Feuchtigkeitsmessgeräte
Moisture Meter
Humidimètre

Universal controlling unit type AD22 with sensor CMS22 for material moisture measurements in
wooden pellets, wooden chips, grains, granulats, …

normal use:

The electronic display and controlling unit AD22 in connection with the sensor CMS22 is used to determine in a matter of seconds the moisture in materials.

measuring range:

max: 0,0 bis   99,9 % H_2O

At the material moisture measurement a range about 5 cm around the sensor will be measured.

materials: wooden pellets, wooden chips, grain, granulates, ...

material temperature range: 5 bis 40°C
working temperature range: 5 bis 40°C
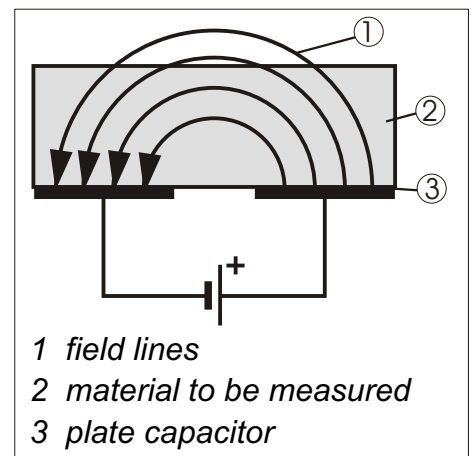storing temperature range: -20 bis 70°C

method of operation:

The measuring electrode of the meter is touching the material during the measuring process, 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 adjustment

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.

1 *field lines*
2 *material to be measured*
3 *plate capacitor*

safty tips:

-   follow the operating instructions
-   only use the meter as directed (see page below)
-   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 only be repaired and serviced by qualified specialists

Damages caused by failure to follow the above safety tips are not covered by the warranty !

Meter type AD22 with Sensor type CMS22

The **AD22** has a monochrome graphical display with high resolution (240 x 160 dots). With the integrated backlight, the display is illuminated. The meter operates with a rotating switch, identified with "OK". By turning and pressing you can set different adjustments.
With the "ON/OFF" button the instrument can be switched on and off.

turn on the meter:

- push ON/OFF-button, the display shows the starttext and time and date, while the ON/OFF-button is pushed.

- After releasing the ON/OFF-button the meter starts with the settings as it was used before.

main menu:

In the main menu the symbol ">" points to the selected item. By turning the rotating switch the menu item will be selected, when selected press "OK"

>mat.moisture: start material moisture measurement with the adjusted material setting.

>select material: the required special material can be selected

>zero point: the zero point will be measured and stored for correcting the moisture measurement

>adjustments: a sub menue for adjusting measurement parameters will be open

>storage: data storage for material moisture measurement
- adjust the storage parameter
- read out the stored measured values

>Info: indicates the instrument serial number, software version and calibration date. The serial no. has to be identical with the ser. no. on the back of the instrument.
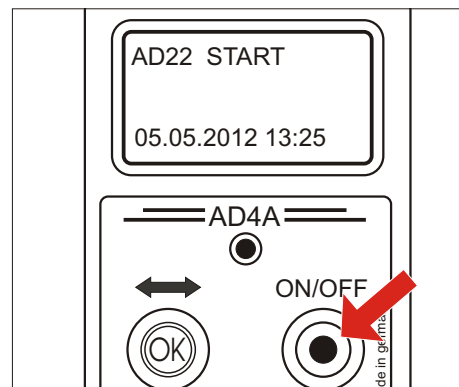
material moisture:

After selection of the menu point **"material moisture"** the extern sensor will be activated.
In the display, in the first line the selected material group and in the second line the selected material will be displayed.

The moisture value will be displayed with a quick bargraph, measuring rate 100 times per second. Below the bargraph the digtital moisture value will be displayed 3 times per second.
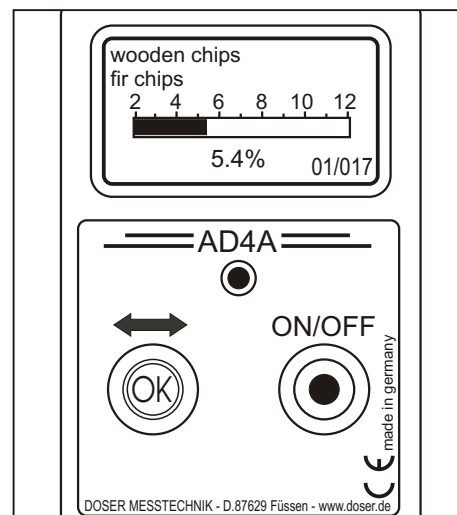
In the right bottom edge:

if the storage is open, the storage block and the number of stored values will be displayed.

select material

with the "select material" first the wished material group and then in the selected group the wished material can be selected.

