Feuchtigkeitsmessgeräte
Moisture Meter
Humidimètre

DS3U Operating Manual

The DS3U can be used for measuring moisture in stacks of veneer, corrugated boards, single card board sheets, ...

Safety Tips:

☛ follow the operating instructions

☛ only use the meter as directed (see page 1)

☛ keep the meter away from live and current electrical parts

☛ avoid impacts

☛ protect the meter from heat

☛ keep the meter dry and try to prevent dirt from entering the case

☛ protect the meter from electrostatic discharge.

☛ the meter must be repaired or serviced only by qualified specialists

Damages caused by failure to follow the above Safety Tips are not covered by the warranty !

Description:

The electronic moisture meter DS3U is used to determine in a matter of seconds the moisture in materials. The average moisture, approx. 3 cm below and 4 cm above the sensor is measured.

materials: stacks of veneers, plywood boards, corrugated boards, single cardboards, ...

measuring range: wood: 0 - 50 % water content
paper, cardboard: 0 - 20 % water content

material temperature range: 5 - 40°C

working temperature range: 5 - 40°C

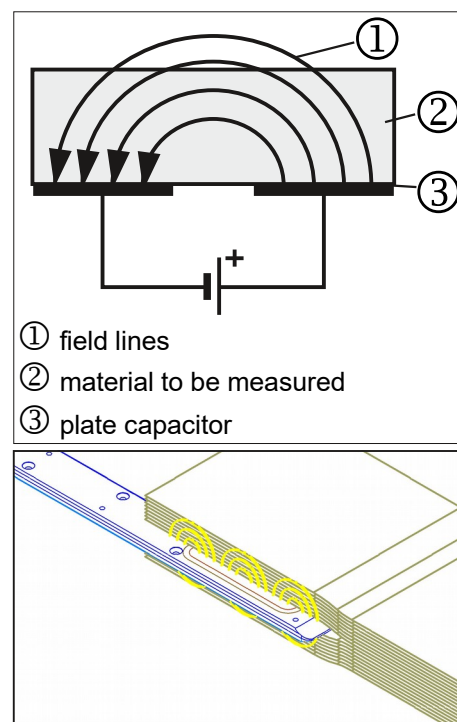**storage temperature range:** -20 - 70°C

Measuring Principle:

The meter works in accordance with the principle of an opened plate capacitor. The capacity of the capacitor depends on the material-(dielectric)-constant of the material in between the plates ②.
Compared with air ($e_r = 1$) , for example water has a very high dielectric-constant ($e_r = 80$). The water content of a wet material can therefore be determined by determining the dielectric constant of this material.

The measuring electrodes 1 of the meter are contacting during the measuring process the materials to be measured above and below the sensor parts , so that a high frequency electrical field is able to pass through the material. A micro processor receives the measured signals and determines from the measured value the percentage water content taking into account the material setting group.
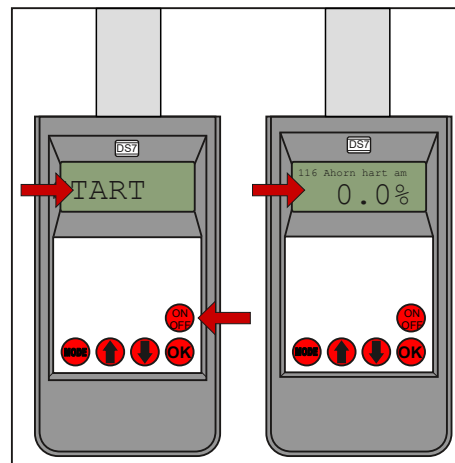

① field lines
② material to be measured
③ plate capacitor

Measurement Preparation:

☛ material thicknesses above and below the sensor < 3 cm ②
☛ no additional metal parts near the measurement place
☛ distance to the border at least 10 cm

Turn on the Meter:

☞ Push ON/OFF-button, the display shows the adjusted material group. Hold the instrument into the air for automatic zero point measurement and correction. If the zero point is not in the valid range, the display shows "ZP-ERROR".
As long as the ON/OFF button is pressed, date and time is displayed

☞ release the ON/OFF-button, the instrument is now ready for use with the setting before the last switching off.

