.4.2 Battery Monitoring

If the battery symbol  appears in the display, the battery is dead and must be renewed.

A list of battery types that can be used can be found in the "Technical data" chapter.

# 4 Specifications

## 4.1 Technical data

| | |
|---|---|
| Display: | OLED display |
| Display resolution: | 0.1% |
| Response time: | < 2 s |
| Storage conditions: | + 5 to + 40 °C |
| | - 10 to + 60 °C (short-term) |
| Operating conditions: | 0 to + 50 °C |
| | - 10 to + 60 °C (short-term) |
| | < 85% RH, non-condensing |
| Power supply: | 9V block battery |
| Approved types: | type 6LR61 and 6F22 |
| Dimensions: | 185 x 50 x 30 (L x W x H) mm |
| Weight: | approx. 200 g |

## 4.2 Prohibited Environmental Conditions

- Condensation, air humidity continuously too high (> 85%) and wetness
- Permanent presence of dust and combustible gases, vapours or solvents
- Ambient temperatures continuously too high (> +50 °C)
- Ambient temperatures continuously too low (< 0 °C)

## 4.3 Measuring ranges of the resistance measurement

Wood moisture:

5 to 70% (type and temperature dependent)

Compensation temperature:

0 to 50 °C

## 4.4 Measuring ranges of the capacitive measurement

Wood moisture:

5 to 45% (type and temperature dependent)

## 4.5 Transport & Storage Conditions

The Hydromette BL A plus may only be stored in the packaging that is provided by us or available from us as accessory. We shall not accept any liability or warranty for damage that may occur to the device or the sensor system as a result of non-compliance. In particular, it is important to avoid storing the devices in foams not supplied by us as these could damage the sensors due to possible outgassing and falsify the measured values.

# 5 Application Notes

## 5.1 Notes for wood moisture measurement

The measurement of wood moisture is carried out with the Hydromette BL A plus using resistance measurement or capacitive measurement. The wood moisture is displayed in percent by weight in relation to absolutely dry wood (ATRO).

### 5.1.1 Notes for resistance measurement

For resistance measurement, the Hydromette BL A plus works according to the method of electrical resistance or conductivity measurement which has been known for years. This process is based on the fact that electrical resistance is highly dependent on the amount of moisture in the wood. The conductivity of oven-dried wood is very low, or the resistance so high that no current worth mentioning can flow. The more water that is present, the greater the conductivity of the wood, or the lower the electrical resistance.

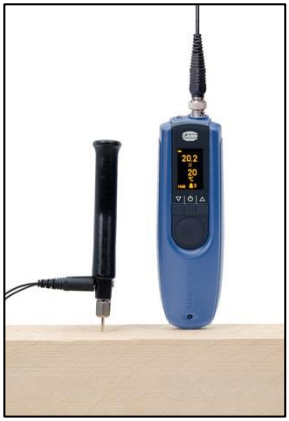



**Figure 5-1: Measuring across the fibre direction with M 20**

To achieve the qualitatively best possible measurement results, the wood used for the sample should be measured at multiple points. For this purpose, the electrode tips must be pressed in crosswise to the grain direction up to at least 1/4 and at most 1/3 of the total wood thickness. To prevent measurement errors and breakage of the measuring tips, the hexagon nuts must always be well tightened and the area between the tip holders kept clean.

The measurement of frozen wood is not possible.

#### 5.1.1.1 Drive-in electrode M 20

The electrode is driven into the wood to be measured with the needles across the grain direction (the electrode body is made of impact resistant plastic). When removing, light lever movements can be used at right angles to the grain to loosen the needles.

To determine the core moisture content, the electrode tips must reach to between 1/4 and 1/3 of the overall wood thickness.

On delivery of the measuring instrument with electrode M 20, 10 replacement tips each of 16 and 23 mm length are included. These are suitable for measurement of wood thicknesses up to 30 and 50 mm respectively.

If thicker wood is to be measured, the electrode needles can be replaced with a suitably longer version. With increasing needle length, however, increased danger of breakage or bending (particularly when pulling out) must be expected. It is therefore recommended to use the M 18 ram-in electrode for thicker or particularly hard woods.