- select the material group, confirm with ok
- select the wished material, confrm with ok

The sytem is now ready for moisture measuring.

```
material group
 special cal.
>wooden chips
 wooden pellest
 feed
 granulates
```

material moisture measurement:

- put the sensor into the material, there must be at least 5 cm material around the sensor, the distance between the sensor and the border of the material must be at least 5 cm.
- read off the moisture value
- at deactivated storage, through pressing OK the moisture value will be hold, "HOLD will be displayed in the reight bottom edge. Press OK again for deaktivating the hold function.
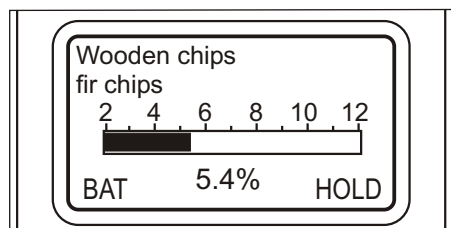- press OK for 2 seconds to get the main menue back

measurement storage:

There are 10 storage blocks. In each block up to 100 moisture values can be stored. Select main menue -> storage for selecting and avtivating the wished block.

At activated storage, moisture values will be stored through pressing "OK" in the right bottom edge the storage block no. and the number of stored values will be displayed.

The stored values will be kept also in switch off position


```
Wooden chips
fir chips
  2   4   6   8  10  12
BAT      5.4%       HOLD
```

```
Storage
 storage 1    ■
 storage 2    □
 storage 3    □
>storage 4    □
 storage 5    □
```

read out the stored values:

If values are stored a filled rectangle will be showed and after selecting this storage block with "values" the stored values can be read.

30,7% 34,5% 44,1% (smallest value, average value, highest value)
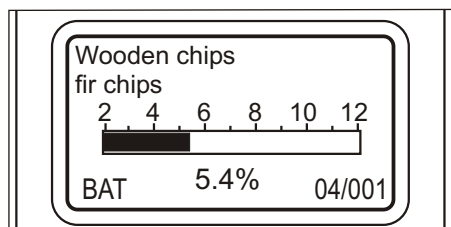 1: 44,0%   (1. Stored value)
  2: 44,1%
  3: 35,8%
  ....

With "statistic" the stored values will be displayed graphicaly, then after pressing "OK" the coresponding parameters will be displayd. At this screen through pressing OK for 2 seconds, a storage text can be changed.

With "delete" the storage block will be deleted. A security check will be displayed to avoid an unintentualy deleting.

With our interface cable and the software AD22-S, stored values can be transferred to a PC.

```
storage 1
>on
 back
```

```
Wooden chips
fir chips
  2   4   6   8  10  12
BAT      5.4%       04/001
```

```
Storage 1
>off
 statistic
 values
 delete
 back
```

adjustment -> calibration:

For calibration the sensor must be dry and clean. It's also reccomended that there are no big temperature differences since an hour before. For adjusting the calibration factor the test module PE22 is necessarry.

After selecting "calibration" adjust the code no. 97 and press "OK"

1. zero point measurement
   hold the dry and clean sensor free into the air. After a few seconds a stable zero poiunt value will be displayed. Press "OK" for storing the zero point value and coming to the next calibration step.
2. the sensor now must be put into the test module PE22 as showed in the picture.
   With the turning knob the calibration factor now can be changed till the rated value (MW = 600) will be displayed as exact as possible. Press "OK" for storing the new calibration factor.

The calibration factor can be adjusted in the rage 150 - 255. If this is not enough, the moisture system needs to be repaired.

```
adjustments
>calibration
 input values
 parameters
 switch off time
 clock/date
 language
 contrast
```



```
Kalibrierung
Faktor= 161
ME=      601
mit ok bestätigen
```

adjustments -> input value:

For getting customer specific calibrations, it makes sence to make comparing measurements with the oven drying method. For this we reccomend ta adjust the instrument to "input values"
This "input values" can be used directly for making a calibration table with the moisture values.

