

# Operating Instructions SONO-VIEW





## **SONO-VIEW**

Stand-alone display for the reliable control and configuration of processes using SONO moisture probes. A total of up to 4 SONO probes can be monitored and the respective measurement values presented at the LCD via a serial interface.

#### Thank you very much for your decision to purchase this IMKO product.

Should you have any questions in respect to this product, please contact our local distribution partner or IMKO directly.

**IMKO** Micromodultechnik GmbH Am Reutgraben 2

D-76275 Ettlingen Germany

Phone: +49-7243-5921-0

Fax: +49-7243-90856

E-mail: info@imko.de

Internet: <u>http://www.imko.de</u>



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### **1 General Notices**

Please carefully read and get acquainted with these operating instructions.

Should any queries arise, please contact our service department under the contact data depicted above. Do not, under no circumstances, attempt to open or repair the device yourself. In the event of any warranty claims, please refer these to the retailer you purchased the device.

The device is subject to technical and optical change within the scope of product improvement.

#### 1.1 Intended Use

This device was developed to serve as a display and configuration device for various IMKO probes. Only the respectively intended probes may be connected to the device. The connection of any probe which is not intended for the device, can lead to damage or the destruction of this device and/or the connected probe.



### 2 Control Elements / Connections

#### **2.1 Control Elements**



#### **2.2 Connections**



USB (Type-Mini B) -USB-IMP-Bridge -Firmware Update -Supply Voltage -Bus-Interface



### 3 Initial Commissioning

#### 3.1 Safety Instructions

Attention: It is strictly necessary to read the General Notices contained under Item I at the beginning of the operating instructions. Any not intended use of the device can lead to damage to this device.

#### 3.2 Checking the Package Content for Completeness

- SONO-VIEW
- Terminal Block
- USB Cable (Type A  $\rightarrow$  Mini B)

#### **3.3 Connection**

For operation, the SONO-VIEW requires a supply voltage of 7...24V (approx. 80..30mA). A joint ground wire together with the probes is not required. For the connection with the probes, it is sufficient to merely connect the two bus lines "RT" and "COM".



Notice: The SONO-VIEW is suited for the display and configuration of up to four probes. Should more than four probes be connected, an error message will be generated and the device cannot operate correctly.



#### 3.3.1 Exemplary Connections

Example 1: Connection of the SONO-VIEW with two SONO probes and one joint voltage supply source.



Example 2: Connection of the SONO-VIEW with 2 SONO-probes merely via IMP-bus. SONO-VIEW and the probes dispose of their voltage supply. This may be useful, if the distance between the measuring equipment and the display device is considerable.



### 4 **Operation**

#### 4.1 Initial and New Installation

At the initial connection to your probe-network, it is necessary to set the same up, respectively follow an installation procedure at the SONO-VIEW.





Notice: The SONO-VIEW is suited for the display and configuration of up to four probes. Should more than four probes be connected, an error message will be generated and the device will not be able to operate properly.

After completion of the installation process, the SONO-VIEW will re-start, verify the connected probes, and will immediately commence to call up the measurement values.

#### 4.2 Measurement Value Display

The SONO-VIEW immediately commences to call up and display the measurement values after start-up. This is performed in a 500 ms cycle. Depending on how many probes are connected, from one to four, the following displays will be presented.



The moisture value in percent and the respective probe number is always presented. If two or three probes are connected, the temperature measured by the probe is additionally also presented. In the event that only one probe is connected, the calibrated radar run-time is also presented.

If more than one probe is connected to the SONO-VIEW, there is an option to change the display. For this purpose, actuate the buttons  $\checkmark$  /  $\checkmark$ . Subsequently, all connected individual probes are presented consecutively. For the purpose of allocation, the probe number is always also presented in the upper section. If this form of display is maintained for a longer period, the same will be assumed as "Standard". In this case, the SONO-VIEW will present this set measurement display form after a re-start.



#### 4.4 Settings

Actuate the button while the measurement display is active and you will reach the setup menu. Here, you are enabled to perform various settings and call up information regarding the SONO-VIEW.



