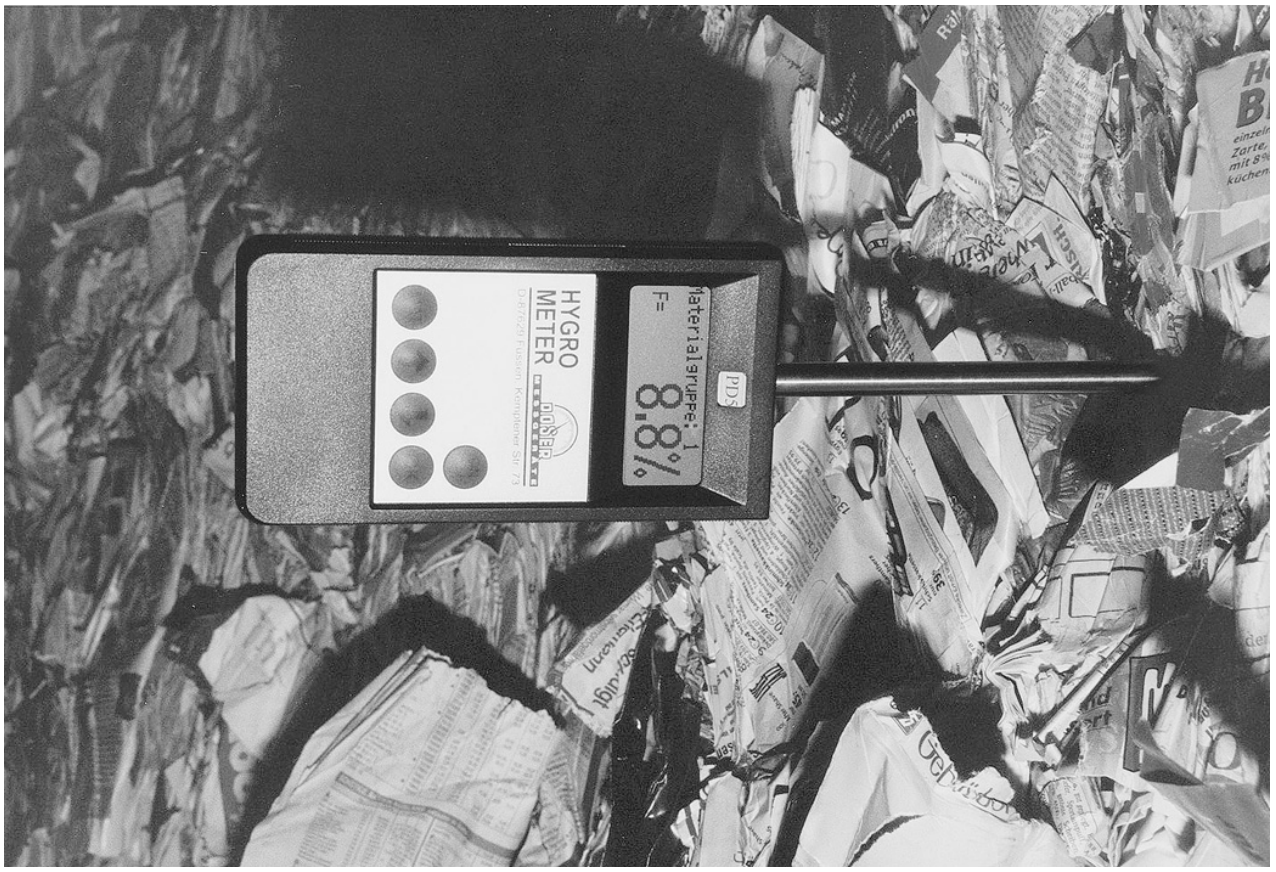
MOISTURE METER
STICKING ELECTRODE

DS5-AL Operating instruction



Moisture meter type DS5AL
for absolute moisture measurement in waste paper balls, wooden chips, pellets, etc.

Duly use:

The electronic moisture meter DS5-AL is used to quickly determine the moisture in materials. An absolute average moisture content is measured.

materials: wastepaper balls, wooden chips, pellets

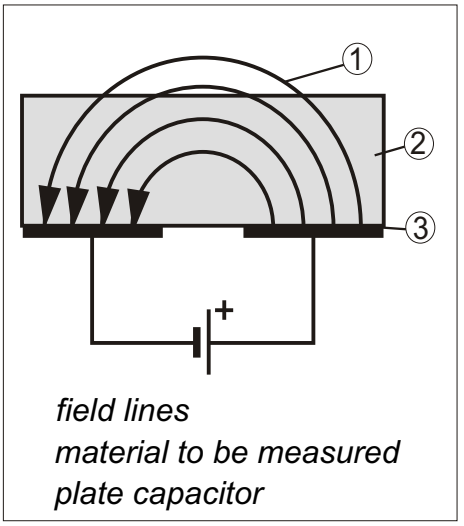
measuring range: 0 - 100 % water content

material temperature range:	+5 - +40°C
working temperature range:	+5 - +40°C
storage temperature range:	-20 - +70°C

Moisture meter type DS5-AL

Method of operation:

The measuring electrode of the meter is pushed into the paper or cardboard piles and a high frequented field is able to pass through the material. Taking in account the material setting, the percentage water content is determined. The result can be read off immediately.



field lines
material to be measured
plate capacitor

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. 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.