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 wood: ISO 3130-1975; building materials: DIN EN 12570; paper: DIN EN 20287 or leather: DIN 53304)

Oven Drying Method:

The oven drying method is the most accurate way to measure the material moisture in materials.

We recommend this for testing and calibrating of all electronic moisture meters.

Short description:
1. For measuring the weights we recommend a balance with a measuring range of 200g and an accuracy of 0,01g
2. For drying you need an oven with adjustable temperatures of 40, 102, 104 and 105°C
3. Take a probe from wood with a sharp saw, avoid edge parts. For building materials take a probe 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: dry weight (DW)
   The drying temperatures:
   wood: ISO 3130-1975)   104 °C
   paper: DIN EN 20287)   105 °C
   building materials   DIN EN ISO 12570)   40 - 105 °C, we recommend always 40°C
   leather   DIN 53340   102 °C

$$\text{Moisture} = \frac{(WW - DW)}{DW} * 100\ \%$$

calibration -> CODE 11 - 20

with the codes 11 - 20 up to 10 customer specific calibrations can be changed.
If the mark is at the first line "meaterial 1" press "OK for 2 seconds to change this material text. Press "OK for 2 seconds again for storing this changed material text.

In the 2. line the wished scale can be selected

In the lines 3 and 4 the treshold values for switching the 2-colour LED can be set. e.g. 100 for 10,0%

If "curve" is selected the edge points for the special material can be set. input values at the left side, moisture values at the right side. Moisture values are moisture values x 100 (e.g. 0500 = 5,0%)

```
calibration
>material 1
 scala: 02- 12/10- 20%
 alarm GNYE: 0050
 Alarm YERD: 0100
 curve
 back
```

```
calibration
curve
>0400 -> 0200
 0800 -> 0400
 1200 -> 0800
 1600 -> 1200
 back
```

adjustments -> switch off time

the automatic switch off time can be set between 0 - 240 seconds. At 0 the automatic switching off is deactivated.

adjustments -> time/date

time and date can be set

adjustments -> language

the wished language can be selected

adjuastments -> contrast

the display contrast can be adjusted

```
adjustments
>calibration
 input value
 parameter
 switch off time
 time/date
 language
 back
```

adjustments -> parameter

acustic alarm: treshold value for piezo loud speaker.
at 0,00 this alarm is off

automax: the maximum moisture value will be hold automatically. During holding the sensor into the air the old value will still be displayed. With touching the material with the sensor again, a new measurement starts.

damping: range: 0 - 99%
the changing of the moisture values will be slowlier at higher damping values.

```
parameter
>acustic alarm: 00.0
 automax:      AUS
 damping:      00
 back
```

sensor mounting

The sensor is delivered with 3 extention pipes, kink protection and cable.
- mount the number of pipes you need also the kink protection
- move the cable through the pipe and connect the cable at the sensor as shown in the picture.
- screw the pipe to the sensor

Battery:

The meter works with 2 batteries type AA (Mignon)
e.g.. DURACELL PLUS AA Alkaline MN1500

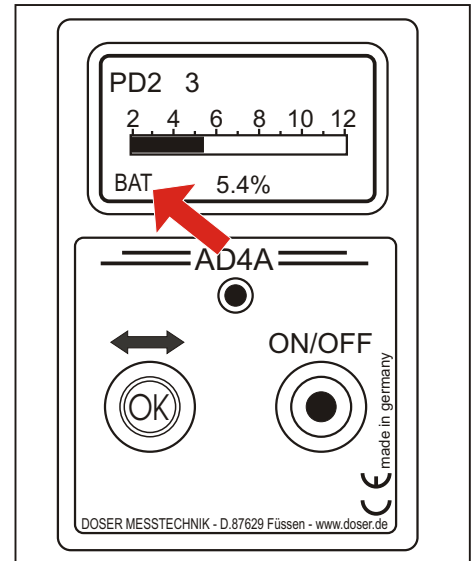If the battery is running low, the display shows „BAT".

Change battery:

With a screwdriver remove the 4 screws at the back of the meter, then remove the cover. Change the batteries and screw the cover on.

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!

Optionale extras:

- factory certificate
- test modul PE22 for sensor calibration (on request with factory certificate)
- customer specivic calibration
- PC software AD22-S with interface cable
- additional extention pipes and longer connection cable

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.