The setup menu features the following structure:

<u>Setting</u>	Description
New Setup	Enables a new detection of connected probes
Language	Setting of the language
Display Contrast	Setting of the display contrast
About SONO- VIEW	Serial number and further information regarding your SONO-VIEW
Info	Support information
USB-IMP-Bridge	Enables the comfortable configuration of your probes via PC

Set the desired setting using the buttons  $\checkmark$  /  $\checkmark$ . By actuating the button  $\bigcirc$ , you can subsequently enter the selected setting. Actuate the button  $\backsim$  again in order to exit the setup menu.

#### 4.4.1 New Set-Up

See Section 4.1 "Initial and New Installation"

#### 4.4.2 Language

The selection of the language is performed with the buttons  $\checkmark$  /  $\checkmark$ . By actuating the button  $\bigcirc$ , the selected language is set as the standard language. To exit the menu item "Language", actuate the button  $\frown$ .



#### 4.4.3 Display Contrast

A bar containing a grey colour gradation will appear.



Set the contrast using the buttons  $\checkmark$  /  $\checkmark$  in a manner that enables you to recognise all grades. Store the set value with the button  $\bigcirc$ . To exit the menu item "Display Contrast", actuate the button  $\succeq$ .

#### 4.4.4 Information about your SONO-VIEW

About SONO-View	
Serial No.: HW: 1.00	5022
IBT: 0.91	APP:0.94
▲ Status ▼ Info	BACK

The device will present the serial number, the HW-version, the IBT version, as well as the firmware version. By actuating the button ▲, the device will present further status information such as the currently connected probes and system voltage values. To exit the menu item "About SONO-VIEW", actuate the button

#### 4.4.5 USB-IMP-Bridge

As soon as this menu item is called up, the SONO-VIEW changes into a transparent data mode. All data packets will be now redirected from the USB interface directly on to the IMPbus and vice versa. This enables a comfortable configuration of the probes via a connected PC without the necessity of additional hardware. For this purpose, please download the free software "SonoConfig"as well as the respective operating instructions available on the IMKO-homepage.

USB/IMP Bridge		
USB/IMP Bridge		
<sup>software:</sup> www.imko.de/software		
	📂 ВАСК	

Connect the SONO-VIEW to the PC using the provided USB cable. The SONO-VIEW will connect with the PC as a virtual serial interface (COM-Port). The respectively required driver is usually automatically installed by all currently used Windows versions. Should the driver not be automatically installed, please download the driver under: http://www.ftdichip.com/Drivers/VCP.htm.



Notice: As long as the SONO-VIEW is in the USB-IMP-Bridge modus, no measurement values are queried by the probe. The probes however continue to measure and issue the measurement value at the analogue output.

Actuate the button in order to exit the menu item "USB-IMP-Bridge".

#### 4.5 Probe Settings

The SONO-VIEW offers the option to comprehensively configure the connected probes even without PC. Settings such as offset displacements or the selection of a material-specific calibration can be simply adjusted with the buttons  $\blacktriangle$  /  $\checkmark$ .

The menu "Probe Settings" respectively offers the following options:

Setting	Description
Probe Info	Presents information regarding the connected probe
Material Calibr.	Selection of a material-specific calibration
Offset balancing	Displacement of the measurement value
Average Mode	Setting of the method of averaging
Average Paramet	Setting of the parameters of the set averaging method
Basic balancing	"Zero Value" calibration of the probe in ambient air

To reach the probe settings, select the individual probe display mode for the probe intended for configuration in the measuring display using the  $\checkmark$  /  $\checkmark$  buttons (also see Item 4.2). By actuating the button<sup>C</sup>, the probe setting of the currently used probe is called up.

- Notice: It is only possible to configure one probe at a time. Should several probes require to be adjusted, the procedure must be respectively repeated for these other probes.
- Attention: Ensure that the correct probe is set before commencing with adjusting the parameters.
- Attention: The SONO-VIEW offers the option to access the measuring parameters of the probe. Before adjusting any parameters, please inform yourself precisely in regard to the function of the same in the respective probe manual. Any performed changes may affect the measurement value, the accuracy, and the measuring rate.



#### 4.5.1 Probe Info

If this menu item is selected, various information of the probe is called up and displayed.



