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Operating manual Electronic Moisture Analyser

KERN DLT-N

Version 2.1
12/2014
GB



DLT_N-BA-e-1421



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Version 2.1 12/2014

Operating manual

Electronic Moisture Analyser


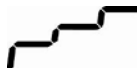
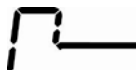

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1 Technical data

Data	DLT 100-3	
Radiator	Halogen (1 x 400 W)	
Temperature range	35°C - 160°C Choice of steps at 1°C	
Maximum load (Max)	160 g	
Warm-up time	2 h	
Minimum for drying	0.5 g	
Readability (d)	Weighing mode	0.001g
	Moisture analysis mode	0.01 %
Reproducibility	Weighing mode	0.001g
	Moisture analysis mode	0.03 % (Initial weight 10 g)
Preheating before weighing-in	✓	
Linearity	± 0.002 g	
Stabilization time (typical)	3 sec.	
Recommended adjustment weight, not added (class)	100g (E2)	
Environmental conditions	<ul style="list-style-type: none"> • 5°C....+35°C ambient temperature • 45% - 75% air humidity non-condensing 	
Heating profiles	Standard drying	
	Step-by-step drying	
	Quick drying	
	Gentle drying	
Result display	[g] residual weight [% M] moisture [% R] dry mass [% A] ATRO	

Shutoff criterion	<ul style="list-style-type: none"> • Manual Press stop button
	<ul style="list-style-type: none"> • Time Drying is finished after the set time, adjustable 1 – 99 minutes
	<ul style="list-style-type: none"> • Autostop % when the set weight loss (%) per time unit is lower than the nominal value (both values adjustable)
	<ul style="list-style-type: none"> • Autostop absolute when the set weight loss (mg) per time unit is lower than the nominal value (both values adjustable)
Data base for drying programs	300 positions
Interface	RS 232C
Dimensions of the housing moisture analyser (B x D x H)	210 x 340 x 225 mm
Available drying room	Ø 100 mm, 20 mm high
Dimensions tablet (B x D x H)	195 x 120 x 10 mm
Sample dishes included	Ø 100 mm
Net weight	4.5 kg
Electric Supply	220 – 240 V AC 50/60 Hz
Mains adapter moisture meter	9 V DC, 1000 mA
Mains adapter tablet	5.2 V 1.35 A

2 Appliance overview

The instrument comprises a drying unit (integrated balance + heating module) and a tablet serving as terminal.

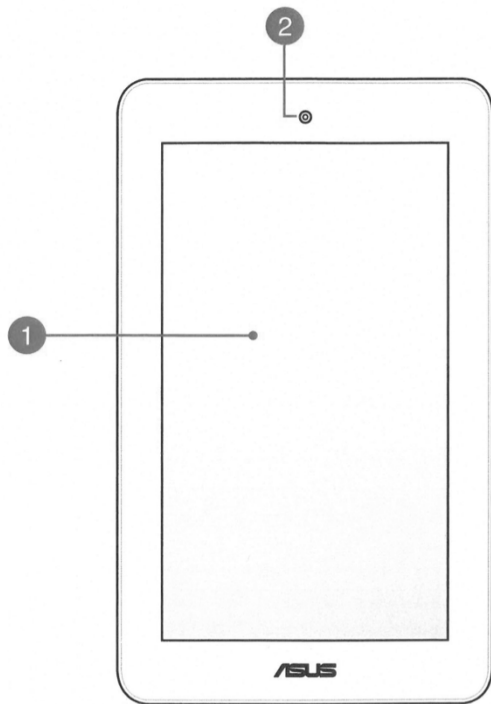
2.1 Overview



Pos.	Designation	
1	Sample chamber	Drying unit
2	Halogen lamp	
3	Temperature sensor	
4	Sample dish	
5	Heating module	
6	Balance	
7	Levelling screw	
8	Table mount	Terminal
9	Tablet	

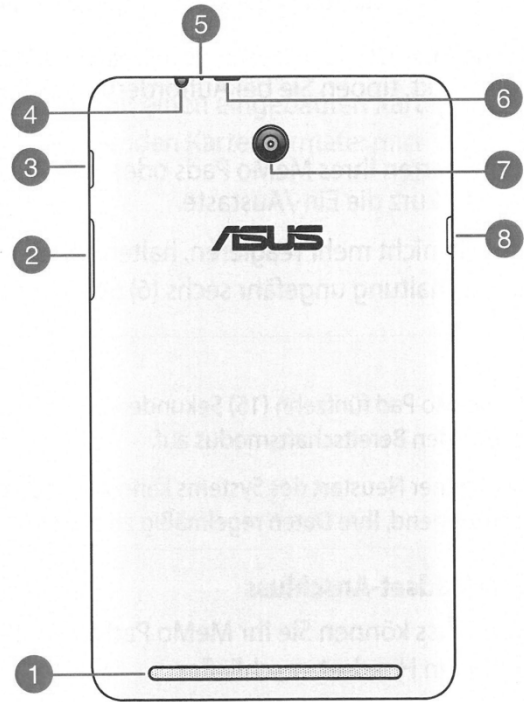
2.2 Tablet

Front side:



- 1 Touch screen
- 2 Front camera

Rear side:



- 1 Audio loudspeaker
- 2 Volume key
- 3 On / off key
- 4 Loudspeaker / headset port
- 5 Microphone
- 6 Micro USB 2.0 port
- 7 Rear camera
- 8 MicroSD card slot

3 Basic instructions

3.1 Proper use

The instrument purchased by you is designed for a fast and reliable determination of material moisture in liquid, porous and solid materials by applying the method of thermogravimetrics.

3.2 Improper Use

Impacts and overloading exceeding the stated maximum load (max) of the instrument, minus a possibly existing tare load, must be strictly avoided.

Balance may be damaged by this.

Never operate instrument in explosive environment. The serial version is not explosion protected.

The structure of the balance may not be modified. This may lead to incorrect weighing results, safety-related faults and destruction of the moisture analyser.

The moisture analyser may only be used according to the described conditions. Other areas of use must be released by KERN in writing.

3.3 Warranty

Loss of warranty due to

- Our conditions in the operation manual are ignored
- The appliance is used outside the described uses
- Modification or opening of the instrument
- Mechanical damage and damage caused by media, liquids
- Natural wear and tear
- The appliance is improperly set up or incorrectly electrically connected
- The measuring system is overloaded

3.4 Monitoring of Test Resources

In the framework of quality assurance the measuring-related properties of the moisture analyser and, if applicable, the testing weight, must be checked regularly. The responsible user must define a suitable interval as well as type and scope of this test. Information is available on KERN's home page (www.kern-sohn.com) with regard to the monitoring of balance test substances and the test weights required for this. In KERN's accredited DKD calibration laboratory test weights and balances may be calibrated (return to the national standard) fast and at moderate cost.

4 Basic Safety Precautions

4.1 Pay attention to the instructions in the Operation Manual








- ⇒ Carefully read this operation manual before setup and commissioning, even if you are already familiar with KERN balances.
- ⇒ All language versions contain a non-binding translation. The original German is binding.

4.2 Personnel training





The instrument may only be operated and maintained by trained personnel.

4.3 Danger Information

WARNING

-  The moisture analyser is used to analyse the moisture content of materials. This instrument must be used exclusively for this purpose. Any other usage may cause a risk to personnel, damage to the instrument or other material damage.
-  The moisture analyser should be used mainly for the drying of aqueous substances.
-  The moisture analyser may not be used in a hazardous area.
-  The instrument may only be operated and maintained by trained personnel.
-  Carefully read this operation manual before setup and commissioning, even if you are already familiar with KERN instruments.

Hazards during and after measuring

-  Ensure correct installation of all components, see chap. 6.2
-  Careful when removing the sample. The sample itself, the sample dish and the heating unit may be very hot.
-  Use the sample retainer at all times as it allows safe working and prevents burns.
-  Individual parts of the case (e. g. the ventilation grids) may heat up considerably during operation. Therefore, only take hold of the instrument by the marked handles.



CAUTION**The moisture analyzer operates using heat!**

- ☞ Maintain sufficient space in the environment of the instrument to prevent heat build-up (distance from the instrument 20cm, upwards 1m).
 - ☞ The heat extractor of the sample must never be covered, blocked, taped up or altered in any other way.
 - ☞ Never place combustible materials on, under or next to the instrument, as the environment of the instrument heats up to a high temperature.
 - ☞ Careful when removing the sample. The sample itself, the sample dish and the heating unit may be very hot.
-



CAUTION**Fire or explosion**

- ☞ Explosive, easily flammable samples and samples that go into a chemical reaction when subjected to heat, may not be analysed with the moisture analyser. Sample materials developing aggressive vapours (e. g. acids) may cause corrosion problems on some parts of the instrument.
 - ☞ If in doubt, conduct a risk analysis.
 - ☞ Select a drying temperature for samples of this kind that is low enough to prevent ignition or explosion.
 - ☞ Wear safety goggles.
-



WARNING**Substances that contain toxic or corrosive ingredients, produce toxic gases when drying, cause irritation (eyes, skin, airways), induce nausea or result in death**

- ☞ Sample materials emitting toxic substances must be dried with a special extraction system in place. Create an environment that prevents the inhalation of vapours hazardous to health.
 - ☞ Sample materials developing aggressive vapours (e. g. acids) may cause corrosion problems on some parts of the instrument.
-

5 Transport and storage

5.1 Testing upon acceptance

When receiving the appliance, please check packaging immediately, and the instrument itself when unpacking for possible visible damage.

5.2 Packaging / return transport



- ⇒ Keep all parts of the original packaging for a possibly required return.
- ⇒ Only use original packaging for returning.
- ⇒ Prior to dispatch disconnect all cables and remove loose/mobile parts.
- ⇒ Reattach possibly supplied transport securing devices.
- ⇒ Secure all parts, such as the sample dish base, sample dish holder etc. against slipping and damage.

6 Unpacking, Setup and Commissioning













6.1 Installation Site, Location of Use

The instrument is designed to achieve reliable weighing results under normal conditions of use.

You will work accurately and fast, if you select the right location for the instrument.

-

On the installation site observe the following:

 Remove explosion prone and easily flammable material in the immediate vicinity. Emerging vapours, sample dish and all parts of the sample chamber are hot!
 Protect the instrument against direct draughts due to open windows and doors.
 Avoid extreme heat and temperature fluctuations e.g. due to installation next to radiators.
 Do not expose the instrument to extreme dampness for longer periods of time. Non-permitted condensation (condensation of air humidity on the instrument) may occur if a cold instrument is taken to a considerably warmer environment. In this case, acclimatize the disconnected instrument for ca. 2 hours at room temperature.
 Avoid direct sunlight
 The air humidity should be between 45% and 75%, non-condensing.
 Sufficient distance from heat-sensitive materials in area around instrument.
 Protect the instrument against high humidity, vapours and dust,  Major display deviations (incorrect weighing results) may be experienced should electromagnetic fields (e.g. due to mobile phones or radio instruments), static electricity accumulations or instable power supply occur. Change location or remove source of interference.  Avoid static charging of the material to be weighed, weighing container and windshield
 Place the instrument on a firm, level surface.  Avoid jarring during weighing.

6.2 Unpacking and placing

1. Drying unit

Take the instrument carefully out of its packaging, remove the plastic jacket and install it at the designated work space.

The instrument is supplied part-assembled. Immediately after unpacking check if the delivered items are complete. Assemble the separate component parts according to their sequence.



1. Windshield



2. Sample dish holder



3. Removal aid

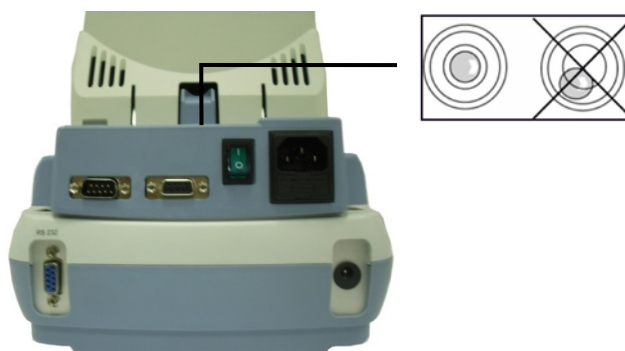


4. Sample dish



1. Put windscreen in sample chamber.
2. Carefully put sample dish holder on top.
3. Position removal aid in a way that the handle fits under the groove of the cover.
4. Put sample dish on the dish holder.

- Level instrument with foot screws until the air bubble of the water balance is in the prescribed circle.



i Check levelling regularly.

5. Tablet

Remove the tablet carefully from the packaging, remove plastic cover and install at intended place of installation, using the table mount.

Charge the rechargeable battery.

Before the first use, the battery should be charged by connecting it to the mains power supply for at least 8 hours.