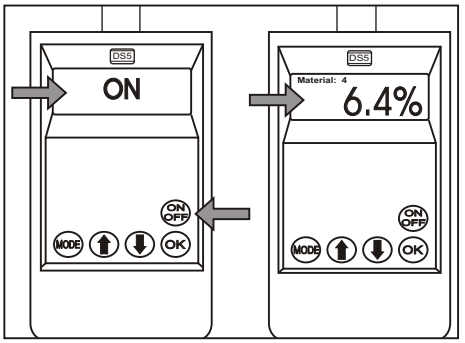
Safety tips:

- follow the operating instructions
- only use the meter as directed (see page 2)
- keep the meter away from live and current carrying parts
- keep the meter dry
- 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 mentioned Safety tips are not covered by the warranty!

Turning on:

- the sensor must be dry and clean
- push "ON/OFF" button, until it shows "on" in the display and hold the meter in the air so that the automatic zero point measurement / correction can be carried out correctly
- release "ON/OFF" button the meter is ready for use



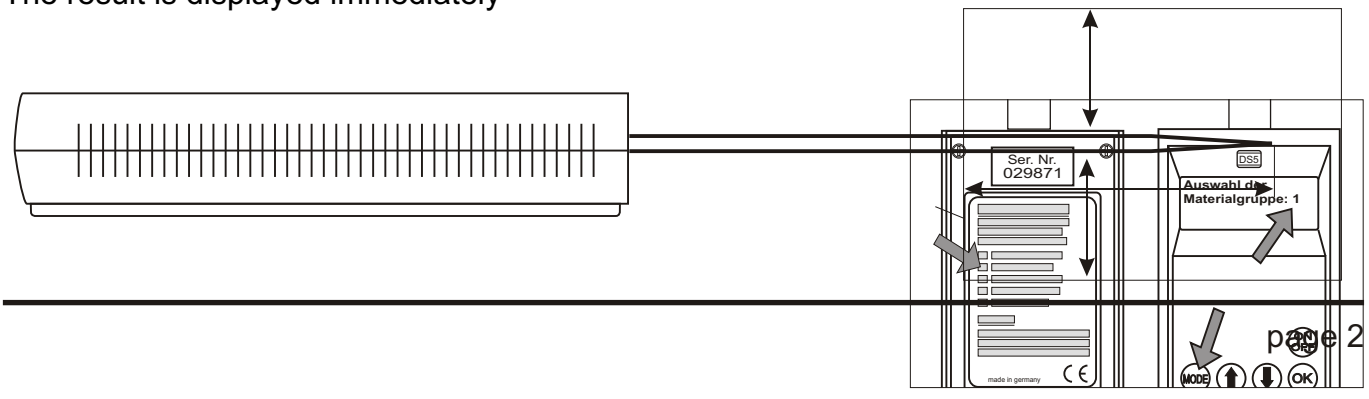
Material adjustment:

- select the best fitting material number
- turn the meter on and then push the “MODE” button
- with the arrow buttons the corresponding material number can be adjusted
- finally the "OK" button has to be pushed

Measurement:

Insert the sensor between into the material (1).
The distance to the border (2) has to be at least 5 cm.
The sticking depth (3) should be at least 15 cm.

The result is displayed immediately



Parameter Settings:

With code numbers parameter settings can be changed. Press both arrow buttons, the display shows “code:00“, adjust the required code with the arrow buttons and confirm it with OK. The following parameters are changeable:

code 11: storage adjustments (OFF, ON single, ON auto)
ON single: single values will be stored by pressing the OK-button
ON auto: All values > 0 will be stored automatically after pressing OK until the storage is filled up or until the OK-button is pressed again.

code 12: number of measurements per second (mps)
range 0 - 10

code 13: number of measurements until automatic switching off (loops)
range 0 - 999, loops = 0: no automatic swiching off

code 14: delete storage, through changing the material setting the storage will be deleted too.