You can exit the menu item "Probe Info" with the button

#### 4.5.2 Material Calibration

The menu item "Material Calibration"enables to adjust a material-specific calibration stored in the probe. This enables to significantly increase the accuracy of the measurement. There are up to 15 material-specific calibrations deposited in the firmware of a SONO probe. These are presented here and can be selected with the buttons  $\blacktriangle$  /  $\checkmark$ . The character "1" set in front of a calibration hereby points out the current standard calibration. Store the selected calibration as standard in the probe using the button  $\bigcirc$ . The set calibration will subsequently be stored in the non-volatile memory of the probe. The menu item "Material calibration" is exited by actuating the button  $\boxdot$ .

#### 4.5.3 Offset Balancing

In order to compensate measurement errors e.g. due to density deviations in the material or due to the installation conditions, there is an option to perform a linear displacement of the measurement value. This is the purpose of this menu item. It is possible to displace the measurement value between -10 and +10 percent points. The set displacement is stored in the probe and will subsequently also affect the analogue output. The setting is maintained in a traceable manner.



Adjust the offset to the desired value using the buttons  $\checkmark$  /  $\checkmark$ . Subsequently store the set value in the probe with the button  $\bigcirc$ . You can exit this menu item with the button  $\backsim$ .

#### 4.5.4 Averaging Mode

This menu item enables the activation, respectively the changing of a measurement value establishment in the probe. IMKO moisture probes respectively offers the following options:

**Mode CS:** (cyclic-successive) Without averaging function intended for very short measuring processes in a range limited to seconds (e.g. 5...20 seconds) at which up to 100 measurements are performed internally per second at a cycle time of 250 milliseconds at the



analogue output. The operating mode CS also serves for the collection of raw values without averaging and filter functions.

**Mode CA**: (cyclic average filter) Standard averaging for relatively fast but continuous measurement processes with filtering and an accuracy of up to 0.1%.

**Mode CF:** (cyclic floating average with filter) Floating averaging for very slow and continuous measurement processes with filtering and an accuracy of up to 0.1%.

This is suited for applications such as within a fluid bed dryer, on the conveyor belt, etc.

Mode CK: (cyclic with Kalman filter) suitable for complex application

**Mode CC:** (cyclic cumulated) with automatic summation of the moisture-quantity measurements in one batch operation.

**Notice:** Please respectively also read the further information contained in your probe operator manual.



Set the desired "Average Mode" with the buttons ▲ / ▼ and subsequently set the set mode as standard with the button ☉. Once this is performed, the setting is stored in the probe. You can exit the menu item "Average Mode" with the button <sup>∞</sup>.

#### 4.5.5 Averaging Parameters

Depending on the set "Averaging Mode", there are various "Average Parameters"available for control purposes.

Averaging Mode	Available Parameters
	Average Time
	Filter Upper Limit Offset
CA – Cyclic Average	Filter Lower Limit Offset
	Upper Limit Keep Time
	Lower Limit Keep Time
	Kalman with Boost
	Average Time
	Filter Upper Limit Offset
	Filter Lower Limit Offset
	Upper Limit Keep Time
CK – Cyclic Kalman	Lower Limit Keep Time
	Q-Parameter
	R-Parameter
	K-Parameter
	Moisture Threshold
	Boost
	Offset



CF - Cyclic Floating	Average Time
	Filter Upper Limit Offset
	Filter Lower Limit Offset
	Upper Limit Keep Time
	Lower Limit Keep Time
CC Cyclic Cumulate	Moisture Threshold
CC - Cyclic Cullulate	No Material Delay

- Notice: Please respectively also read the further information contained in your probe operator manual.
- Attention: Before adjusting a parameter, please precisely inform yourself in regard to the function of the same. Any performed change may affect the measurement value, the accuracy, and the measuring rate.

The parameters are dynamically enabled with the set "Average Parameter".

Average Parameters			
SAVE	SAVE		
Average Tin	ne(s)		
Filter Upper L	·· 1		
	C CHOOSE		
Average Parameters			
Average Tim	ne(s)		
	1		
<b>▲</b> + ▼ -	C ACCEPT		
Average Parameters			
Average Parameters	Keep Time		
Average Parameters Lower Limit SAVE	Keep Time		
Average Parameters Lower Limit SAVE Average Tim	Keep Time ne(s)		

The buttons  $\checkmark$  /  $\checkmark$  serve for the navigation between the individual parameters. The current value of the selected parameter is presented in the lower left section of the display. To change the value, actuate the button  $\boxdot$ .