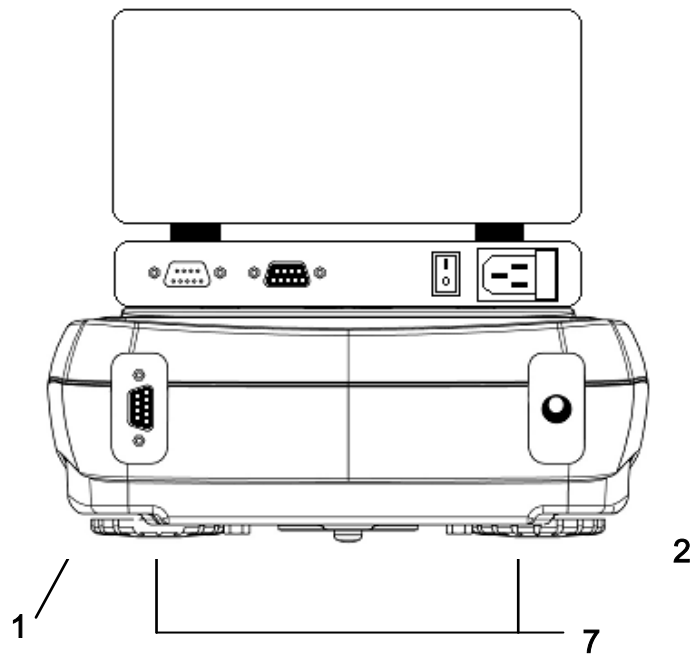


6.3 Scope of delivery / serial accessories

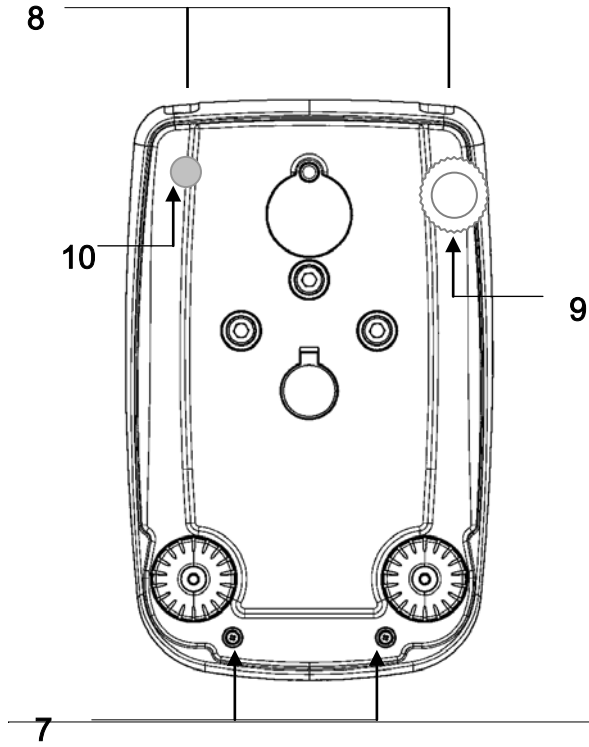
Drying unit	Tablet
<ul style="list-style-type: none"> Drying unit, see chap. 2 10 sample dishes Power cable Power pack drying unit Connecting cable “balance heating module“ Operating manual 	<ul style="list-style-type: none"> Tablet see chap. 2 Table mount Mains adapter Micro-USB cable RS 232 Bluetooth Adapter

6.4 Connections

1. Drying unit



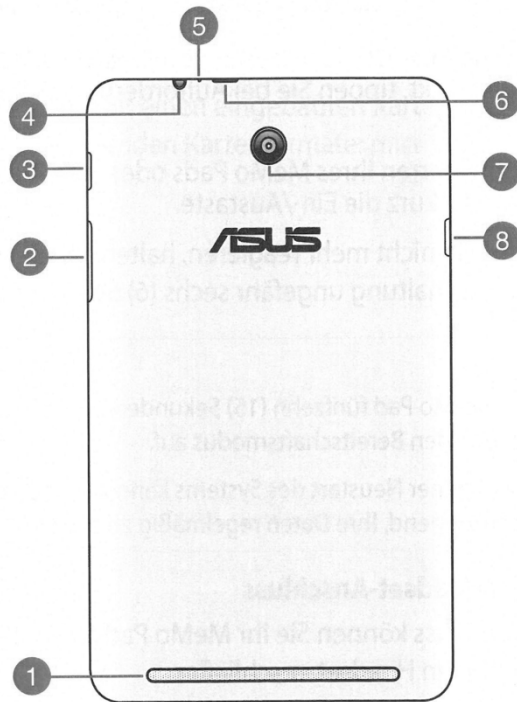
1. Connection of connecting cable "balance / heating module"
2. Connection net adapter „Balance“.
3. Power supply „heating module“.
4. Connection RS 232 „Bluetooth Adapter“
5. Connection of connecting cable "balance / heating module"
6. Main switch „heating module“
7. Adjustable foot screws



- 8. Housing screws
- 9. Housing screws (for access remove the foot screws)
- 10. Adjustable foot screws
- 11. Rigid foot screw

2. Tablet

Rear side:



- 1 Audio loudspeaker
- 2 Volume key
- 3 On / off key
- 4 Loudspeaker / headset port
- 5 Microphone
- 6 Micro USB 2.0 port
- 7 Rear camera
- 8 MicroSD card slot

6.5 Mains connection

Power is supplied to the integrated balance via the external power unit. The stated voltage value must be the same as the local voltage. Only use original KERN mains adapters. Using other makes requires consent by KERN.

Power supply to the heating module is provided via the supplied mains cable. Do not connect the instrument to the power grid unless the information on the instrument (sticker) matches the local mains voltage.

The instrument must be connected to a standard socket with earth terminal. Do not eliminate the protective effect by using an extension lead without earth terminal. For power supplies from power grids without earth terminals call a specialist to establish equivalent protection according to the relevant installation regulations.

6.6 Commissioning


- 👉 Established connections according to diagram and connect to power supply. Make sure that the tablet is turned off during the connection. Turn on drying unit at master switch.

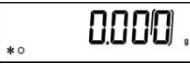


After the turn on check, the drying unit will be in default “tablet” mode.

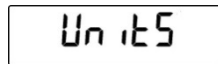



If not, activate it by following the steps below:

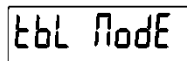
- ⇒ In weighing mode, press and hold pressed  until the audio signal stops. Release the key and the menu item "units" will appear.







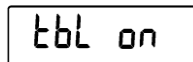


- ⇒ Press  repeatedly until "tbl mode" appears.




- ⇒ Acknowledge with . The current setting will be displayed.

- ⇒ Press  to select the setting "tbl on".




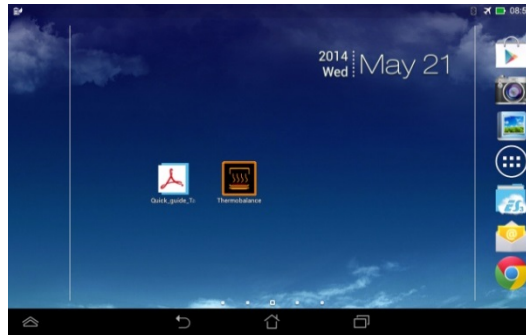
- ⇒ Acknowledge with . Wait until „tablet“ appears.

-  To turn on the tablet, press and hold the tablet's on/off key for approx. two seconds.

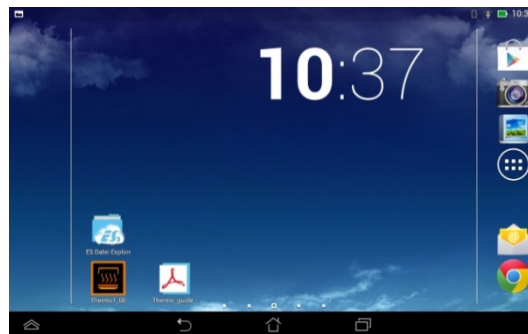
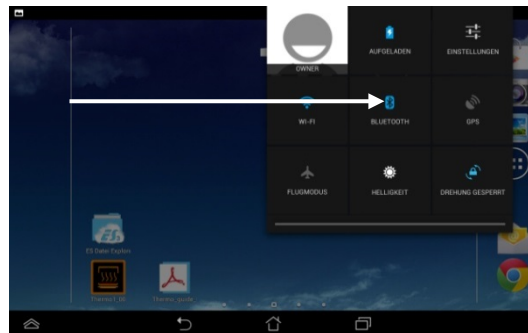



-  To unlock tap  and drag onto .



 The start screen will appear.



 Ensuring Bluetooth connection

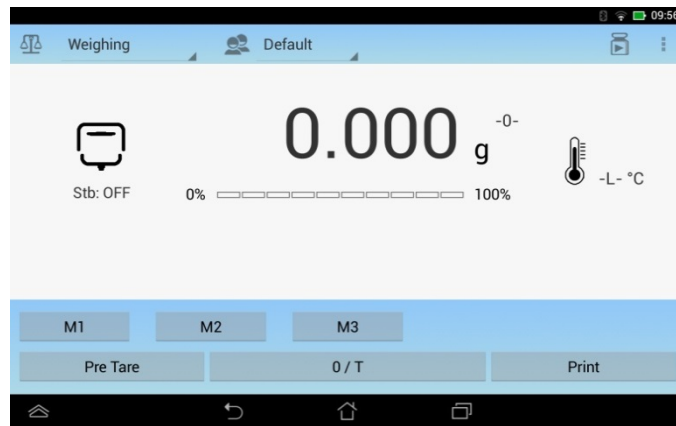


When enabled, the icon for Bluetooth  will be shown in the top right corner.

 To start application “moisture analysis”, use .



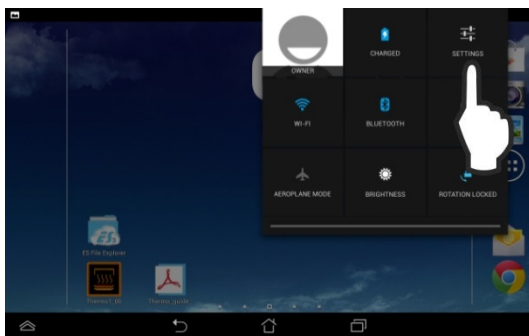
Wait for Bluetooth connection, whereupon the start screen will appear.



Setting operator language

On delivery the display is set to German.

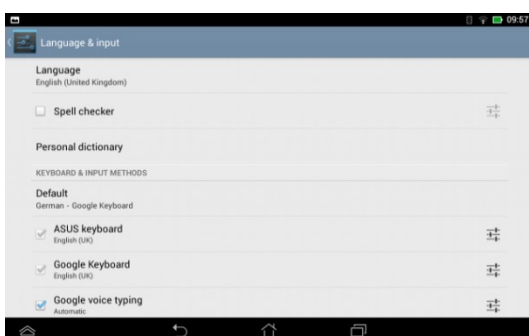
Setting additional languages:



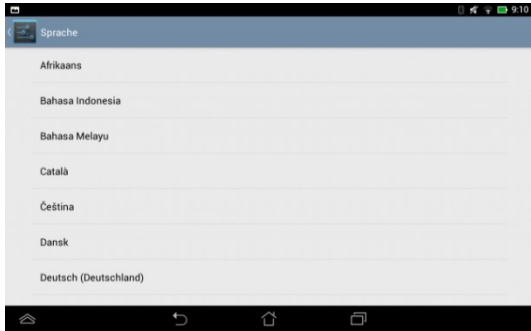
⇒ Tap <Settings>.



⇒ Tap <Language & input>.



⇒ Tap <Language>.



⇒ In dropdown menu select the desired language.



Initial Commissioning

In order to obtain exact results with the electronic balances, your balance must have reached the operating temperature (see warming up time chap. 1).


During this warming up time the weighing system must be connected to the power supply (mains, accumulator or battery).

To adapt the balance to ambient conditions, open wind screen doors.


The accuracy of the weighing system depends on the local acceleration of gravity.

Strictly observe hints in chapter Adjustment.

6.7 Call-up weighing mode

⇒ Press  in table mode, "tbl mode" will be shown.


tbl mode

⇒ Press  to confirm, "tbl on" will be shown.

tbl on

⇒ Press  to select setting "tbl oFF".

tbl oFF

⇒ Acknowledge with . Wait until weighing mode is shown.

*o 0000.

6.8 Connection of peripheral devices

Before connecting or disconnecting of additional devices (printer, PC) to the data interface, always disconnect the moisture analyser from the power supply.

Only use accessories and peripheral instruments by KERN, as they are ideally tuned to the instrument.

6.9 Adjust balance


As the acceleration value due to gravity is not the same at every location on earth, each balance must be coordinated - in compliance with the underlying physical weighing principle - to the existing acceleration due to gravity at its place of location (only if the balance has not already been adjusted to the location in the factory). This adjustment process must be carried out for the first commissioning, after each change of location as well as in case of fluctuating environment temperature. To receive accurate measuring values it is also recommended to adjust the balance periodically in weighing operation.

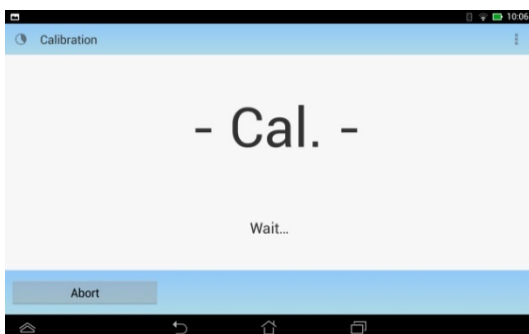


- Observe stable environmental conditions. A warming up time (see chapter 1) is required for stabilization.
- Carry out adjustment with placed sample dish. Ensure that no objects are within the sample dish.
- We recommend carrying out adjustment in adjustment mode “external standard” (See chap. 10.5). Here the adjustment takes place near the maximum load of the balance (recommended adjustment weight see chap. 1).
Adjustment in adjustment mode “external user define” can also be carried out, based on weights of different nominal values, however, from a metrological point of view this does not produce best results.
- Info about test weights can be found on the Internet at: <http://www.kern-sohn.com>.

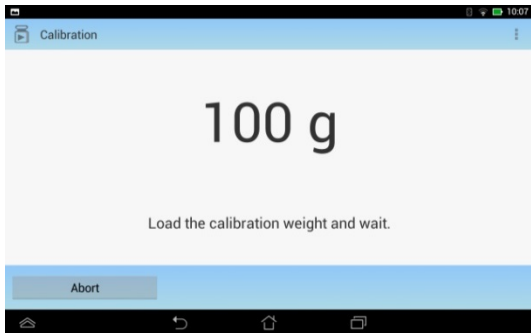
Call function:



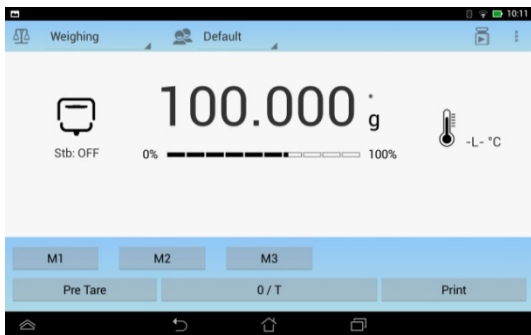
⇒ In weighing mode tap the top right corner of the control button .



⇒ Wait until the weighed value for the required adjustment weight appears flashing.