Main Menu

If the main menu is not shown after switching on, press „MODE" for getting the main menu. Select the wished item with the arrow buttons and press „OK"

Main Menu

- **material moisture:** the moisture measurement starts

- **storing:** settings for measurement storing

- **material:** material menus will be opened for selecting and changing the material settings

- **zero point:** the new zero point can be measured for later corrections

- **input value:** test measurements can be done, the input value can be correlated to moisture value in the material settings

- **settings:** the parameter settings can be changed

- **calibration:** the calibration measurements can be done, the test module PE-DS3 is needed

- **device info:** serial no. and firmware no is shown

```
- material moisture
  storing
  material
  zero point
  input value
  settings
  calibration
  Device info
```

Material Moisture

in the first line the selected material is shown
in the second line the adjusted storage setting is shown
In the third line the number of stored values is shown
In the fourth line, at week battery alarm „BAT" is shown
In big characters the actual moisture content is shown

By pressing „MODE" the main menu is shown

With the arrow buttons the wished material out of the selected group can be selected. Eventually stored values will be deleted, as only measured values for one material setting can be stored.

```
paper no. 1
on
  3          0.0%
BAT
```

Material Moisture Measuring:

- hold the sensor free into the air for automatic zero point measurement
- stick the meter with its sensor into the material stack
  be sure that there are enough material around the sensor
- read of the moisture value

Turn off the Meter:

- push "ON/OFF" button until the display shows an OFF-text as long as the ON/OFF-button is pressed
- release "ON/OFF" button, the meter is turned off

After an adjustable time the instrument switches off automatically. If switch off time is adjusted to 0, the automatic turning off is deactivated. In this case the instrument has to be turned off by pushing the ON/OFF-button

Material menu

In the first line the actual selected material is shown. There are two different material menus, depending on the selected material group:

Menu for fixed calibrations:

- material selection:	first the material group, then the materiel in that group can be selected
- back	back to the main menu

paper no. 1
- material selection
  back

Menu for customer specific calibrations

- material selection:	first the material group, then the materiel in that group can be selected
- teaching material:	through sample measurements with known moisture content, a material calibration can be made, up to 100 teaching measurements are possible
- change corner point:	calibration points can be changed
- change name:	the material text can be changed with the arrow buttons
	press OK for the next character press MODE for ending and storing
- delete:	the material calibration data will be reset to standard values, the material can be taught
- back:	back to the main menu

paper no. 1
- material selection
  teaching material
  change corner point
  change name
  delete
  back

Material Teaching

For teaching you need to measure pieces with known moisture content. For each material more measurements can be done. From all stored measurements average vales will be calculated and shown in the second line.

On the left the input values, on the right the moisture values
In the third line, the measured comparing values are shown.

1. line: material name

2. line: average values from all taught values belonging to the selected material

3. line: In the first column the measurement no.
If this number is > 1, then comparing values are already stored and further comparing values can be added.

in the second column the measured value is shown

in the third column the moisture value is shown

```
material 01
AVG:0456 - 08.5%
  1:0436 - 08.8%
```

```
material 01
AVG:0456 - 08.6%
  2:0476 - 09.3%
```

With the arrow buttons the moisture can be adjusted, by pressing the OK button the taught pair values are stored and a next teaching can be done
The teaching always can be ended by pressing the MODE button.
Up to 99 teaching measurements are possible for each material.

Change corner points

In the first line the actual selected material is shown.
There are in total 6 pair of values which are defining the material calibration.
In the first column the edge no is displayed, in the second column the input value and in the third column the moisture value.
Always the value marked with „<" can be changed with the arrow buttons, by pressing „OK" the next value can be changed.
By pressing „MODE" the changing is aborted

```
material no.   1
1:     0    0,0%
2:    49<   0,0%
3:   271    5,5%
4:   717   14,5%
5: 3156   50,0%
6: 5000   50,0%
```

1:      starting edge, input 0 = moisture 0,0%, this cannot be changed

2:      here the input value can be changed, this is the input value at the dry material, the moisture value should be stay at 0,0%

3 to 4: the edge points can be changed

5:      the maximum moisture can be defined

6:      this corner is always input 5000 and the moisture of the 5.corner, this cannot be changed.

After confirming the 5th point values bey pressing OK, the changing of the material calibration is finished, the main menu will be displayed.

After changing the calibration corner points, no additional teaching is possible for this material.

Measurement Storage

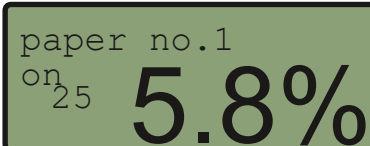The DS3U is able to store up to 100 moisture values.