The value will now appear enlarged in the display. Adjust the value with the buttons ▲ / ▲ and subsequently assume the same with the button ▲. You also have the option to exit the entry with the button ▲ without performing any change to the value. Repeat this procedure for all parameters intended for adjustment.

As soon as you have performed all adjustments as desired, select the item "Save" and acknowledge the same with the button . Now, the parameters are written back into the probe and are immediately active.

You can exit the menu item "Average Parameters "with the button r without saving the same. Hereby, all performed changes are deleted!



#### 1.1.1 Material Calibration

The "Material Calibration" menu item allows you to set a material-specific calibration stored in the probe. In addition, you have the possibility to carry out your own calibrations in order to be able to measure special materials.

**Note:** Pressing the key Diriefly will take you to the previous menu point. By pressing the key Diriefly for a long time, regardless of which material calibration sub-point is currently active, you return to the probe setting menu.

Setup:→Material Calibr.	
Material Calibr.	
>> CHOOSE	
CHANGE	
васк	NEXT C

After selecting the menu item "Material cal.", use the  $\checkmark$  /  $\checkmark$  buttons to "CHOOSE" one of the 15 stored material-specific calibrations or "CHANGE" to perform a new calibration on one of the 15 calibration memories. The corresponding sub-point is selected with the key  $\bigcirc$ and the key  $\bigcirc$  leaves this menu point.

#### 1.1.1.1 Choose Calibration Curve

The sub-item "Select" allows you to select between up to 15 material-specific calibrations.

No.	Name:
01!	OWN:Maize without TC
02	Maize with TC
03	Wheat without TC
04	Wheat with TC

Use the  $\checkmark$  /  $\checkmark$  buttons to select between the materialspecific calibrations. The "!" shows the current standard calibration before calibration. Save the selected calibration with the button  $\bigcirc$  as a standard in the probe. The setted calibration curve is not stored in the probe. By pressing the key  $\Hugeinfty$ , you can leave this subitem "Select" again.

#### 1.1.1.2 Change

The "CHANGE" sub-point allows you to perform a 1-point calibration or 2-point calibration.



Use the  $\checkmark$  /  $\checkmark$  buttons to toggle between 1-point calibration and 2-point calibration. The corresponding procedure is executed with the key  $\boxdot$  and the key  $\checkmark$  is for finishing this procedure.

#### 1.1.1.2.1 1-Point Calibration

With this material calibration option, a linear equation (f (x) = mx + b) is calculated with the dry density. So it is necessary to have the dry density of the measured material before activating this option. A reference moisture content and the tp value (propagation time of the radar signal) which can be measured or set at the point of the reference moisture. Even if a



polynomial of higher degree is useful for obtaining greater accuracy, the linear equation is often sufficient to achieve very good results.

**Note:** To perform a 1-point calibration, you need a material sample as well as the dry density of the material to be measured. The moisture value has to be determined with another method like kiln drying or similar, before activating this calibration procedure.

Procedure:



At the beginning of the calibration, the selected calibration memory (01 - 15) has to be overwritten with the  $\checkmark$  /  $\checkmark$  buttons. Press the button  $\bigcirc$  to accept the setting and press the button  $\bigcirc$  to move to the previous item.



The percentage reference moisture of the material to be measured, must then be set with the  $\bigtriangleup$  /  $\checkmark$  buttons. Press the button  $\bigcirc$  to accept the setting and press the button  $\bigcirc$  to move to the previous item.



In the following step, the dry density of the material to be measured must be set with the  $\checkmark$  /  $\checkmark$  buttons. Press the button  $\bigcirc$  to accept the setting and press the button  $\bowtie$  to move to the previous item.

In the next step, the tp value (radar signal time) has to be determined by a measurement with the connected probe or by manual setting with pre-determined tp values.



Use the  $\checkmark$  /  $\checkmark$  buttons to select between "Measure" and "Set". The corresponding sub-point is selected with the key  $\boxdot$  and the key  $\boxdot$  can be used to switch to the previous point.



#### Measure tp:

Setup:- Material Calibr.	
Start Measure	
Ø-tp:	ps
васк	START C

Press the key 🖸 to start the tp measurement and press the key 🔁 to move to the previous point.



After starting the measurement with the key **G**, the mean value of 10 measured tp values is formed. During this phase, the SONO-View does not respond to any input.

