6. Calibration curves

The device automatically recognises the connected sensor and provides the corresponding calibration curves.

With no sensor attached to the device, the calibration curves for the ram electrode will be provided (see "Overview external sensors" page 3).

6.1 Calibration curves of the ram electrode

Wood type	Sub categories	Measuring range limit
Beech	Rubber, Eucalyptus	32 %
Oak	Mahogany, Wenge	32 %
Alder	Acacia, Alstonia, Birch, European chestnut, Horse chestnut, Cherry Tree, Walnut, Okan	40 %
Ash	Keruing	35 %
Spruce		40 %
Pine	Balsa, Yew Tree, Stone Pine	35 %
Larch	Maple, Douglas Fir, Hemlock, Poplar, Elm	32 %
Fir	Ceiba, Lime	37 %
Willow	Pear, Hickory, Olive wood, Ramin, Teak	40 %
Straw	Straw bales (art. no. 12521 required) Compressed density from 100 kg/m³ to 130 kg/m³	30 %
Hay	Hay bales (art. no. 12521 required) Compressed density from 100 kg/m³ to 130 kg/m³	25 %
Cellulose	Cellulose insulation material (art. no. 12521 required) Density from 38 to 65 kg/m³	35 %
Digit 1	Special products	0 - 100
Empty 1	Free curve for special products	
Test block	! Only for testing the moisture meter !	

Explanations to wood types and sub categories:

The wood types listed in the "Wood type" column are displayed in the measurement window of the humimeter BL2. If you want to measure a type of wood that is not displayed on the device, search for it in the subgroups and set the corresponding wood type on the device, e.g. if you measure poplar, set the wood type larch on the device.

6.2 Calibration curves of the insertion probe

Calibration curve	Product type	Measuring range
Wood chips	See "6.3.1 Wood chips"	10 % - 50 %
Coarse wood chips	See "6.3.2 Coarse wood chips"	10 % - 50 %
Industrial wood chips	See "6.3.3 Industrial wood chips"	10 % - 50 %
Pellets	Wooden pellets	11 % - 20 %
Sawdust	Sawdust	14 % - 50 %
Olive stones	Shredded olive stones	10 % - 21 %
Digit 2	Special products	0 - 100
Empty 2	Free curve for special products	
Test block	! Only for testing the moisture meter !	

6.2.1 Definition wood chip types (in accordance with EN ISO 17225-1)

The given numbers refer to the particle sizes that fit through the round screen openings.

- P16 at least 75 % of the mass between 3.15 and 16 mm
- P31 at least 75 % of the mass between 8 and 31.5 mm
- P45 at least 75 % of the mass between 8 and 45 mm
- P63 at least 75 % of the mass between 8 and 63 mm

6.3 Selection of calibration curve for wood chips

The calibration curves for wood chips depends on the wood type (hardwood, softwood), the size of the chips (size classes according to norm EN ISO 17225-1) as well as on the content of fine fraction.

If you are not sure which calibration curve is the best suited for your material, it is recommended to carry out a reference measurement by kiln-drying (according to EN ISO 18134-2).

Schaller Messtechnik GmbH will be happy to advise you on the selection of the right calibration curve. Please send a picture of your wood chips, placing a measuring tape to the material, to support@schaller-gmbh.at. You will receive a recommendation from us immediately.

6.3.1 Wood chips

For wood chips with fine fraction, mainly consisting of hardwood (maximum proportion of softwood of 30 %). For wood chips sizes from P31 to P45. The fine fraction mainly derives from barks, small branches and bushes. See example pictures 59 and 60.

If your wood chips don´t contain small parts (few fine fraction or no fine fraction) or if the wood chips contain a higher proportion of softwood, use one of the following calibration curves.

6.3.2 Coarse wood chips

For coarse wood chips without fine fraction, mainly consisting of hardwood (maximum proportion of softwood of 30 %). This curve also has to be used for wood chips with fine fraction, mainly consisting of softwood, with a proportion of softwood (spruce, fir, pine, larch) of 70 % and more. For wood chips sizes from P31 to P63. See example pictures 61 and 62.

If your wood chips mainly consist of softwood and don´t contain small parts (few fine fraction or no fine fraction), use the following calibration curve.

6.3.3 Industrial wood chips

For coarse wood chips without fine fraction, mainly consisting of softwood, with a proportion of softwood (spruce, fir, pine, larch) of 70 % and more. For wood chips sizes from P45 to P63. This curve is predominantly suited for measuring wood chips deriving from logs and full trees as well as sawmill residues without fine fraction. See example pictures 63 and 64.

Example pictures wood chips

59

60

Example pictures coarse wood chips

61

62

Example pictures industrial wood chips

63

64

6.3.4 Compression of wood chips

The humimeter BL2 is calibrated for normally compressed wood chips. If the wood chips being measured are much less or much more compressed, the accuracy of the measurement will decrease. Normally compressed wood chips are defined in norm EN 15103 (determination of the bulk density).

6.4 How moisture is defined

In the standard delivery state, the device measures and shows the material moisture content. The moisture content readings are calculated in relation to the material's overall mass:

$$\%WG = \frac{M_n - M_t}{M_n} \times 100$$

M_n: Mass of the sample with average moisture content

M_t: Mass of the sample with zero moisture content

%WG: Moisture content (in accordance with EN ISO 18134-2)

Example: 1 kg wood with 40 % moisture content
The total weight of 1 kg (corresponding to 100%) consists of 0.6 kg (60 %) wood and 0.4 kg (40 %) water.

6.5 Definition of wood moisture

The wood moisture defines the amount of water contained in the material in relation to the material´s dry weight.

Example: 0.6 kg wood with 0.4 kg water
The dry weight of 0.6 kg corresponds to 100 %. In relation to the dry weight, the 0.4 kg water result in a wood moisture of 66.7 %.

It is possible to set the device to the calculation of wood moisture at the factory. For that please contact support@schaller-gmbh.at.

6.6 Notes for comparative measurement with oven-drying method

The device uses a much higher sample quantity than the drying oven (12-fold to 20-fold quantity of kiln-drying method). Furthermore, to determine a more accurate average moisture value in case of inhomogeneous material, there can be effected several measurements within a short time.

Considering a sampling error due to the considerably smaller sample quantity as well as the content of volatile matters (resin etc.) that are not water, the kiln-drying method will practically reach an accuracy of approx. +/- 3 %. Therefore, if the measuring values of these two very different methods of determining the water content are compared, differences of +/- 3 % can be considered to be normal.

In the standard EN ISO 18134-2 is declared that the drying oven method provides no absolute values, but only comparable values.