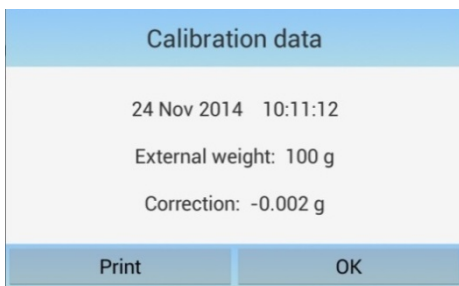


⇒ **During** the flashing display put the required adjustment weight carefully in the centre of the sample dish.



After successful adjustment the balance automatically returns to weighing mode.

Take away adjustment weight



To view/issue an adjustment protocol, call the following menu item (See chap 10.5):

<Settings>



<Adjustment>

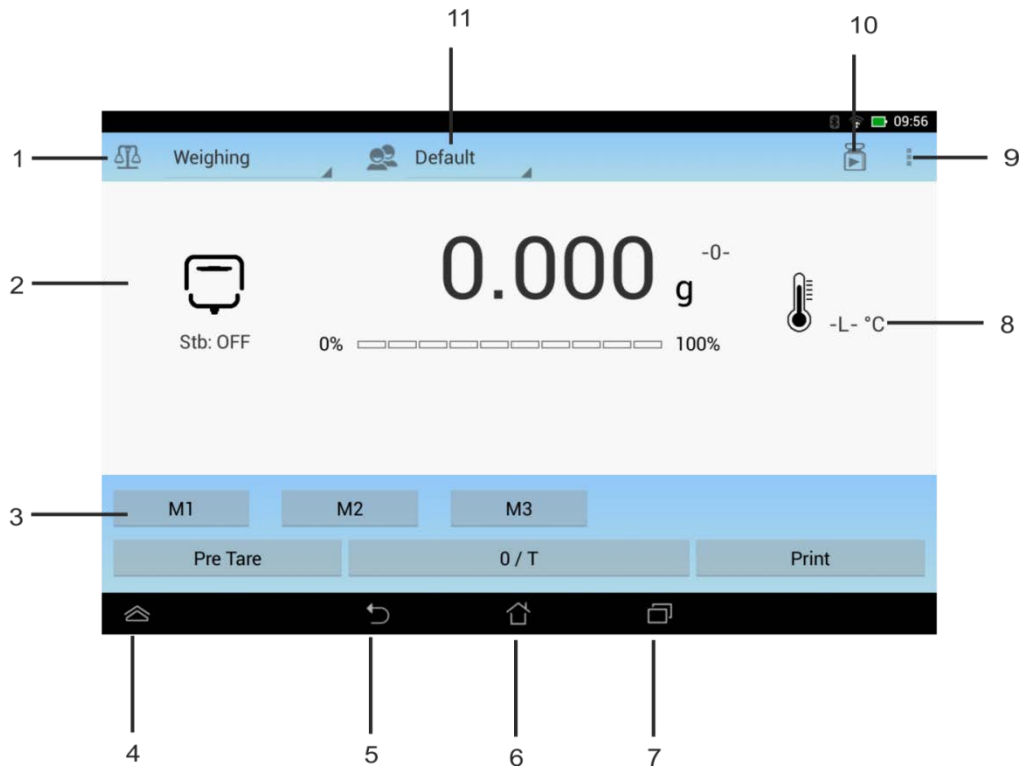


<Adjustment protocol>

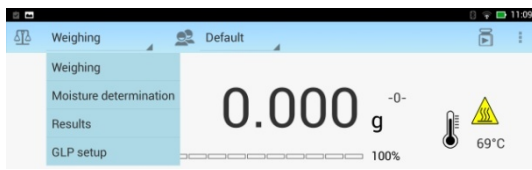
7 Operating elements

i In “tablet mode” the keys of the drying unit will be disabled (with the exception of ON/OFF). Use the tablet for all actions.

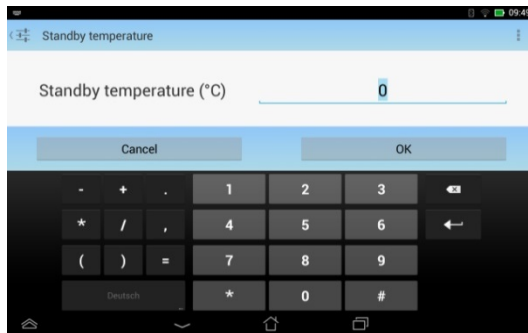
7.1 Start screen



1 Call-up function menu:



-
- 2**
- Status display
 - Tap and hold: Set standby temperature:




-
- 3**
- User specific shortcut keys (M1- M5) for calling up the 5 most frequently used drying programs
 - Function keys (Pre tare, zero setting / tare, print)

4 Link to android service programs

-
- 5**
- Back to previous screen
 - Tap twice: Exit application “moisture meter“.

6 Back to start screen

7 Return to application “moisture meter“

8 Current temperature; higher temperatures will also be indicated by the warning icon .

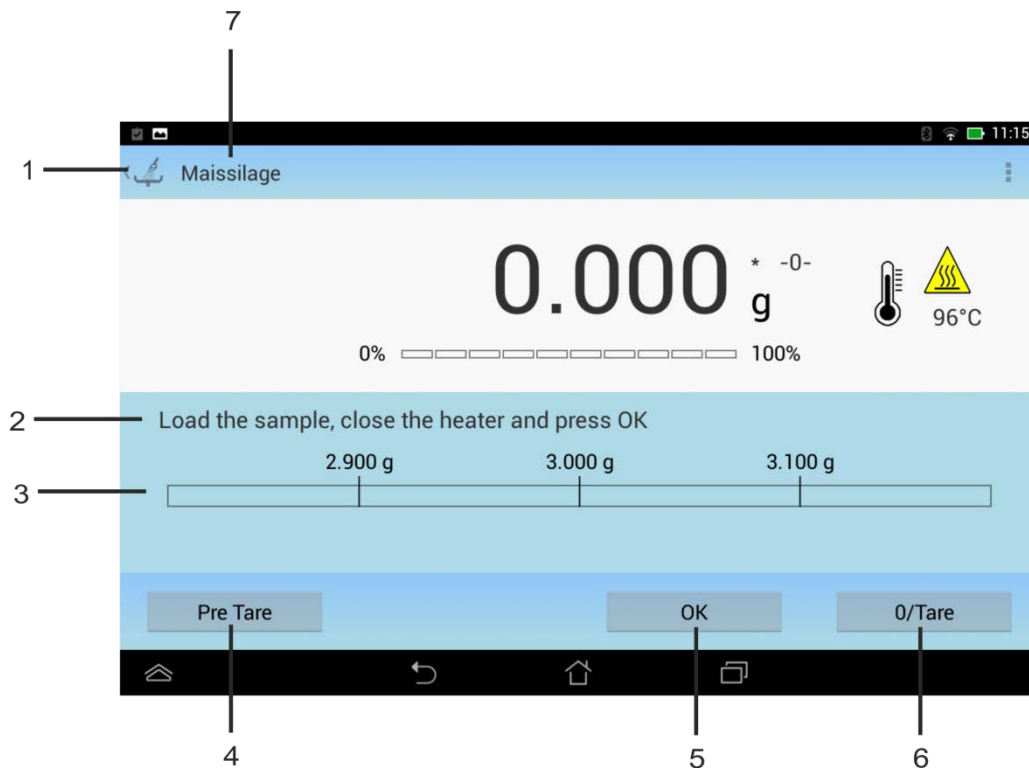
9 Call up menu

10 Invoke adjustment

11 Select user profile

7.2 Work screen

The work screen is shown at the start of measuring, see chap. 11.



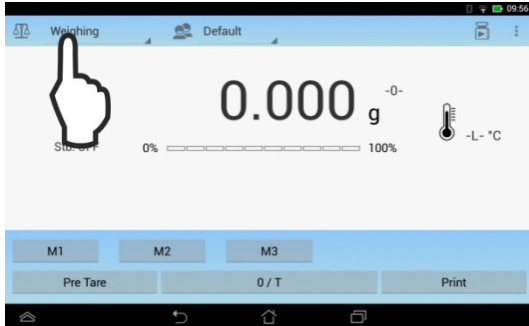
1	Drying process active
2	Instructions for the performance of tasks during measuring
3	Weighing guide; only shown when function is enabled, see chap. 11.1.4
4	Enter tare value numerically
5	Start drying; only shown for setting <manual start mode>, see chap. 10.1
6	Taring / Setting to zero
7	Designation for current drying program

8 Simple weighing / taring



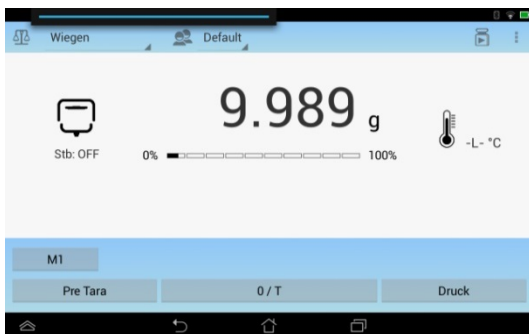
In order to obtain exact weighing results, the integrated balance must have reached its operating temperature (see warming up time chap. 1).

8.1 Weighing:



⇒ Ensure weighing mode

⇒ Wait for zero display, reset to zero using **0/T**.



⇒ Place goods to be weighed on balance.

⇒ Wait until the stability display appears **[*]**.

⇒ Read weighing result.

8.2 Taring:

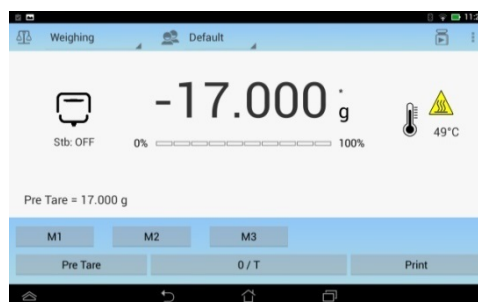
1. Put weighing container on the weighing pan.
2. Wait until the stability display (*****) appears, then tap **0/T** button.
3. After standstill control the zero display appears. The weight of the container is now internally saved.
4. Weigh the material.
5. Wait until the stability display appears (*****).
6. Read net weight.

8.3 Default tare (pre tare)

Where the tare weight is known, you can enter this numerically.

⇒ Tap control button **Pre Tare**.

⇒ Enter known tare weight (such as 17 g) and import by pressing **<OK>**.



The weight display will show the negative tare weight.

⇒ To delete pre tare, enter "0".


9 User profile

In this menu 10 user profiles can be created, processed or deleted.

Each user will be assigned to a profile with his own specific settings (basic settings of the instrument, hole data memory).

Factory setting is „Default“, this cannot be deleted or renamed.



⇒ Tap top right corner of control button .

⇒ Tap control button **<Profiles>**, the dropdown menu will appear.

< New profile >	Create new user profile Enter "user name" in numeric input window and import by pressing <OK> .
< Rename >	Rename user profile
< Copy >	Copy user profile
< Delete >	Delete user profile

10 Setup menu

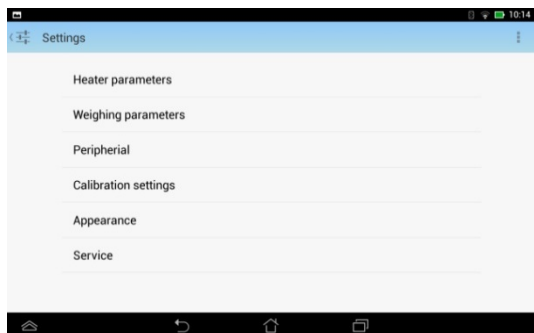
In this menu item the user-specific basic settings of the instrument take place. The settings are stored together with the active user profile and remain valid if working with that profile. If a user profile is called up, the respective settings are automatically loaded, see chap. 9.

Invoke setup menu:



⇒ Tap top right corner of control button .

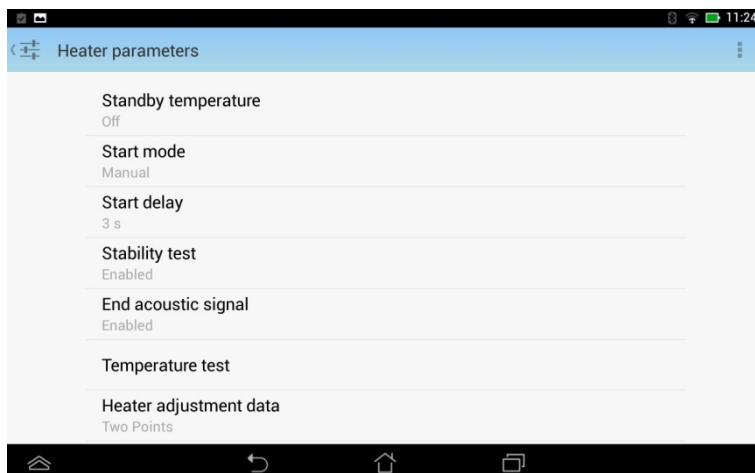
⇒ To call the setup menu, tap the **<Settings>** button and the dropdown menu will appear.



⇒ To call and change individual settings, simply tap on the screen.

10.1 Heating module settings

⇒ Tap **<Heater parameters>**, see chap.: 10. The available settings will be displayed.

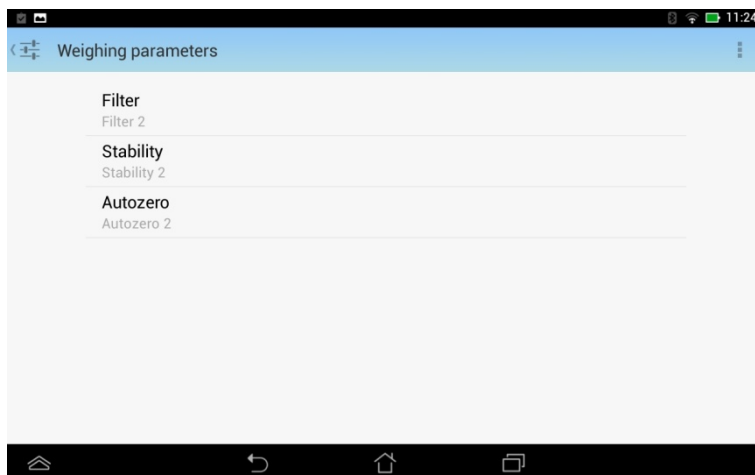


<Standby-temperature>	Settings:	
	Off	Switched off
	Standby Temperature	The numeric input window will be displayed. Enter required temperature selectable 35°C – 100°C. To import press <OK> . The display returns to the previous screen.
<Start mode>	Settings:	
	Manual	Measuring will start as soon as you tap the control button „OK“
	Automatic	Measurement will start automatically after closing the sample chamber.
<Start delay>	Settings:	
	Enter the desired time, selectable from 0-30 sec. in the numeric input window. To import press <OK> . The display returns to the previous screen.	