Setup:-) Material Calibr. READY		
Ø-tp:	158.7 ps	
ВАСК	NEXT C	

After completion of the measurement, the tp mean value is displayed. Press the key <sup>C</sup> to accept the measured value and press the key <sup>C</sup> to move to the previous point.

#### Set tp:



The tp value can be adjusted manually using the  $\checkmark$  /  $\checkmark$  buttons. Press the button  $\bigcirc$  to accept the setting and press the button  $\boxdot$  to move to the previous item.

In the last step, the calibration settings can be saved with "Save" to the previously selected calibration memory location, or can be canceled with "Discard".

**Note:** After performing "Save", the original material calibration is preceded by an "OWN:", indicating that this is a specially prepared material calibration.





Use the  $\blacktriangle$ /  $\checkmark$  buttons to toggle between "Save" and "Discard". The corresponding sub-point is selected with the key  $\bigcirc$  and the key  $\boxdot$  can be used to switch to the previous point.

#### 1.1.1.2.2 2-Point Calibration

For the 2-point calibration, a linear equation (f (x) = mx + b) can be calculated with two moisture values of a material and the corresponding tp values (running times of the radar signal) which are measured or set at the respective material moisture. Even if a polynomial of a higher degree is useful for obtaining greater accuracy, the straight line equation is often sufficient to obtain very good results.

Note: In order to perform a 2-point material calibration, you need two material samples with different moisture values. Moisture values should be determined by another method like kiln drying or similar, before activating this calibration procedure. The sequence - "lower moisture value" (more dry material) and then - "upper moisture value" (moist material) must be observed.

#### **Procedure:**



After selecting the menu item "Material cal.", use the ▲ / ▲ buttons to "CHOOSE" one of the 15 stored material-specific calibrations or "CHANGE" to perform a new calibration on one of the 15 calibration memories. The corresponding sub-point is selected with the key ④ and the key ▲ leaves this menu point.



Subsequently, the percentage moisture value at the lower point of the material to be measured, must be set with the  $\checkmark$  /  $\checkmark$  buttons. Press the button  $\bigcirc$  to accept the setting and press the button  $\boxdot$  to move to the previous item.



In the next step, the tp value (radar signal time) has to be determined by a measurement with the connected probe at the lower moisture point or by manual setting with pre-determined tp values.



Use the  $\blacktriangle$  /  $\checkmark$  buttons to toggle between "Measure" and "Set". The corresponding sub-point is selected with the key  $\boxdot$  and the key  $\backsim$  can be used to switch to the previous point.

#### Measure:

See point "1.1.1.2.1 1-Point Calibration(Measure)".

#### Set:



The tp value of the lower moisture point can be setted manually using the  $\checkmark$  /  $\checkmark$  buttons. Press the button  $\bigcirc$  to accept the setting and press the button  $\boxdot$  to move to the previous item.



The percentage reference moisture of the lower point of the material to be measured, must then be set with the  $\checkmark$  /  $\checkmark$  buttons. Press the button  $\bigcirc$  to accept the setting and press the button  $\boxdot$  to move to the previous item.

The next step is to determine the tp value (radar signal time), the upper moisture value, a measurement (with the connected probe) or manual setting.

Setup:		
set tp value of upper	r:	
≫measure		
set		
васк	NEXT	С

Use the  $\blacktriangle$  /  $\checkmark$  buttons to select between "Measure" and "Set". The corresponding sub-point is selected with the key  $\boxdot$  and the key  $\backsim$  can be used to switch to the previous point.



#### Measure:

```
See point 1.1.1.2.1 1-Point Calibration(measure)
```

#### Set:



The tp value for the upper moisture value can be adjusted manually using the  $\checkmark$  /  $\checkmark$  buttons. Press the button  $\bigcirc$  to accept the setting and press the button  $\boxdot$  to move to the previous item.

In the last step, the calibration settings can be saved with "Save" to the previously selected calibration memory location, or can be canceled with "Discard".

**Note:** After performing "Save", the original material calibration is preceded by an "OWN:", indicating that this is a specially prepared material calibration.



Use the  $\blacktriangle$ /  $\checkmark$  buttons to toggle between "Save" and "Discard". The corresponding sub-point is selected with the key  $\boxdot$  and the key  $\backsim$  can be used to switch to the previous point.