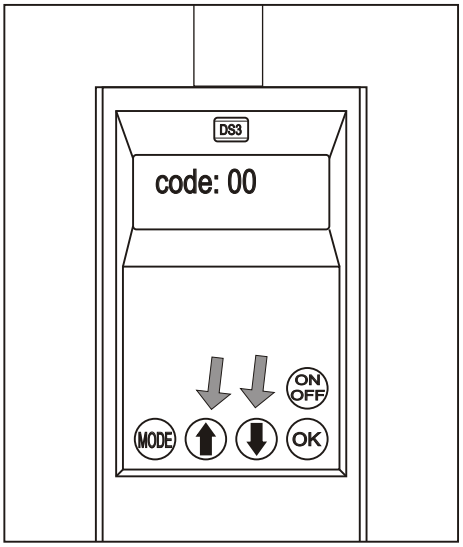
code 15: select language

code 21: attenuation (brake), range 0 - 99

code 22: automatic maximum value measuring (automax)
no automatic maximum measurement (float)

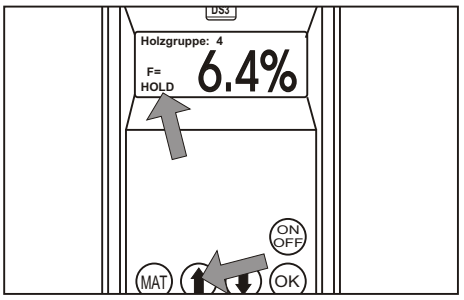
code 95: toggle between material moisture and calibration measurements (display of input values)

code 97: starts the calibration procedure



Storing of Moisture Values:

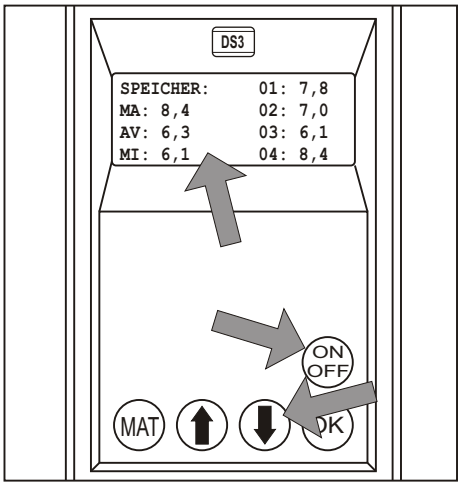
If the storage is activated, by pushing the OK-button up to 250 values can be stored. If the storage parameter is set to “on single” always one value is stored, if the parameter is set to “on auto” every value > 0 is stored automatically until the storage is full or the OK button is pressed again. The number of measurements per second (mps) can be adjusted between 1 and 10. The storage procedure will be signed with an “stor” on the botom line at the right side.



Restorage of the Stored Values:

By pushing the **"OK"** and the **“arrow down”** button, the stored values can be restored. The result is shown in 2 colums. On the left average value(AV), Minimum value (MI) and maximum value(MA) and on the right side the stored values, they can be scrolled with the arrow buttons.

With our optional PC-interface cable and software **DMI-Controller** the stored values can be transfered to a PC for storing them into a file or showing them on a graph.



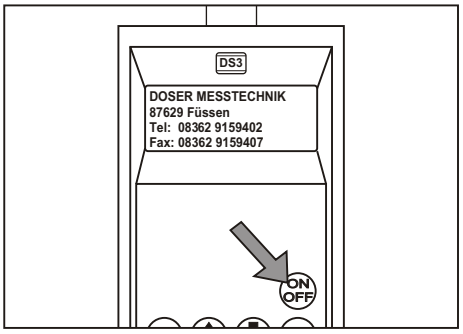
Cancellation of the Stored Values:

After changing the material adjustment or with code 14, the stored values will be cancelled, which is shown as “delete storage” on the display.

Turn Off the Meter:

- push "ON/OFF" button until the display shows the service address, this keeps in the display as long as the “ON/OFF”-button is pressed
- release "ON/OFF" button: the meter turns off

If no measurement is carried out for an adjustable time,
the meter turns off automatically.

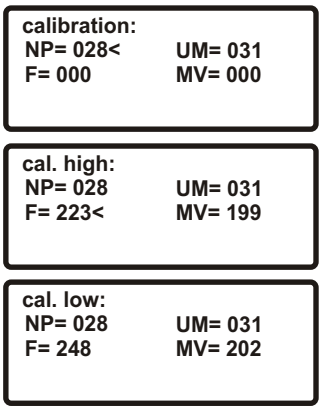


Basic Calibration:

start calibration procedure with code 97

1. **zero point**
   The zero point only can be tested, not adjusted. On the display the zero point (NP) and the actual measuring value (UM) are shown. At the test the sensors have to be clean and dry! The instrument has to be hold free into the air. Than wait till NP and UM are nearly equal. The value should be between 10 and 390. Is UM <1 or > 400, then no zero point calculation is working, in this case the instrument needs to be repaired.
   With the OK-button to the next calibtration step.
2. **measuring in test module PE50R at high amplification**
   As shown on the picture, the instrument has to be sticked into the test module.With the arrow buttons the factor (F) can be changed till the display shows MV=200.
   With OK-button to the next step.
3. **measuring in test module PE50R at low amplification**
   With the arrow buttons the factor (F) can be changed till the display shows MV=200.
   With OK-button the changed factors will be stored.