< Stability test >	Settings:	
	On	Stability control before start of measurement switched off
	Av	Stability control before start of measurement switched off
< End acoustic signal>	Settings:	
	On	Switched off
	Off	When turned on, an audio signal will be sounded as soon as the test is finished.
< Temperature test >	See chap. 6.9.2	
< Heater adjustment data >	See chap. 6.9.2	

10.2 Balance settings

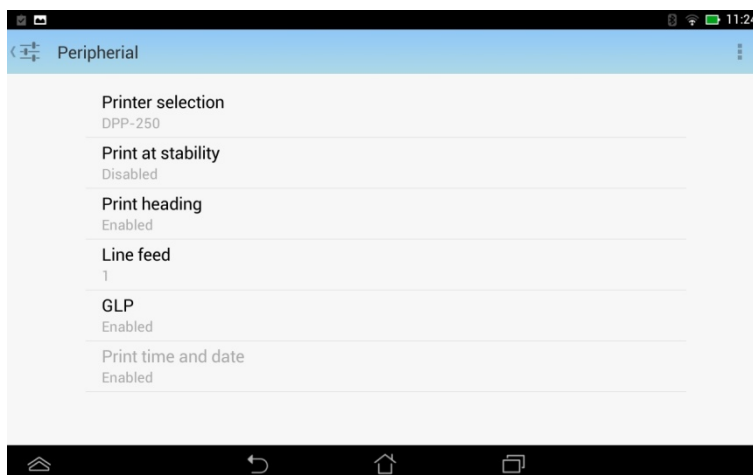
⇒ Tap **<Weighing parameters>**, see chap: 10. The available settings will be displayed.



< Filter >	Settings:	
This menu item allows the balance to be set according to specific ambient conditions and measuring purposes.	Filter 1	Setting for dosage
	Filter 2	The balance reacts quickly and in a sensitive manner, very quiet set-up location.
	Filter 3	The balance reacts slowly and in a robust manner, busy set-up location
< Stability >	Settings:	
	Stability 0	Very quiet setup location ↓
	Stability 1	
	Stability 2 default setting	
	Stability 3	Very setup location.
<Autozero>	Settings:	
Under this menu item the automatic zero point correction can be switched on or off. In switched-on-state the zero point is automatically corrected at drift or when dirty.	Auto zero off	Auto Zero switched off
	Autozero 1	Auto Zero range ± ½ Digit
	Autozero 2	Auto Zero range ± 3 Digits
	Autozero 3	Auto Zero range ± 7 Digits
	Autozero 3E	Auto Zero range ± 7 digits in the whole weighing range

10.3 Peripheral equipment

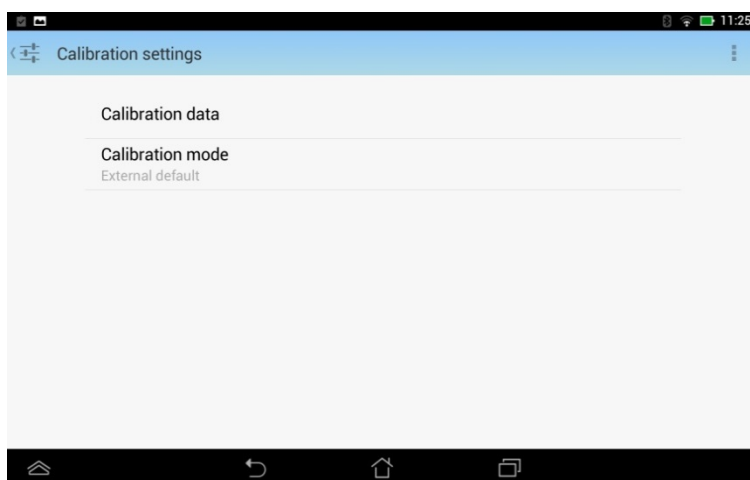
⇒ Tap <Peripheral>, see chap: 10. The available settings will be displayed.



< Printer selection >	Settings:	
	DPP-250	Setting for KERN YKC-01
	DPP-350	
< Print at stability >	Settings:	
	On	Stability check before data transfer on
	Off	Stability check before data transfer off
<Print heading>	Settings:	
As headline can be defined 4 lines with 40 characters each	Off	Printout header line disabled
	On	Printout header line enabled
	Line 1	In setting <ON> tap corresponding line and enter your text in the displayed input window, then import by pressing <OK>.
	Line 2	
	Line 3	
Line 4		
< Line feed>	Settings:	
Line feed at the end of the printout.	Enter desired number in numeric input window.	
<GLP>	Settings:	
	On	GLP-printout enabled
	Off	GLP-printout disabled
<Print time and date>	Settings:	
(for disabled GLP function only)	On	Print date/time on test certificate
	Off	Do not print date/time on test certificate

10.4 Adjustment

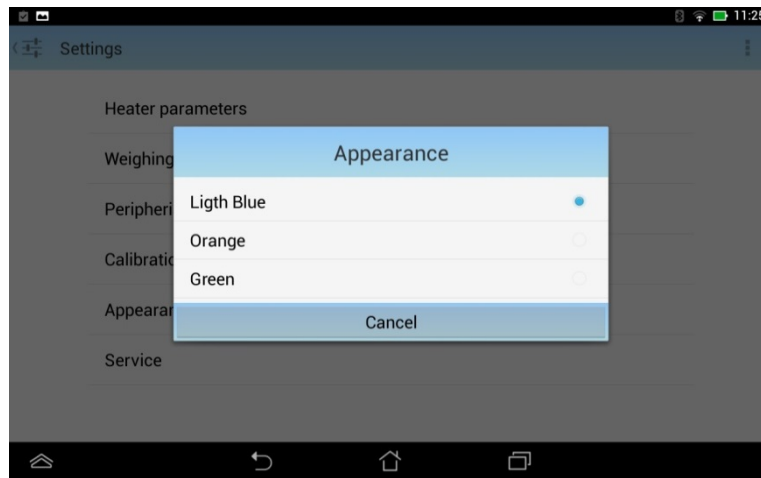
⇒ Tap < **Calibration settings** > see, chap: 10. The available settings will be displayed.



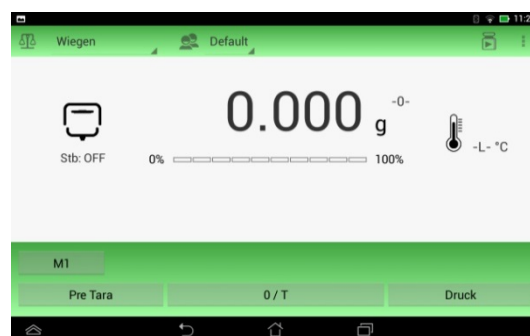
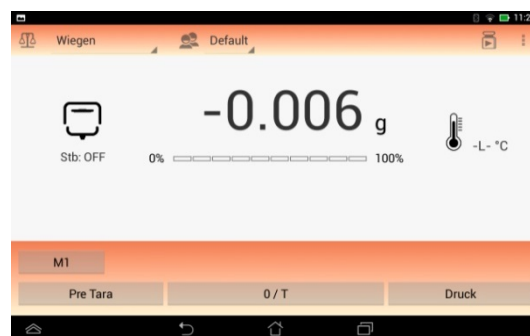
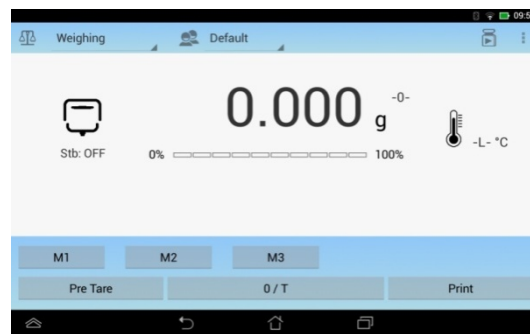
<p>< Calibration data ></p>	<p>View or print adjustment protocol:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center; background-color: #ADD8E6;">Calibration data</p> <p style="text-align: center;">24 Nov 2014 10:11:12</p> <p style="text-align: center;">External weight: 100 g</p> <p style="text-align: center;">Correction: -0.002 g</p> <p style="text-align: center;"> Print OK </p> </div>	
<p>< Calibration mode ></p>	<p>Settings:</p>	
	<p>External default Standard (default setting)</p>	<p>Here the adjustment takes place near the maximum load of the balance (recommended adjustment weight see chap. 1).</p>
	<p>External custom</p>	<p>Weights of different nominal values may be used here for adjustment but are not optimal for technical measuring.</p>

10.5 Colour of display

⇒ Tap <Appearance>, see chap: 10. The available settings will be displayed.

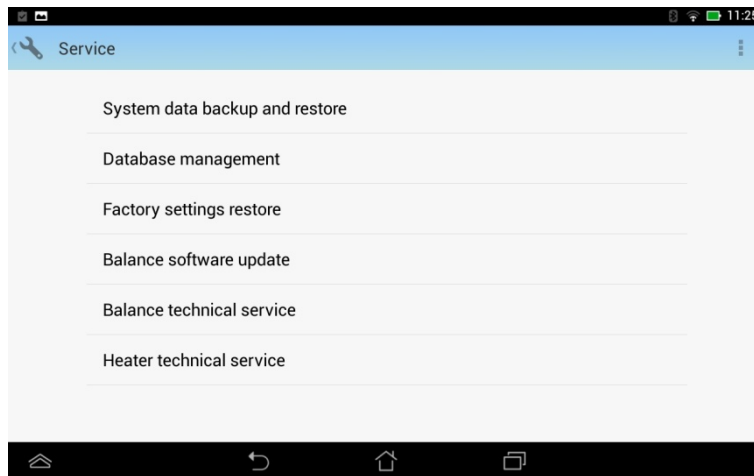


⇒ Select desired colour:



10.6 Service menu

- ⇒ Tap <Service >, see chap: 10.
The available settings will be displayed.



i The changes to service menu settings described below must be made by expert staff with profound knowledge of balances.

< Backup and reset system data >
< Administration of database >
< Reset to default settings >
< Update software of balance>
< Technical service of balance> (Password: 1234“)
< Technical service of heating module> (Password: 1122“) see chap. 6.9.2.2

11 Drying parameters

The optimum drying parameters (drying temperature, drying period) depend on the type and size of the sample and the required accuracy of the measuring result. The exact parameters can only be determined by experiments.

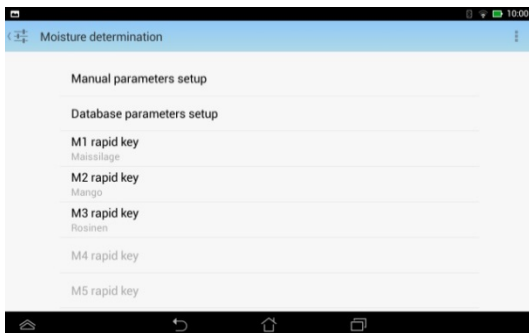
You will find examples taken from actual use in our application manual, available from our KERN home page (www.kern-sohn.com).

The instrument offers the possibility to set the drying parameters sample-specific manually or to load a suitable drying program with the required drying parameters from the database.

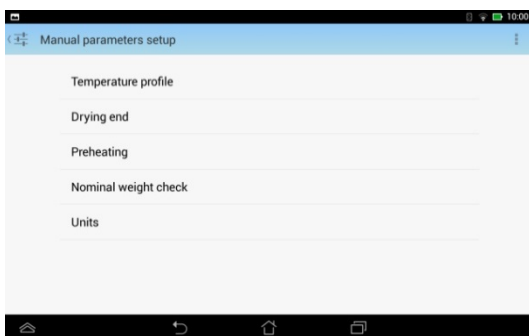
11.1 Setting the drying parameters manually



⇒ Tap < **Moisture Determination** >.



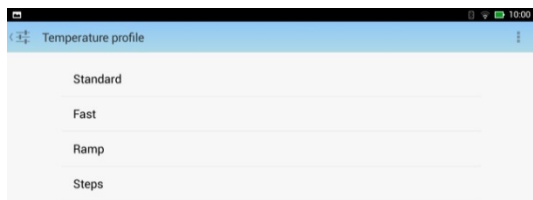
⇒ Tap < **Manual parameters set up** >



⇒ The dropdown menu for drying parameters will appear.

11.1.1 Setting the heating profile

This function offers different heating profiles to adapt the drying characteristic optimally to the used sample.

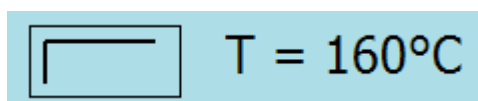


Tap **< Heating profile >** in dropdown menu (see chap. 11.1).

The available heating profiles are displayed:

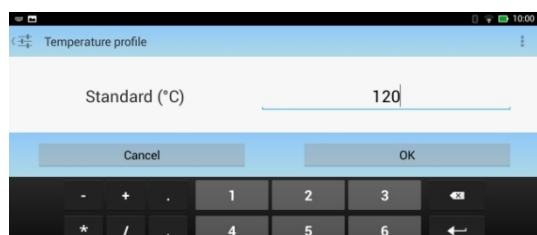
- Standard
- Fast
- Ramp
- Steps

1. Standard drying



Display pictogram during drying

This heating profile are used for most samples. The sample will be heated up to the set drying temperature, selectable 35°C -160°C

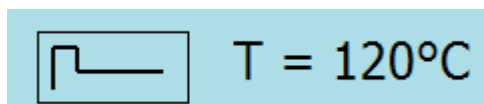


Tap **< Standard >**.