If possible, the hexagon nuts should be tightened with a spanner or pliers before beginning a series of measurements. Loose electrode tips break off easily.

#### 5.1.1.2 Surface measuring caps

Surface measurements should only be made with wood moisture levels under 30%. For surface measurements on workpieces that have already been machined, or for measuring veneers, both hexagon nuts on the M 20 electrode are unscrewed and replaced with the surface measuring caps. For the measurement, both contact surfaces are pressed onto the workpiece to be measured or onto the veneer at right angles to the grain direction. The measurement depth is approx. 3 mm, therefore multiple sheets of veneer must be laid on top of each other for the measurement. Do not measure on metal surfaces! When measuring stacks of veneer, to expose the measuring point, ensure that the veneer is **lifted** and **not pulled** over the remaining stack **(avoid friction: electrostatic charge!).** Wood particles adhering to the measuring surface must be regularly removed. If the elastic, plastic measurement sensors are damaged, they can be reordered (no. 4316) and glued on using commercially available cyanate-based instant adhesive.

#### 5.1.1.3 Stick-in electrode pair M 20-HW 200/300

If the hexagon nuts with standard electrode tips on the M 20 electrode are removed, they can be replaced with the M 20-HW electrode tips. These must be fastened tightly!

For measurement in chips and wood wool, it is advisable to compact the material to be measured slightly. To do so, sawdust should be pressed together with a weight of approx. 5 kg. No compression is necessary for balls of wood wool.

#### 5.1.1.4 Ram electrode M 18

The two needles of the ram electrode must be driven to the required measurement depth crosswise to the grain direction with a slide hammer. To be able to determine the core moisture content, the electrode tips must penetrate to between 1/4 and 1/3 of the overall wood thickness.

Pulling out the needles is also done with the slide hammer with the impact direction upwards. If possible, the hexagon nuts should be tightened with a spanner or pliers before beginning a series of measurements. Loose electrode tips break easily.

**Attention:**

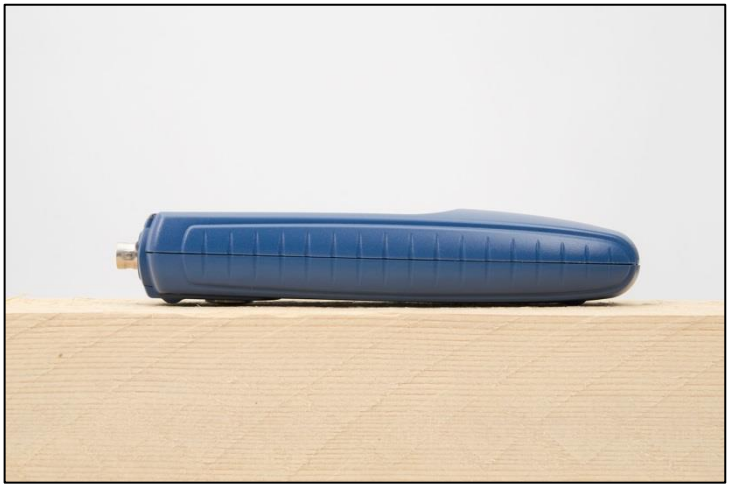
**Do not completely drive in the electrode tips. There should be approx. 4 - 5 mm space between the wood surface and the hexagon nut. This particularly applies when using Teflon-insulated tips.**

**Figure 5-2: Ram electrode M 18**

If woods with very different moisture distribution (e.g. water pockets) are used for measurement, we recommend the use of Teflon-insulated electrode tips, which enable very precise measurement of zones and layers. They are available in packets of 10 in lengths of 45 mm (order no. 4450) and 60 mm (order no. 4500).

### 5.1.2 Notes for capacitive measurement

Measurements with the Hydromette BL A plus must not be performed on a conductive surface (e.g. metal). For wood thicknesses of less than 40 mm (e.g. veneers, strips, etc.), either several layers must be laid on top of each other until a minimum thickness of 40 mm is reached, or the selection for thin material thicknesses must be selected in the menu. In the second case there must be air or e.g. Styrodur underneath the measuring point. The measurement is based on the principle of the capacitive electric field. The active measuring electrode is located on the bottom of the device. In order to prevent the operator's hand from influencing the measurement process, the device may only be held at the lower part during both measurement and functional check. Never touch the device near the active measuring electrode during measurement or check. Do not measure in the area of knots and twists as well as through bark or cambium.