Storage menu

- setting: the storage can be switched on, automatic or single measurements can be selected.

                arrow down, "storing off", „OK": the storage is switched off, back to main menu

                arrow up, "storing on", OK: the storage is on

                arrow up, „automatic", OK: all measurement will be stored automatically till the storage is full In the settings menu the number of measurements per second can be adjusted

                arrow down, „single values"   moisture values will be stored by pressing „OK" during the measurements

- read values: stored moisture values can be read

- delete: the stored values will be deleted

Storage possibilities:

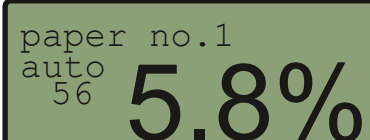**storage on, single values:**
In the second line on the left side "on" is displayed, when the storage is aktiv. Single moisture values can be stored through pressing the OK-button. In the third line on the left, the number of stored values is displayed.

```
paper no.1
on
  25    5.8%
```
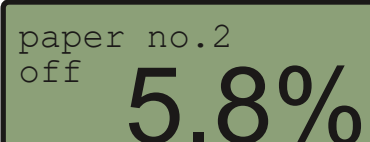
storage on, automatic
In the second line on the left side "auto" is displayed. All measurement values bigger then 0,0% will be stored automatically, the numbers of measurement per second can be adjusted. In the third line on the left, the number of stored values is displayed.

```
paper no.1
auto
   56   5.8%
```

After changing the material setting, the storage is deleted automatically!

The automatic storing can be started stopped through pressing the OK-button. "OFF" is the displayed in the second line. Pressing again the OK-button the automatic storing is on again.
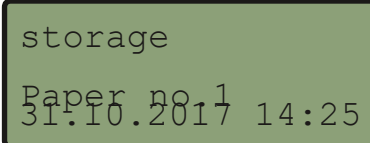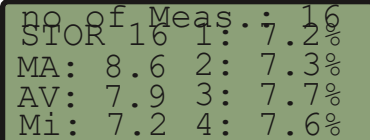
```
paper no.2
off
     5.8%
```

Read stored values

In the first window date and time at storage starting, used material, and number of stored values will be displayed
With pressing the OK-button, the second window appears with minimum, average and maximum of the stored value on the left side and all stored values on the right side. With the arrow buttons the display can be scrolled. With pressing the OK-button the storage window will be closed.

```
storage

Paper no.1
31.10.2017 14:25
```

```
no of Meas.: 16
STOR 16 1: 7.2%
MA: 8.6  2: 7.3%
AV: 7.9  3: 7.7%
Mi: 7.2  4: 7.6%
```

With our Software DOSOFT and an USB-cable stored values can be transferred to a PC. The software can be downloaded from www.doser.de and it can be used free for 30 days.

Test Measurements / Calibration

Input Measurement

The input measurement in combination with oven method measurements needs be done for getting customer specific calibration curves. For putting new calibrations into the instrument, code 50 can be used. Or alternatively with more comfort the software DOSOFT can be used.

```
input:
  0000
```

Checking Measuring Quality:

We recommend carrying out regular periodical controlling check measurements, as different local circumstances might need different material adjustments. (recommendation: controlling measurements by oven drying method ISO 3130-1975 for wood or DIN ISO 287 for paper moisture.

Oven Drying Method:

The oven drying method is the most accurate way to measure the material moisture.
We recommend this for testing and calibrating of all electronic moisture meters.
Short description:
1. For measuring the weights we recommend a balance with an measuring range of 200g
   and an accuracy of 0,01g
2. For drying you need an oven with adjustable temperatures of 40, 100 and 104°C
3. Take a probe from wood with a sharp saw, avoid edge parts. For building materials take a probe with a with a sharp chisel to a depth of approx 3cm. the probe should be at least 20g
4. It is very important to take the weight of the first probe immediately, as air humidity may change the moisture content. Name of the first weight: wet weight (WW)
5. The probe must be dried in the oven until the weight is constant,
   the maximum drying temperatures for paper and cardboard : 100 °C   (DIN ISO 287)
   the maximum drying temperatures for wood: 104 °C   (ISO 3130-1975)
   the maximum drying temperatures for concrete: 50 °C
   the maximum drying temperatures for gypsum: 40 °C
7. The name of the dry weight is DW.
8. The moisture content is calculated with the formula:

wood moisture (ISO 3130-1975):
$$MOISTURE = \frac{(WW - DW)}{DW} * 100\%$$

building materials, paper, cardboards:
$$MOISTURE = \frac{(WW - DW)}{WW} * 100\%$$

Basic Calibration:

The moisture meter can be tested and calibrated with the test module PE-DS3.