The numeric input window will be displayed. Enter required drying temperature, selectable 35°C – 160°C.

Import entry with **<OK>**, the display returns to the previous screen.

2. Quick drying



Display pictogram during drying

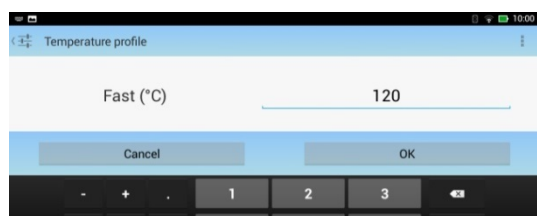
This heating profile is suitable for samples with high moisture content (e.g. liquids). After start the selected temperature will be exceeded for a short time - to compensate the evaporation coldness and to accelerate the drying process.

Then the temperature is automatically controlled down to the set value.

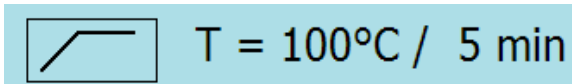
Tap **< Fast >**.

The numeric input window will be displayed. Enter required drying temperature, selectable 35°C – 160°C.

Import entry with **<OK>**, the display returns to the previous screen.



3. Gentle drying



Display pictogram during drying

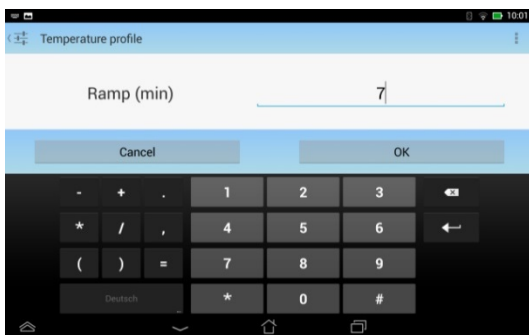
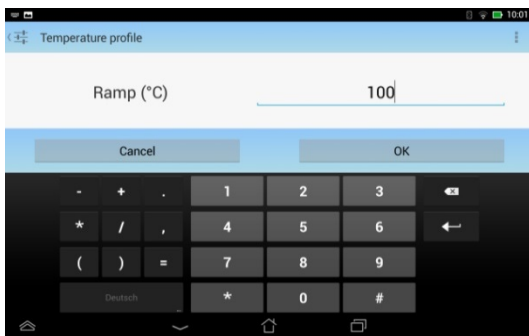
This heating profile is suitable for the soft drying of substances, which tend to skin formation (e.g. substances containing sugar or volatile substances). Skin formation will then affect the evaporation of the trapped moisture. The temperature is permanently increased and reaches the selected drying temperature only after finishing the so called ramp duration. The ramp, i.e. the period between start of drying process and reaching the drying temperature, can be selected.

Tap **< Ramp >**.

Selectable parameters:

- Drying temperature: 35°C - 160°C
- Ramp duration: 1 – 15 minutes.

Tap the respective control button, the numeric input window will appear. Enter required drying temperature or ramp duration.



Import entry with **<OK>**, the display returns to the previous screen.

Note:

If the drying temperature in the set ramp duration cannot be reached, an error message will appear. Increasing ramp time.

4. Step-by-step drying



T1 = 80°C t1 = 04:47

Display pictogram during drying

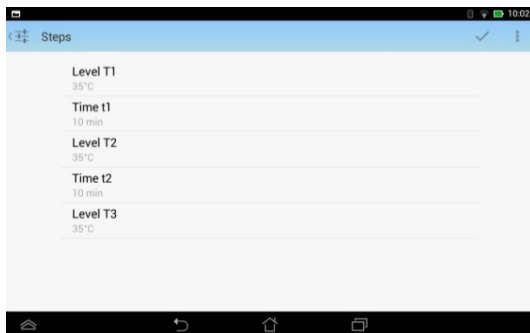
This heating profile is suitable for drying substances which consist of several components (such as etheric oils), which evaporate at different temperatures or of substances which present a specific behaviour when being warmed up. 3 steps can be selected. For the individual steps are freely selectable drying temperature and duration. In the last step the switch-off criterion finishes the measurement.

Tap **< Steps >**.

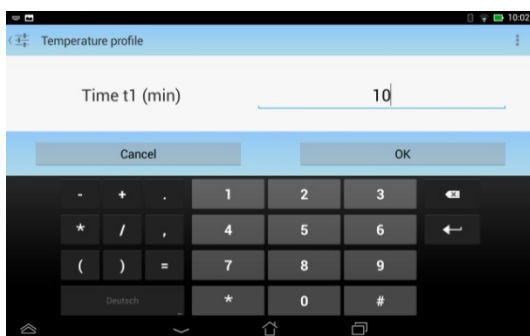
Enter temperature and time for every level.

Selectable parameters:

- Step temperature: 35°C - 160°C
- Duration (step 1 and 2): 1 – 99 minutes



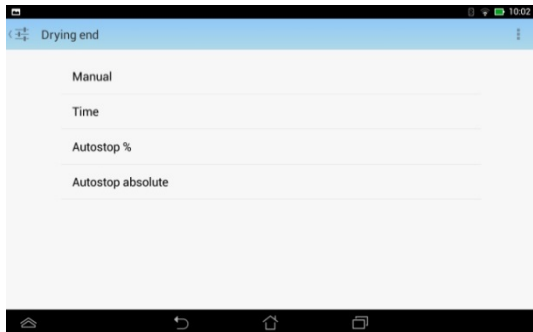
Import entry with **<OK>**, the display returns to the previous screen.



Display examples level 1

11.1.2 Shutoff criterion

A switch-off criterion defines when the instrument has to finish the drying process. The switch-off criteria make sure that the measurements are always finished under the same conditions thus providing repeatable measurements.



Tap **< Shutoff Criterion >** in dropdown menu (see chap. 11.1).

The available switch-off criteria are displayed:

- Manual
- Time
- Autostop %
- Absolute auto stop

Note:

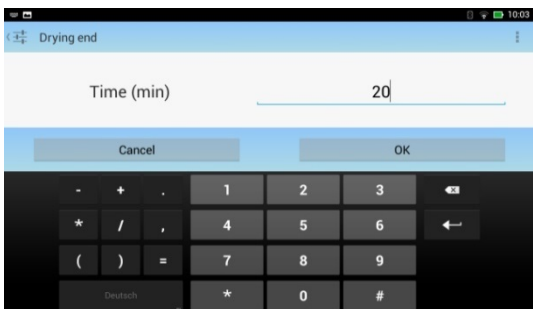
Independent on the selected setting, measurement can be finished at any time by tapping the control button **Stop**.

1. Manual

Measurement will be finished by tapping the control button **Stop**.

2. Time

Measurement will continue until the set drying period has elapsed



Tap **< Time >** and the numeric input window will appear. Enter required drying period, selectable 1 -99 minutes.

To import press **<OK>**. The display returns to the previous screen.

3. Autostop %

This switch-off criterion is based of the loss of weight (% humidity) per time unit. Measurement is finished, when the set weight value per time unit is lower than the nominal value, both values being freely adjustable [% / sec].

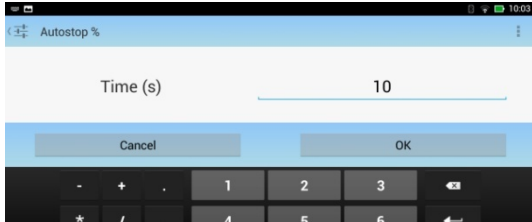


Tap **< Autostop % >**.

Tap loss of weight (variation in %) or time unit and enter desired value.



- Selectable parameters:
- Variation: 0.1 - 10.0%
 - Time unit: 1 – 99 s



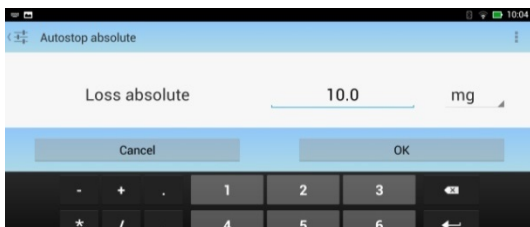
To import press **<OK>**.

4. Absolute auto stop

This switch-off criterion is based of the weight loss (mg) per time unit. Measurement is finished, when the set weight value per time unit is lower than the nominal value, both values being freely adjustable [mg / sec].



Tap **< Autostop absolute >**.



Tap loss of weight (variation absolute) or time unit and enter desired value.

- Selectable parameters:
- Weight loss: 1 - 60 mg
 - Time unit: 1 - 99 s

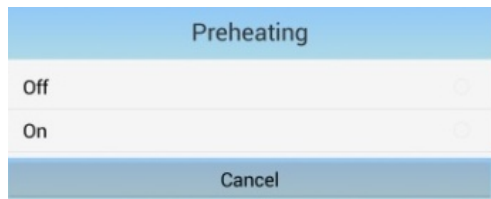


To import press **<OK>**.

11.1.3 Preheating (before weighing-in)

If needed, the function „preheating“ can be enabled for preheating the sample chamber prior to beginning the actual measurement.

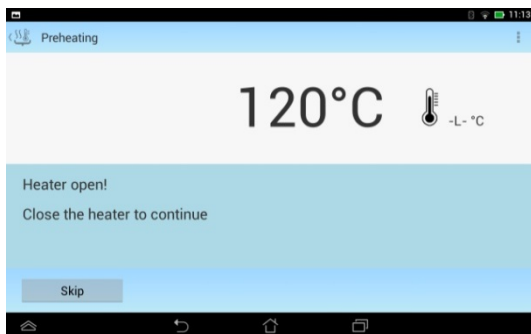
A preheated device may affect the consistency of the results as the device keeps the same temperature status for each measurement. Preheating will take place up to the point of measuring, in standby mode (For setting see chap. 7, [2]) including after finished measuring.



Tap **< Preheating >** in dropdown menu (See chap. 11.1).

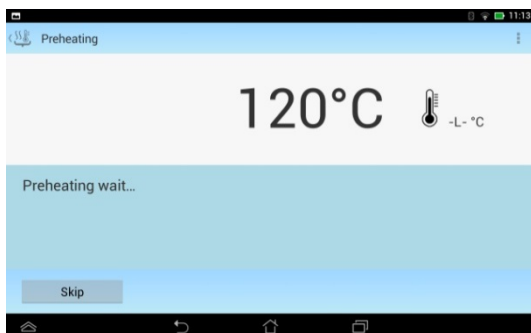
<Off> Function deactivated

<On> Function activated



Procedure when function is enabled:
Prior to starting the measurement, the instrument starts heating up on the set drying temperature.

If necessary close the sample chamber, preheating will start.



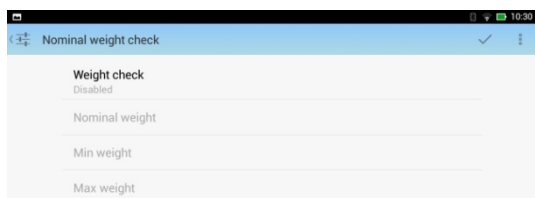
You may stop preheating during the preheating period by tapping **Skip** and after weighing the sample measurement can be started.



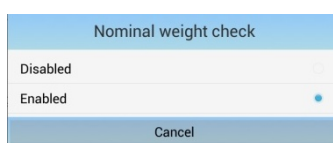
For standard applications preheating normally is not required.

11.1.4 Weighing assistance

The weigh-in aid facilitates the weighing-in of the samples on a nominal value with adjustable tolerance range. This is especially useful, when samples with the same weight are processed. This will increase reproducibility of the measurement results. If all samples are weighed-in within the tolerance range, this will increase repeatability.



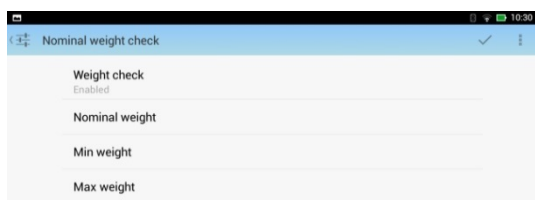
Function deactivated



Tap **< Weight check >** in the dropdown menu (See chap. 11.1).

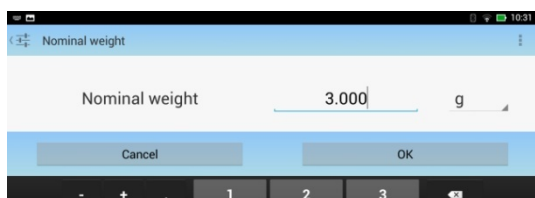
<Disabled> Function deactivated

<Enabled> Function activated

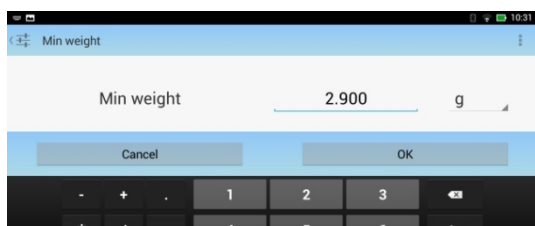


Function activated

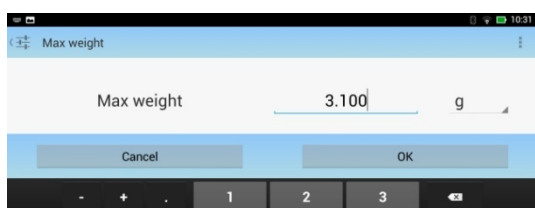
With the function enabled, enter target weight, lower and upper weight limit one after the other, and import by pressing **<OK>**.



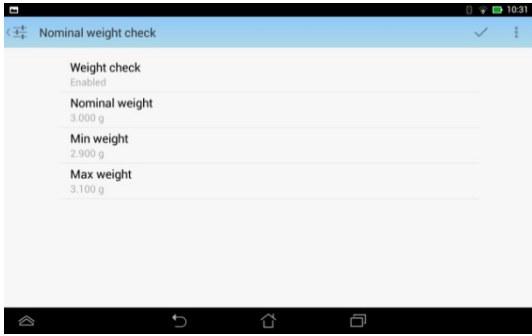
Nominal weight: Nominal weight



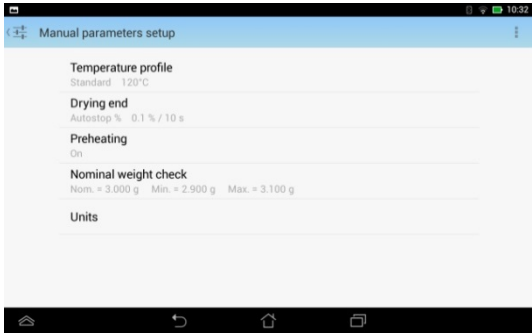
Min. weight: Lower weight limit



Max. weight: Upper weight limit



Return to menu by .