#### 1.1.2 Offset Adjustment

For compensation of measurement deviations caused by e.g. density fluctuations in the material or by installation conditions, it is possible to linearly shift the measured value. This menu item is used for this purpose. You can move the measured value between -10 and +10 percentage points. The set displacement is stored in the probe and then also affects the analog output. The setting remains comprehensible.





Use the  $\blacktriangle$ /  $\checkmark$  buttons to adjust the offset to the desired value. Then save the set value with the button  $\bigcirc$  in the probe. Press the key  $\trianglerighteq$  to exit this menu item.

#### 1.1.3 Average Mode

This menu item allows you to switch on or switch over a measurement averaging in the moisture probe. The configuration of SONO- probe is preset in the factory before delivery. SONO moisture probes offer the following options:

**Mode CS:** (Cyclic-Successive) For very short measuring processes (e.g. 2...10 seconds) without floating average and without filter functions, with internal up to 100 measurements per second and a cycle time of 250 milliseconds at the analogue output. Measurement mode CS can also be used for getting raw data from the SONO-probe without averaging and filtering.

**Mode CA:** (Cyclic-Average-Filter) For relative short measuring processes with continual average value, filtering and an accuracy of up to 0.1%

**Mode CF:** (Cyclic-Float-Average) for continual average value with filtering and an accuracy of up to 0.1% for very slowly measuring processes, e.g. in fluidized bed dryers, conveyor belts, etc.

**Mode CK:** (Cyclic-Kalman-Filter with Boost) Standard setting for SONO-MIX for use in fresh concrete mixer with continual average value with special dynamic Kalman filtering and an accuracy of up to 0.1%.

**Mode CC:** (Cyclic Cumulated) with automatic summation of a moisture quantity during one batch process.

Mode CH: (Cyclic Hold) similar to Mode CC but without summation.

**Mode CH is recommended for applications in the construction industry.** If the SONOprobe is installed under a silo flap, Mode CH can measure moisture when batch cycles are very short, down to 2 seconds. Mode CH executes an automatic filtering, e.g. if dripping water occurs.

Note: Please also refer to the information in your Probe User's Manual

Average Mode	1
CC - Cycl.Cu	mulate
CA-Cvcl A	verag
CK - Cycl.Ka	lman
▲ UP ▼ DOWN	C SAVE

Use the  $\blacktriangle$  /  $\checkmark$  buttons to set the desired "Average Mode" and then set the mode as the default with the button  $\boxdot$ . The setting is then stored in the probe. Press the button  $\backsim$  to exit the "Average Mode" menu item.



#### **1.1.4 Average Parameters**

Depending on the "average mode" set, various "average parameters" are available for control purposes.

<u>Average Mode</u>	Available Parameters
CA - Cyclic Average	Average Time
	Filter Upper Limit Offset
	Filter Lower Limit Offset
	Upper Limit Keep Time
	Lower Limit Keep Time
	Kalman with Boost
	Average Time
CK – Cyclic Kalman	Filter Upper Limit Offset
	Filter Lower Limit Offset
	Upper Limit Keep Time
	Lower Limit Keep Time
	Q-Parameter
	R-Parameter
	K-Parameter
	Moisture Threshold
	Boost
	Offset
	Average Time
CF - Cyclic Floating	Filter Upper Limit Offset
	Filter Lower Limit Offset
	Upper Limit Keep Time
	Lower Limit Keep Time
CC - Cyclic Cumulate	Moisture Threshold
	No Material Delay

Note: Please also refer to the information in your Probe User's Manual.

**Caution:** Before you adjust a parameter, please be sure to check its function. A change can affect the measured value, the accuracy and the measurement rate.



The parameters are activated dynamically with setting the "Average parameter".



Use the  $\checkmark$  /  $\checkmark$  buttons to navigate between the individual parameters. The lower right area shows the current value of the selected parameter. To change the value, press the key  $\bigcirc$ .

The value now appears in the display. Use the  $\checkmark$  /  $\checkmark$  buttons to adjust the value and press the button  $\bigcirc$  to accept. You can also leave the entry without changing the value. Repeat the procedure for all parameters to be adjusted.

If you have adjusted all parameters as desired, select "SAVE" and confirm with the key **G**. Now the parameters are written back into the probe and are now active. You can leave the menu item "Average Parameters" with the button **C** without saving. Than all changes will be lost!