For this procedure the sensors need to be dry and clean!
Select „Calibration" in the main menu and put in code no 97

```
calibrating:
measuring val :    123
Zero point:        123<
```

1. **zero point**
   the zero point only can be measured and not adjusted. The zero point should be between 10 and 390. If the measured value is above 400, no zero point will be measured. Hold the meter with its sensors free into the air, both values must be equal, wait till the zero point is stable and press the OK-button.
   If the zero point is out of range, the meter needs to be repaired!

```
calibrating:
PE-DS3:    191
factor:    223<
```

2. **Measurement with Test Modul PE-DS3:**
   the meter needs to be put into the test module PE-DS3.
   The calibration result is shown, additional the calibration factor. This factor can be changed with the arrow buttons till the measurement result is as exact as possible **190**. The factor can be changed between 150 and 255. With pressing the OK-button, the changed calibration will be stored and the calibration procedure finished.
   If the calibration is not possible, the meter needs to be repaired.

Battery:

we recommend to always use high quality batteries,
e.g. alkaline or lithium 9V block batteries.
If the battery is running low, the display shows "BAT" in the bottom line.

```
455 Sapelli
BAT    5.8%
```
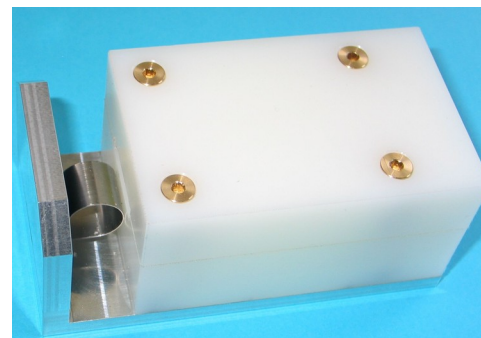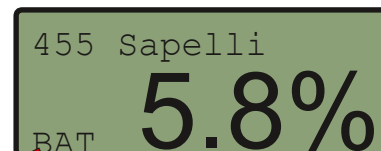
Change battery:

- open the battery box for example with a small screw driver
- take out the battery
- insert new battery, observing the correct polarity

Attention!

In accordance with battery legislation, all used batteries must be disposed off in special battery collecting bins. The disposal of old or used batteries as part of normal waste is not allowed!

Optional Extras:

- manufacturer certificate
- test module PE30-7 for checking and calibrating the moisture meter, also possible with manufacturer certificate
- customer specific calibration of the moisture meter
- PC software DOSOFT, can be downloaded from www.doser.de and tested for 30 days for free
- alkaline battery 9V block

Included fixed material calibrations

paper:
paper 1: filter paper, wrapping tissue
Paper 2: crepe paper, semi chemical
fluting medium, test liner,
"schrenz"
paper 3: recycled fluting medium,
wrapping paper
paper 4: kraft paper
paper 5: offset paper

corrugated boards :
single boards on Styrofoam,
Touch line across to the wave
1:      light corrugated board
2:      2,9 x 6,0
3:      double 2,9x6,0 + 1,4x4,0
4:      double 1,4x4,0 + 2,9x6,0
5:      4,0 x 7,5
6:      D2,0 x 6,0

Veneers:
116, Maple hard am
133, Aniegre
150, Birch europ.
190, Bubinga
200, Beech europ.
259, Doussie
261, Iroko
270, Oak white am
271, Oak europ.
274, Oak red am
290, Alder europ.
301, Ash europ.
305, Ash burl eu
362, Pine europ.
380, cherry europ
381, cherry bl am
390, Larch europ.

455, Sapeli
550, Walnut am
551, Walnut eu
552, Walnut burl eu
660, Satinwood
700, Teak
764, Wenge
770, Zebrano
931, Spruce europ.
935, Pear w. wild eu
936, Poplar burl.eu.
937, Sycomore europ.
944, Yew europ.

Our operating instructions are intended for guidance and to provide information on our products and their uses. They should not be taken to imply special characteristics or suitability for any specific purpose, other than those stated.

We constantly work to improve our products and reserve the right to alter our products and operating instructions without advanced notification.