### 5.1.3 Test adapter for resistance-based wood moisture measurement

The test adapter available with order no. 6070 for checking the wood moisture measuring part can be used to check the functionality of the device, the measuring cable MK 8 and the electrodes M 18 and M 20.

For this, the device is connected with measurement cable MK 8 and the 4-mm plug of the cable in the socket of the test adapter.

The device must be set to wood type 4 and manual temperature compensation set to 20 °C. No active sensor may be connected. The display should show 21% at the top right in the first line. A difference of +/- 0.5% is permitted.

### 5.1.4 Wood equilibrium moisture content

If wood is stored in a particular climate for a long period, it takes up the moisture matching this climate, which is termed equilibrium moisture content or equilibrium wood moisture content.

On reaching the equilibrium moisture content, the wood no longer loses moisture if the surrounding conditions remain the same and also does not absorb any moisture.

The wood equilibrium moisture content is between approx. 6.0 and 7.5% wood moisture (corresponds to 30–40% relative humidity and 20-25 °C) in the winter months, and between approx. 10.5 and 13.0% (corresponding to 60–70% relative humidity and 25 °C) in the summer months. Further values and tables can be found on the World Wide Web.

### 5.1.5 Growth ranges of fungi

Dry rot 18 - 22 °C, 20 - 28% wood moisture

Wet rot 22 - 26 °C, > 55% wood moisture

White rot 25 - 28 °C, 40 - 50% wood moisture

Spruce gill polypore 35 - 45% wood moisture

Scaly lentinus 40 - 60% wood moisture

Blue stain fungi > 25% wood moisture

### 5.1.6 Swelling and shrinkage of the wood

Wood shrinks if it transfers moisture to the surrounding air below the fibre saturation level. On the other hand, wood swells if it takes up moisture from the surrounding air below the fibre saturation level. This is a very complex process. If you are interested, we recommend finding the relevant information on the World Wide Web.