#### 4.5.6 Basic Balancing

At the exchange of a sensor head, due to deviating cable lengths, it may be necessary to perform a basic balancing in air. Hereby, the moisture measurement value of the probe is realigned to the correct "Zero Value".



Actuate the button in order to start the basic balancing. The balancing will be performed subsequently.



Attention: In order to exclude the occurrence of a faulty air calibration, the sensor must be dry and free of any material during basic balancing.

Basic balancing Basic baland Please wait	cing	Q
	C	

The notice "Please wait "will be generated in the display. The procedure lasts approximately 30 seconds.

### 5 Technical Data

Power Supply	+7 24V DC / 0.7W
Operating	0 50°C
Temperature	
Dimensions	145mm x 75mm x 34 mm
Weight	153g
Mounting	Cap Rail (optional)
Interfaces	IMP-Bus (RT / COM)
	USB Mini-B (galvanically isolated)



### 6 Savety Notes

In this documentation, text points are highlighted, which require special attention.



#### DANGER:

The Warning Triangle with the exclamation mark warns you against personal injury or property damage.

#### **Intended Use**

Sensors and measuring systems of IMKO GmbH may only be used for the purpose described, taking into account the technical data. Misuse **and use of the e**quipment other than for its intended purpose **are not eligible.** The function and operational safety of a sensor or measuring system can only be guaranteed if the general safety precautions, national regulations and the special safety instructions in this operating manual are observed during use.

The moisture sensors and measuring systems of IMKO GmbH are used to measure moisture according to the measuring purpose and measuring range defined and defined in the technical data. Only adherence to the instructions described in the manual is regarded as intended use. The manual describes the connection, use and maintenance of IMKO sensors and IMKO measuring systems. Read the manual before connecting and operating a sensor or measuring system. The manual is part of the product and must be kept close to the sensor or measuring system.



#### Impairment of safety

The sensor or the measuring system has been designed and tested in accordance with EN 61010 safety regulations for electronic measuring instruments and has left the factory in a safe and safe condition. If the sensor or the measuring system can no longer be operated safely, it must be put out

of operation and secured by means of marking before further commissioning. In case of doubt, the sensor or the measuring system must be sent to the manufacturer or his contractual partner for repair or maintenance.



#### Modifications

For safety reasons, it is not permitted to carry out any modifications or modifications to the sensor or the measuring system without the consent of the manufacturer. The opening of the sensor or hand-held meter, adjustment and

repair work, as well as all maintenance work other than the work described in the manual may only be carried out by a specialist authorized by IMKO. The sensor or the measuring system must be disconnected from the power supply before installation or maintenance work. Do not open or repair the hand-held unit and the power supply!





#### **Hazard Warnings**

Danger due to improper operation. The sensor or the measuring system may only be operated by instructed personnel. The operating personnel must have read and understood the operating instructions.



#### Danger by electricity

The hand-held meter must not be immersed in water or other liquids. The sensor is insensitive to moisture contained in the typically measured products. Only connect the hand-held meter to a properly installed outlet with the supplied voltage supply cable, the voltage of which corresponds to the

technical data. Make sure that the power outlet is well accessible, so that you can unplug the power supply quickly if necessary. Use only the adapter that is suitable for your outlet.

Only operate the meter with the supplied original accessories. If you need additional accessories or replacement, please contact the manufacturer.

Do not use the meter in following case:

- if the measuring instrument, sensor, plug-in power supply or accessories are damaged,
- the sensor or the measuring system does not operate as intended,
- the power cord or plug is damaged,
- the sensor or the measuring system has fallen down.

Unplug the power supply from the wall outlet in following case:

- if you do not use the sensor or the measuring system for an extended period of time,
- before cleaning, unpacking or changing the sensor or the measuring system,
- if you are working inside the sensor or measuring instrument, e.g. connect devices,
- if a fault occurs during operation,
- during thunderstorms.

Caution - Property damage

Ensure that there is a sufficient distance to strong heat sources such as heating plates, heating pipes. Disconnect the sensor or handheld device from other devices before relocating or transporting it. Disconnect the connectors

on the device.

Do not use aggressive chemical cleaning agents, scouring agents, hard sponges or the like.



## Precise Moisture Measurement

in hydrology, forestry, agriculture, environmental and earth science, civil engineering, as well as individual applications!

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