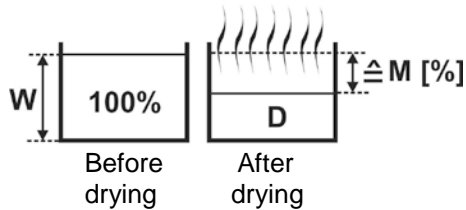
English

11.1.5 Result display

This function will define the unity where the measuring results are displayed and printed out.

Calculation:

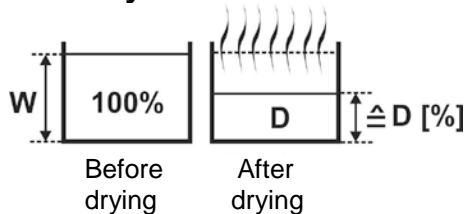
% M: Moisture content



Display shows the moisture content of the sample as a percentage of the wet weight
(W = wet weight = starting weight = 100%)

$$M [0\dots-100\%] = \frac{\text{Wet weight } W - \text{dry weight } D}{\text{Wet weight } W} \times 100\%$$

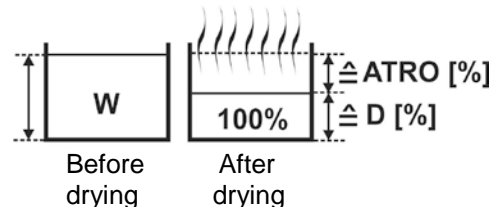
% D: Dry content



Display shows dry material content of sample as a percentage of the wet weight
(W = wet weight = starting weight = 100%)

$$D [100\dots0\%] = \frac{\text{Dry weight } D}{\text{Wet weight } W} \times 100\%$$

ATRO %M: ATRO moisture content



Display shows moisture content of the sample as a percentage of the dry weight
(D = dry weight = final weight = 100%)

$$ATRO [0\dots-999\%] = \frac{\text{Wet weight } W - \text{dry weight } D}{\text{Dry weight } D} \times 100\%$$

g: Residual weight in grams

Display shows the weight of the sample in grams.



ATRO is a unit which is exclusively used in the timber industry.

Settings:




Tap < **Units** > in dropdown menu (See chap. 11.1).

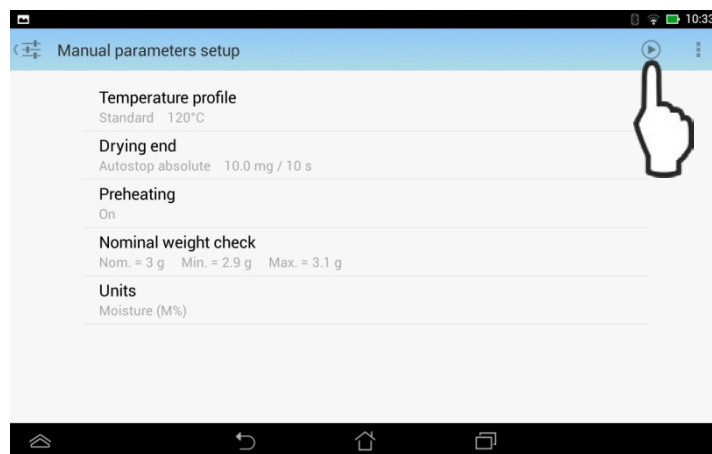
Selectable display types:

- Moisture (%M)
- Dry weight (%R)
- Atro (%A)
- Residual weight (g)

Note:

You can switch over during or after weighing to the available units, see chap. 12 “Switch over result display”.

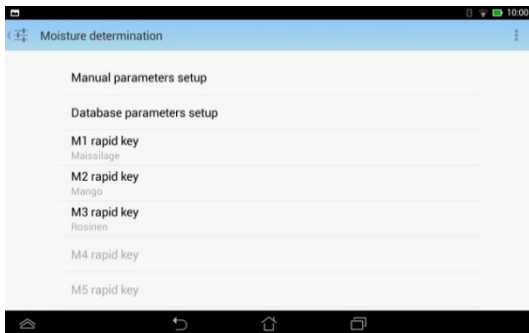
After having entered all drying parameters, you can start the drying cycle by tapping  the top right corner, see chap. 12



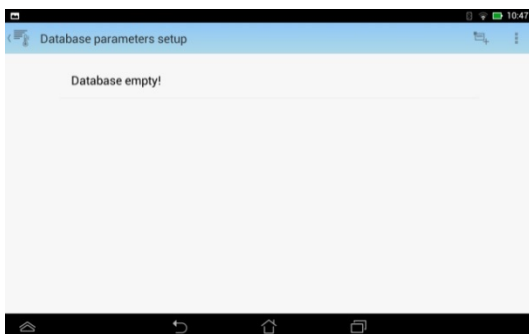
11.2 Save drying parameters in database




⇒ Tap < **Moisture Determination** >.

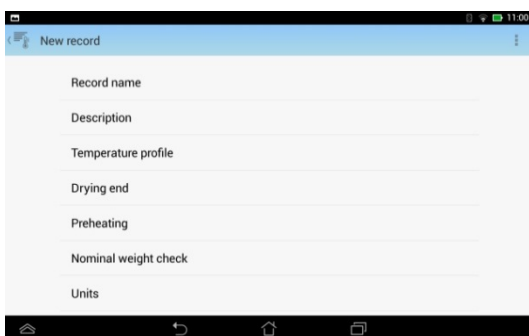


⇒ Tap <**Database parameters setup**>.



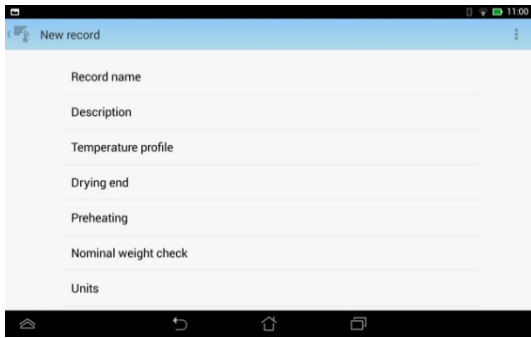
⇒ The dropdown menu for data records will appear. The database will be empty when started up for the first time.

⇒ To create a new data record (drying program), tap the icon  in the top right corner.

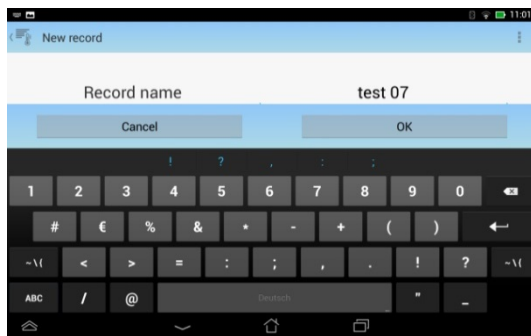


⇒ The list of parameters will appear.

11.2.1 Creating a new drying program (data record):



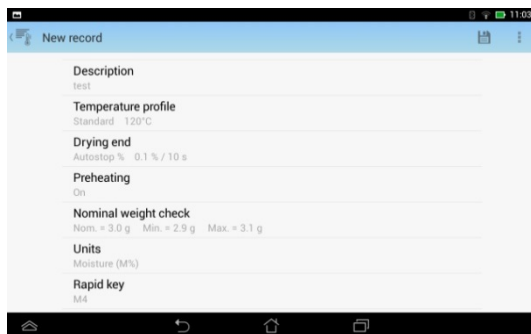
⇒ Call parameter dropdown menu, see chap. 11.2




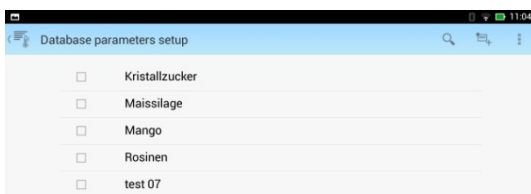
⇒ Tap **<Record name>** and the input window will appear. Enter name (such as maize silage) for the new drying program (max. 30 characters) and import by pressing **<OK>**.

⇒ Then enter all drying parameters:

- Description (max. 30 characters)
- For heating profile, see chap. 11.1.1
- For cut-off criteria, see chap. 11.1.2
- For preheating, see chap. 11.1.3
- For weighing guide, see chap. 11.1.4
- For result display, see chap. 11.1.5
- Occupancy shortcut keys, selectable: From M1, M2, M3, M4, M5

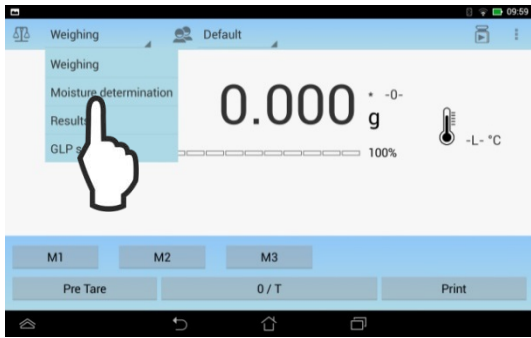


⇒ To save the new data record to database, press .

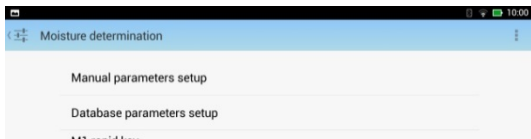


⇒ The list of saved drying programs will be displayed.

11.2.2 Change / delete drying programs (data record)



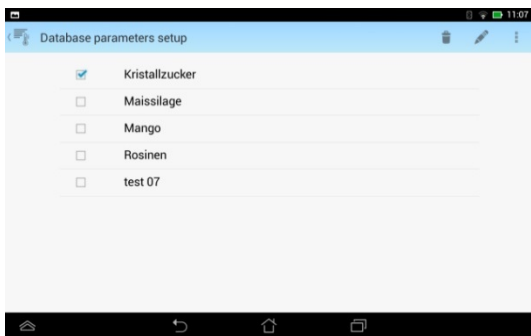
⇒ Tap **<Moisture Determination>**.



⇒ Tap **<Database parameters setup>**.

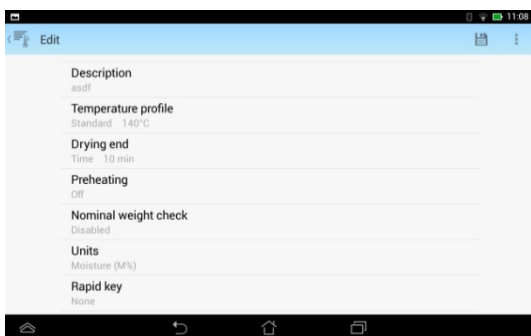


⇒ The dropdown menu for data records will appear.



⇒ Highlight the data record to be edited by tapping on it.

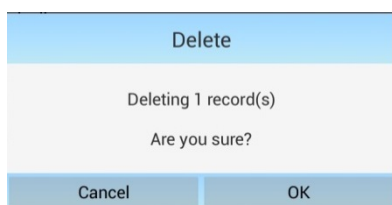
⇒ To highlight all data records, tap icon  and select **< Select all >**



⇒ Press  to change drying parameters.

Import changes with .

or



⇒ Delete data record with .

⇒ To import query, press **<OK>**.

12 Carrying Out Measurement

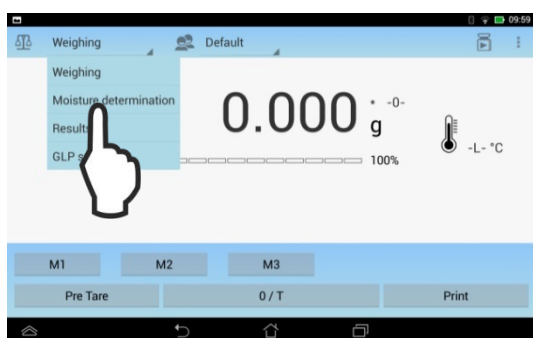


During the first start-up set the drying parameters as described in chap. 11.

(1) Start-up

⇒ Turning on moisture meter, see chap. 6.6. In order to obtain exact results, the instrument must have reached its operating temperature (see warm-up time chap. 1). For this warm-up time the instrument must be connected to the power supply.

(2) Select drying program



⇒ Tap **<Moisture Determination>**.

There are three options for loading the work screen (See chap.7.2) used to start a drying cycle:

Either

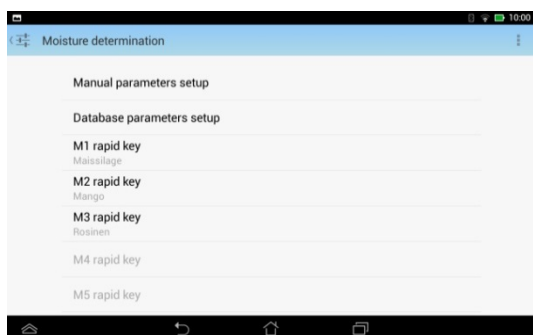
⇒ Set drying parameters manually in **< Manual parameters setup >**,
See chap. 11.1.

or

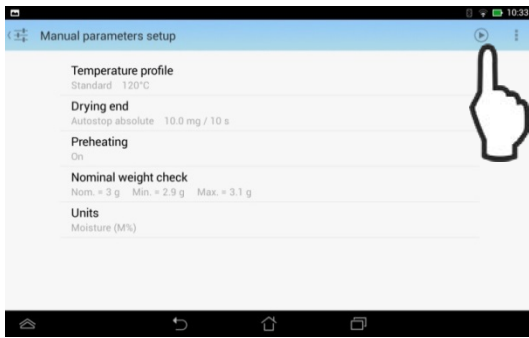
⇒ Tap **< Database parameters setup >**
in order to load a program suitable for the
sample from the database (See chap.
11.2.


or

⇒ Use the shortcut keys M1-M5,
provided they are enabled (See chap.
11.2.