The factors can be changed in the range 150 - 255. If this is not enough, the instrument needs to be repaired.



Oven Drying Method:

The oven drying method is the most accurate way to measure the material moisture in paper NORM EN20 287 or DIN ISO 287or wood DIN 52183.

We recommend this for testing and calibrating of our moisture meters.

Short description:

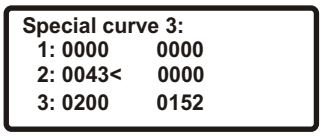
- for measuring the weights we recommend a balance with an measuring range of 200g and an accuracy of 0,01g
- For drying you need an oven with adjustable temperatures of 105°C
- Take a sample from the waste paper, avoid border parts. The sample should be at least 20g
- It is very important to take the first weight of the sample immediately, as air humidity may change the moisture content.
  Name of the first weight: wet weight (WW)
- The probe must be dried in the oven until the weight is constant, the maximum drying temperature: 105 °C (ISO 287),
- the name of the dry weight is DW
- moisture calculation:
  DIN 52183: MOISTURE = 100% * (WW - DW) / DW
  DIN ISO 287: MOISTURE = 100% * (WW - DW) / WW

Customer Specific Linearisation Curves:

It is possible to store 10 special linearisation curves with up to 8 free programmable points each. The values in this storage will stay in the memory during replacement of the battery. The adjustemt of the calibration points can be done with the PC-software DMI-Controller, or they can be changed through the kexpad as decribed below.

The microcontroller in the meter takes the analog measurement value with automatic zero point correction.
The resulting value is our input value.
You can display the input value with code 95. 1:0000

According to a rectangular coordinate system, the input are assign in the X-direction
and the moisture result are assign in the Y-direction.
According to this, X-values are input values ,
Y-values are the assigned moisture values.
X-values (input values) can appear in the area 0-4095,
this input values (Y-values) can be dedicated to moisture values (Y-values)
The moisure values have to be written in %-values * 10
(for example: for the moisuture value 12,3 % ==> Y-value = 123).



For chaging the calibration points you need to put in code 40 to 49 for curve 0 to 9 (e.g. code 43 for curve no. 3).
The values signed with “<” can be changed with the arrow keys.
Confirm the changed value with “ok”, then you can change the next value.

Calibration sample:

Special curve 3:

1:	0000	0000	
2:	0043<	0000	till the input of 43 the display shows 0,0%
3:	0200	0152	200 is the calibration value with our testmodule, with the testmodule the instrument will show 15,”%
4:	1430	0500	500 =50% is the maximum value
5:	5000	0500	input 1430 to 5000 the display stays at 50,0%
6:	0000	0000	points 6 to 10 not used
7:	0000	0000	
8:	0000	0000	
9:	0000	0000	
10:	0000	0000	

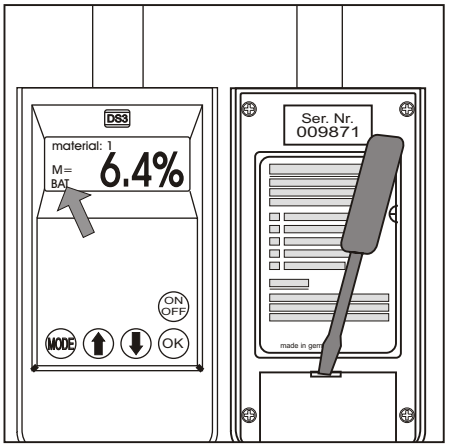
The maximum value for the input value is bewteen 4000 and 5000, depending on the basic calibration factor.

With code 31, the defoult calibration curves can be selected
With code 30, the special curves can be selected.

Moisture meter type DS5-AL

Battery:

The meter works with a commercial 9V block battery. The capacity is continuously controlled. If the battery is running low, the display shows “BAT”



Change battery:

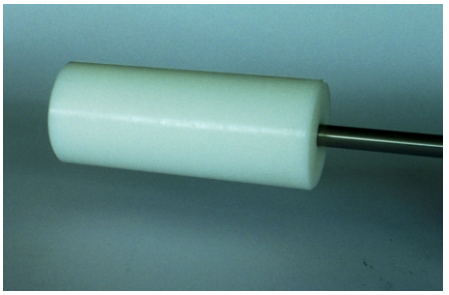
- open the battery box for example with a small screw driver
- take out the battery
- insert new battery, observing the correct polarity
- close the battery box

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:

- test module type **PE50R** for testing and calibrating
- PC-Software DMI-Controller to adjust parameter settings and to transfer measured values for analysys and documentation
- special calibration of the moisture meter



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.

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