# 6 Wood types table for the capacitive measurement

| Species | Setting | Species | Setting | Species | Setting |
|---|---|---|---|---|---|
| Abachi | 5.0 | Ebano africano | 9.0 | Nussbaum, franz | 7.0 |
| Abedul | 6.5 | Ebène d'Afrique | 9.0 | Nyankom | 7.0 |
| Abete del Canada | 5.5 | Ebenholz | 9.0 | Oak | 7.5 |
| Abetina rosso | 5.0 | Ebony, African | 9.0 | Oak, White | 8.0 |
| Aboudikro | 8.0 | Eiche | 7.5 | Obeche | 5.0 |
| Abura | 7.0 | Eiche, weiß amerik | 8.0 | Palo brasil | 8.5 |
| Acero bianco | 6.0 | Epicéa | 5.0 | Pernambouc | 8.5 |
| African Walnut | 6.5 | Epicéa du Nord | 5.0 | Pernambuc | 8.5 |
| Ahorn | 6.0 | Erable | 6.0 | Pezzo | 5.0 |
| Alder | 6.5 | Erle | 6.5 | Pin à lensens | 7.0 |
| Alno | 6.5 | Esche | 8.0 | Pin maritime | 5.0 |
| Alvies | 4.5 | European Maple | 6.0 | Pin sylvestre | 5.5 |
| Ameneiro | 6.5 | Faggio | 8.0 | Pinie | 5.0 |
| American Maple | 8.5 | Fichte | 5.0 | Pino albar | 5.5 |
| Arce | 6.0 | Fichte, nordisch | 5.0 | Pino da incense | 7.0 |
| Ash | 8.0 | Framiré | 7.0 | Pino silvestre | 5.5 |
| Aulne commun | 6.5 | Frassino | 8.0 | Plum Tree | 7.0 |
| Ayous | 5.0 | Frêne | 8.0 | Prugno | 7.0 |
| Bahia | 7.0 | Fresno | 8.0 | Pruneaulier | 7.0 |
| Beech | 8.0 | Haya | 8.0 | Prunier | 7.0 |
| Betulla finlandese | 6.5 | Hemlock | 5.5 | Ramin | 8.0 |
| Birch, Northern | 6.5 | Hêtre | 8.0 | Rotbuche | 8.0 |
| Birke, nordisch | 6.5 | Idigbo | 7.0 | Rovere | 7.5 |
| Björk | 6.5 | Iroko | 6.0 | Samba | 5.0 |
| Bouleau du Nord | 6.5 | Kambala | 6.0 | Sapele | 8.0 |
| Brasilholz | 8.5 | Kiefer, nordisch | 5.5 | Sapeli-Mahagoni | 8.0 |
| Brazilwood | 8.5 | Kirschbaum | 6.0 | Sapelli | 8.0 |
| Buche | 8.0 | Laerk | 6.5 | Sapin de Douglas | 6.0 |
| Carballo | 7.5 | Larch | 6.5 | Scots Pine | 5.5 |
| Carolina Pine | 7.0 | Larice | 6.5 | Seekiefer | 5.0 |
| Cedar, red | 1.0 | Lerche | 6.5 | Seraya, blanc | 6.5 |
| Cembra Pine | 4.5 | Limba | 5.5 | Seraya, White | 6.5 |
| Cerezo | 6.0 | Limbo | 5.5 | Sipo | 6.0 |
| Cerisier, americain | 7.0 | Lime | 8.0 | Swiss Pine | 4.5 |
| Chêne | 7.5 | Linde | 8.0 | Tiglio | 8.0 |
| Chêne, blanc | 8.0 | Maple | 6.0 | Tilleul | 8.0 |
| Cherry | 6.0 | Melèze | 6.5 | Tilo | 8.0 |
| Cherry, American | 7.0 | Meranti, blanc | 6.5 | Tsuga du Canada | 5.5 |
| Ciliegio | 6.0 | Meranti, Dark Red | 7.0 | Utile | 6.0 |
| Ciliegio tardive | 7.0 | Meranti, rouge foncé | 7.0 | Verzino | 8.5 |
| Cirmulo | 4.5 | Meranti, White | 6.5 | Walnut, European | 7.0 |
| Ciruelo comun | 7.0 | Merisier | 6.0 | Wawa | 5.0 |
| Corina | 5.5 | Niangon | 7.0 | Wenge | 9.0 |
| Dibetou | 6.5 | Noce africano | 6.5 | White Afara | 5.5 |
| Douglas Fir | 6.0 | Noce commune | 7.0 | Whitewood | 5.0 |
| Douglasia | 6.0 | Nogal | 7.0 | Zimbro | 4.5 |
| Douglasie | 6.0 | Northern Pine | 5.0 | Zirbelkiefer | 4.5 |
| Ebano | 9.0 | Noyer commun | 7.0 | Zwetschgenbaum | 7.0 |

# 7 Accessories

**Drive-in electrode M 20** (order no. 3300)

For surface and depth measurements up to approx. 50 mm for sawn timber, veneer, chipboard and wood fibre boards, equipped with electrode tips:

-16 mm long (order no. 4610) with 10 mm penetration depth

-23 mm long (order no. 4620) with 17 mm penetration depth

**Ram electrode M 18** (order no. 3500)

For depth measurements in thick wood up to 180 mm thick, available for this:

Electrode tips without insulation

-40 mm long (order no. 4640) with 34 mm penetration depth

-60 mm long (order no. 4660) with 54 mm penetration depth

or

**Electrode tips with insulated shank**

-45 mm long (order no. 4550) with 25 mm penetration depth

-60 mm long (order no. 4500) with 40 mm penetration depth

**Measuring cable MK8** – Length: 1 m (order no. 6210)

For connection of electrodes for resistance measurement

**Wood moisture test adapter** (order no. 6070)

Test adapter for wood moisture, for check of wood moisture measuring instruments with accessories.

**Surface measuring caps M 20-OF 15** (order no. 4315)

For moisture measurements on surfaces without damaging the material to be measured, to be used in combination with the M 20 electrode

# 8 Appendix

## 8.1 General Concluding Remarks

The conclusions to be drawn from the measurement results are related to the individual conditions and the knowledge from professional experience for each user.

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