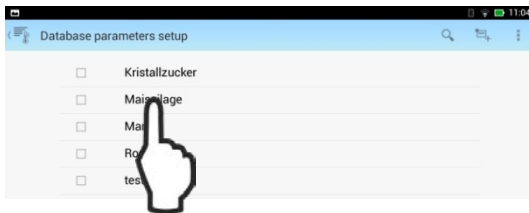


➤ <Manual parameter setting>




After setting all drying parameters, tap the control button  the top right corner. The work screen will appear, showing the previously set parameters.

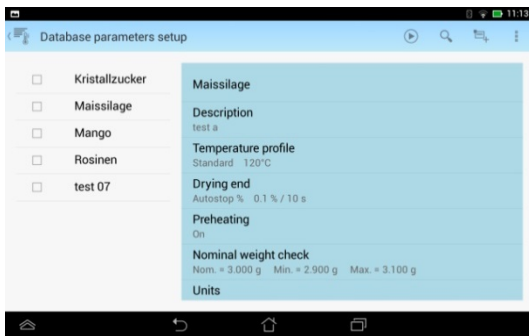
➤ < Database parameter settings >




Load desired drying program from the dropdown menu by tapping.

or

Use  to search names in the dropdown menu.



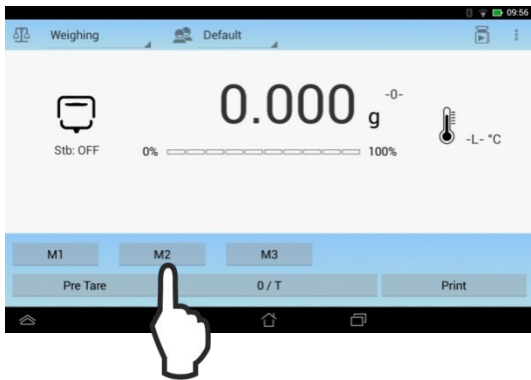
The drying parameters of the selected data record will be shown in the blue window.

Tap control button  top right corner.

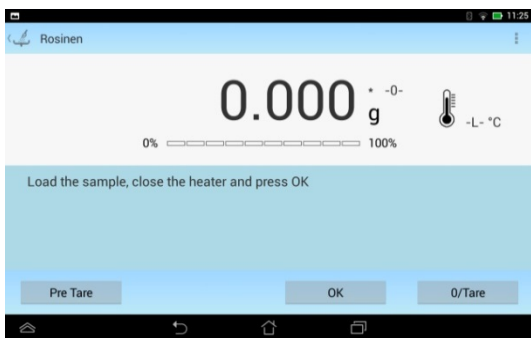


The work screen for the selected drying program will appear.

➤ Shortcut keys



Tap shortcut key (M1 –M5).

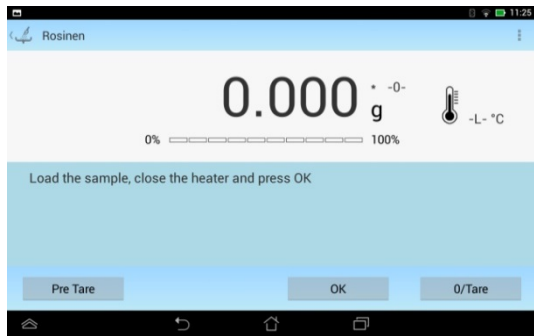


The work screen for the selected drying program will appear.

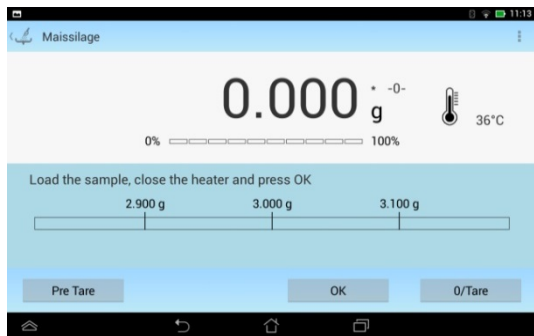
(3) Carrying Out Measurement

⇒ Step 1: Preheat

Work screen without preheating,
see chap.11.1.3

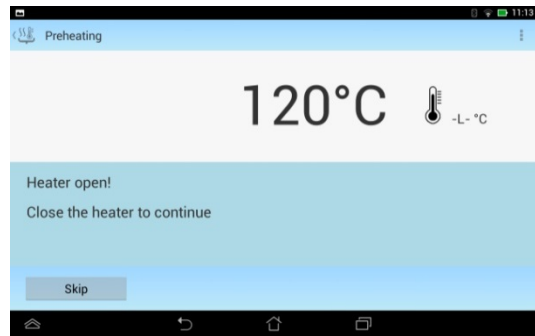


Sample display: Work screen with weighing guide disabled, see chap: 11.1.4

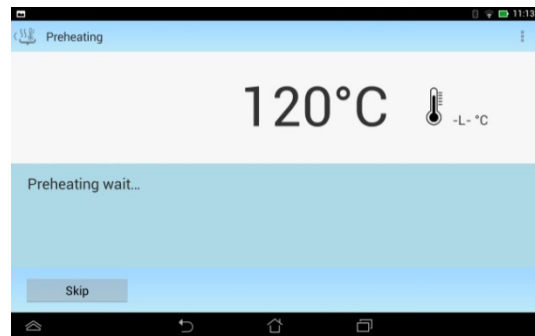


Sample display: Work screen with weighing guide enabled, see chap: 11.1.4

Work screen with preheating,
see chap.11.1.3



The display may prompt you to close the sample chamber.

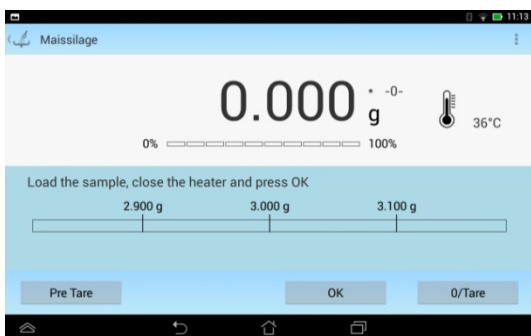


Close sample chamber, preheating will start.

The warning symbol  will be displayed for temperatures > 50°C.

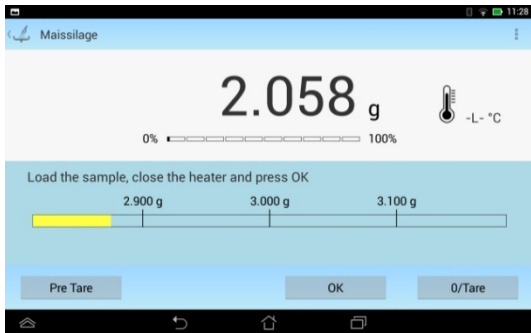
You may stop preheating during the preheating period by tapping **Skip**.

⇒ Step 2: Determining the initial weight of a sample



- Put an empty sample dish on the sample dish holder and move it to the sample chamber.
- Tare empty sample dish.
- Place sample in sample dish.

For details with enabled weighing guide, (see chap. 11.1.4) Determine the target weight \pm tolerance as described below.

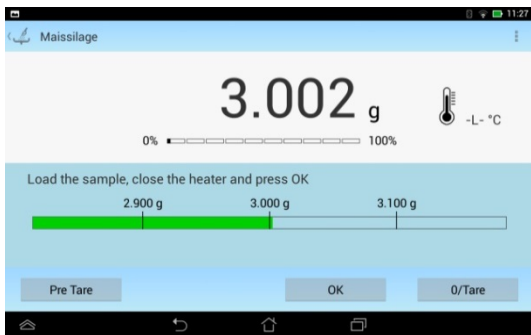


Working with the weigh-in aid:

The bar graph display moves from the left to the right and proceeds equally to the weight loaded onto the weighing balance.

yellow:

Weighed-in < lower weight value



green

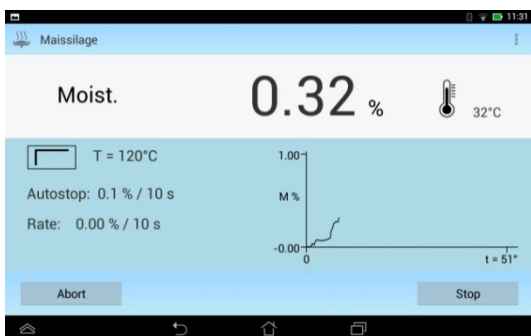
Target weight within the weight limits



red:

Weighed-in > upper weight limit

⇒ **Step 3: Start drying**



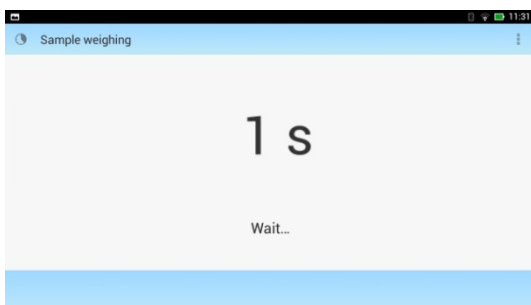
Measuring will start independently on the setting „Start mode“, see chap. 10.1

Automatic

Measurement will start automatically after closing the sample chamber.

Manual

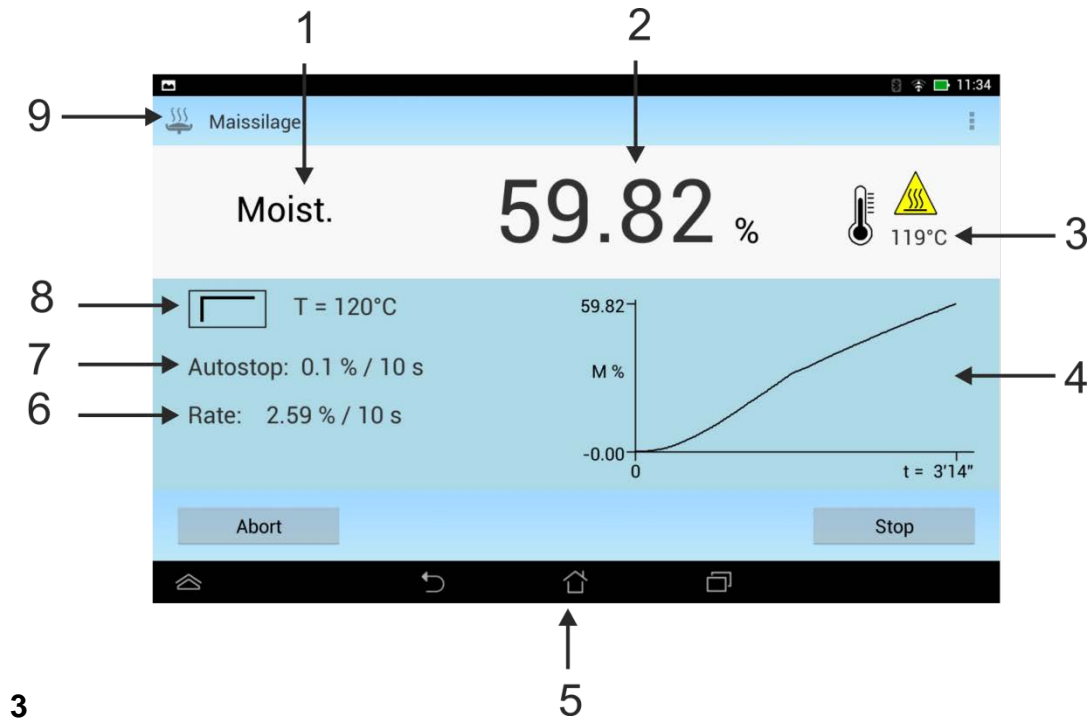
Measuring will start as soon as you tap the control button **OK**.



Measuring will start independently on the settings „Start delay“ and „Stability control“, see chap. 10.1

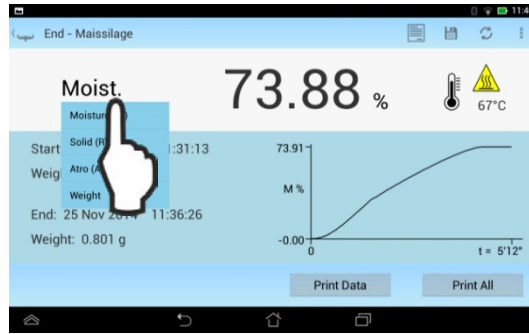
⇒ **Step 4: Display during drying process**

- ❖ You can watch the drying process on the display unit.
- ❖ The drying progress is shown continuously as a graphic display.
- ❖ The display shows the selected settings.
- ❖ To interrupt the drying process tap control button **Abbruch**.

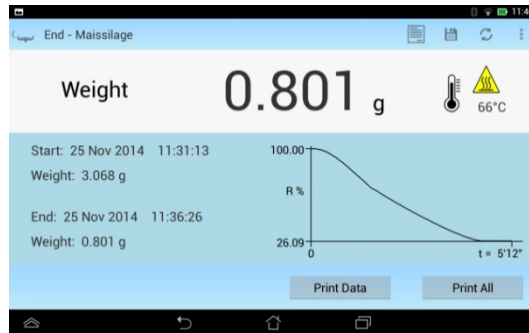


1. Display of results, tap for switching over
2. Current measured value in %
3. Current temperature
4. Display of drying graph
5. Android[®]-specific navigation elements
6. Current weight loss / time unit
7. Shutoff criterion
8. Heating profile
9. Drying process active

⇒ Switch over display of result

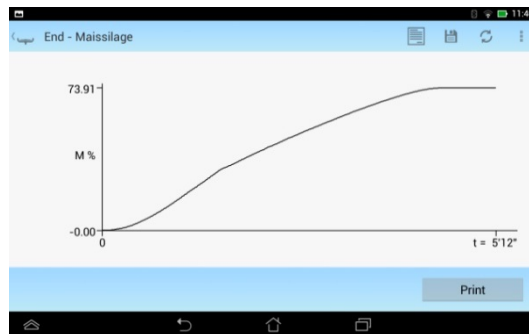


Tap result display of result and import desired unit into dropdown menu (such as [g]).



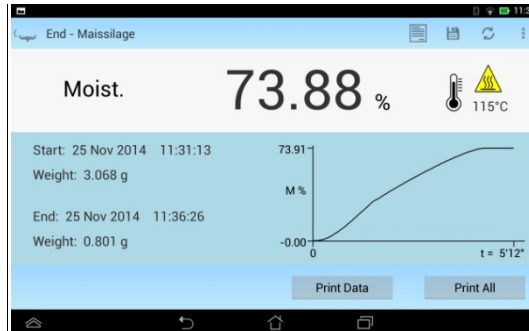
⇒ Switching in graphic display

The display may be zoomed in or out by tapping the diagram.



⇒ **Step 6: End of measurement, display/printout measuring results**

⇒ The end of the drying process will be indicated by an audio signal, provided this has been enabled in the menu (menu settings <end audio signal “ON”>), see chap. 10.1) whereupon heating will be turned off.



⇒ The displayed control buttons provide the following options:



Display of set drying parameters



Saving measurement results, see step 7.



Carrying out additional measurements with the help of the current drying program

Print All

If an optional printer is connected, a printout of the measuring protocol with drying graph will be issued.

Print Data

If an optional printer is connected, a printout of the measuring protocol without drying graph will be issued.

Sample protocols (KERN YKC-01):

Print All

Print Data

 25 Nov 2014 11:37:16

KERN
 Ziegelei 1
 72336 Balingen
 Deutschland

Balance ID:
 WI1400307
 Project ID:
 1234
 User ID:
 Mustermann

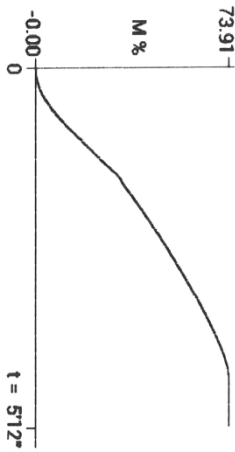
Maissilage
 test a

Standard 120°C
 Autostop % 0.1 % / 10 s
 Preheating: On
 W. Min. 2.900 g
 W. Nom. 3.000 g
 W. Max. 3.100 g

25 Nov 2014 11:31:13
 W Start 3.068 g

25 Nov 2014 11:36:26
 W End 0.001 g

Moisture (M) 73.88 %



Signature:

 25 Nov 2014 11:39:31

KERN
 Ziegelei 1
 72336 Balingen
 Deutschland

Balance ID:
 WI1400307
 Project ID:
 1234
 User ID:
 Mustermann

Maissilage
 test a

Standard 120°C
 Autostop % 0.1 % / 10 s
 Preheating: On
 W. Min. 2.900 g
 W. Nom. 3.000 g
 W. Max. 3.100 g

25 Nov 2014 11:31:13
 W Start 3.068 g

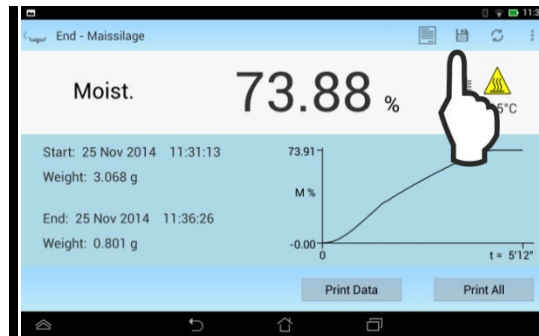
25 Nov 2014 11:36:26
 W End 0.001 g

Moisture (M) 73.88 %

Signature:

English


⇒ **Step 7: Save measurement results (max. 300 measurement results)**



⇒ Tap control button



The screenshot shows a "New record" form. The fields are: "Record name" (empty), "Description" (empty), "Start" (25 Nov 2014 11:31:13 Weight: 3.068 g), "End" (25 Nov 2014 11:36:26 Weight: 0.801 g), "Result" (Moisture (M) 73.88 %), "Temperature profile" (Standard 120°C), and "Drying end" (Autostop % 0.1 % / 10 s).

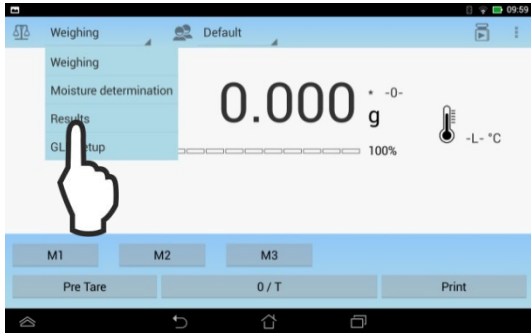
⇒ Enter data record name and designation and import by pressing . The database results will be displayed.

The screenshot shows a "Database results" screen with a list of records, each with a checkbox:

Record Name	Description
<input type="checkbox"/>	Maissilage
<input type="checkbox"/>	Silage 07
<input type="checkbox"/>	asd
<input type="checkbox"/>	mais
<input type="checkbox"/>	silage

13 Call up / edit / delete measurement results

13.1 Calling measurement results



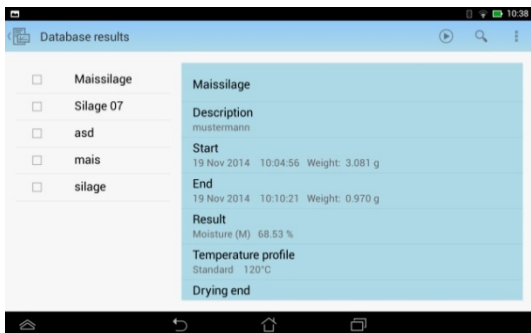
Tap <results>.



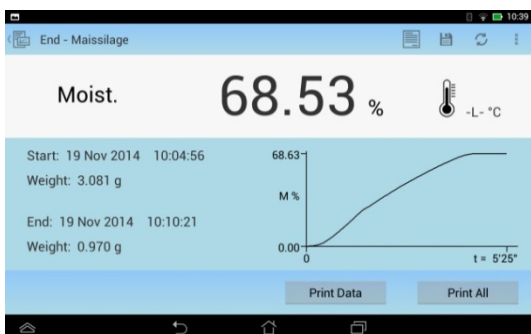
Tap <database results>.



The list of data records will be displayed.
Select data record.

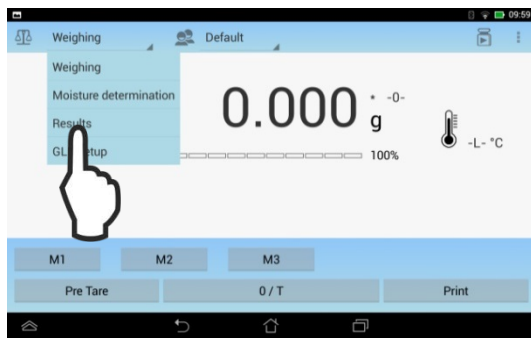


Tap 

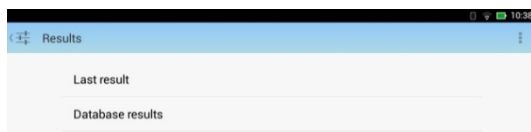


The selected measurement result will be displayed.

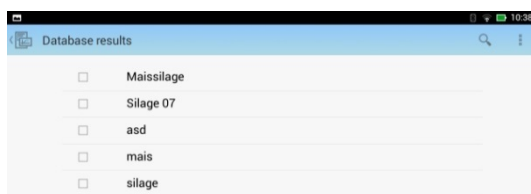
13.2 Changing / deleting measurement results



Tap <results>.




Tap <database results>.



The list of data records will be displayed.


⇒ Highlight the data record to be edited by tapping

or


⇒ To highlight all data records, tap icon  and select < **Select all** >



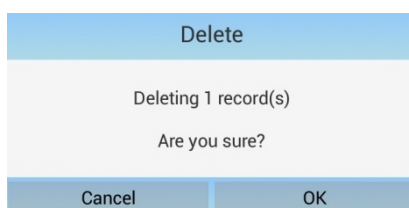
⇒ Press  to change drying

parameters. Import changes with .

or

⇒ Delete data record with .

⇒ To import query, press <OK>.



14 GLP



Tap <GLP settings>.



Select desired setting.

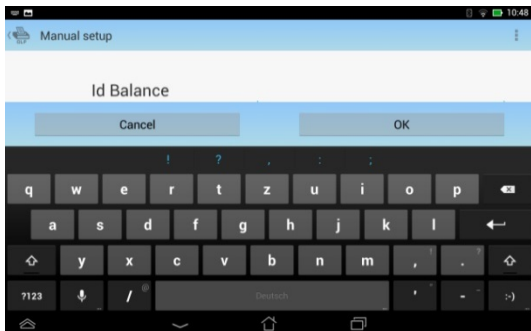
1. <Manual setting>



Tap < **Manual setup** >.

Selectable parameters:

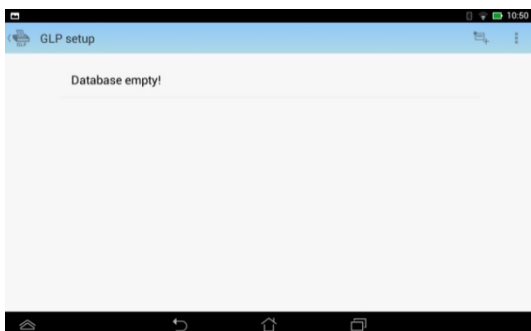
- Id Balance
- Id Project
- Id User



Tap the respective control button, the numeric input window will appear.

Import entry with <OK>, the display returns to the previous screen.


2. <Data base>

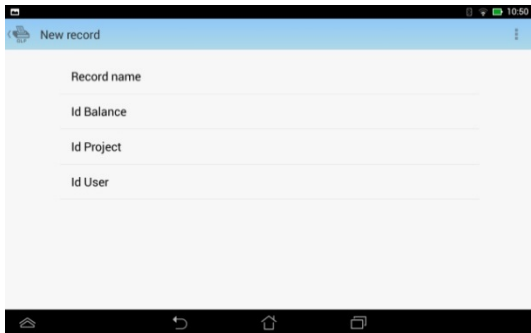


Use this function to store several GLP users and to modify or to delete existing ones.

Tap < **Database** >.

⇒ The dropdown menu for data records will appear. The database will be empty when started up for the first time.

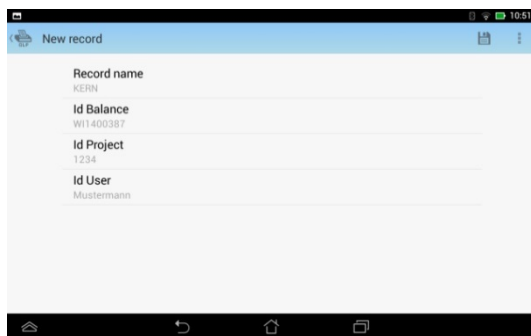
⇒ To create a new data record, tap the icon  in the top right corner.




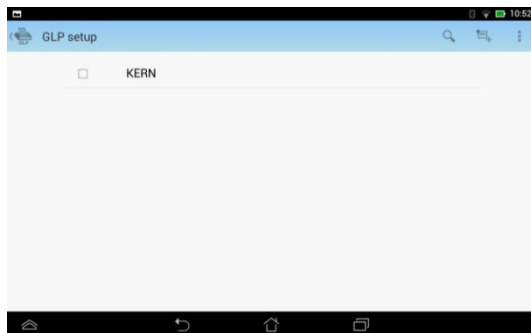
⇒ Tap **<Record name>** and the input window will appear.
Enter designation (max. 30 characters) and import by pressing **<OK>**.

⇒ Then enter all the other parameters:

- Id Balance
- Id Project
- Id User




⇒ To save new data record to database, press .

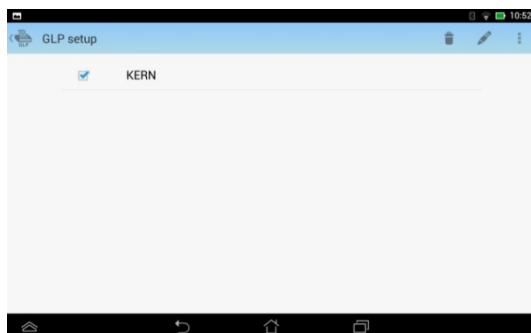



The list of data records will be displayed.

⇒ Highlight the data record to be edited by tapping

or

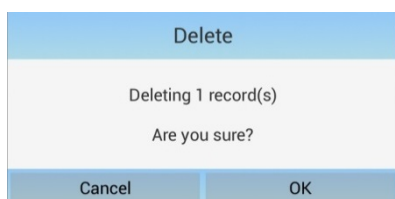
⇒ To highlight all data records, tap the icon  and select **<Highlight all>**.



⇒ Press  to change parameters.

Import changes with .

or



⇒ Delete data record with .

⇒ To import query, press **<OK>**.

15 General information concerning moisture analysis

15.1 Application

In all cases where moisture is added to or removed from products, a fast determination of the moisture content is of enormous importance. For countless products the moisture content is not only a quality feature but also an important cost factor. Very often fixed limits for moisture content apply to the trade in industrial or agricultural goods as well as chemical or food products which are defined by terms of delivery and general standards.

15.2 Basics

Moisture does not only mean water but includes all substances that evaporate when heated up. In addition to water this includes,

- Fats
- Oils
- Alcohol
- Solvents
- etc...



There are various methods to analyse moisture in a product.

KERN DLT uses a method called thermogravimetrics. In accord with this method, the sample is weighed before and after heating, determining the material moisture by looking at the difference.

The conventional drying chamber method follows the same principle, with the exception that this method requires a considerably longer measuring period. . In accord with the drying chamber method, the sample is heated from the outside to the inside by a hot air current, so as to remove the moisture. The radiation applied in the KERN DLT penetrates mainly the sample in order to be transformed inside it into heat energy that is, warming from the inside to the outside. A minor amount of radiation is reflected by the sample, a reflection that is less in dark samples than in light-coloured ones. The depth of penetration of the radiation depends on the permeability of the sample. In samples of low permeability the radiation only penetrates the outer layers of the sample, possibly resulting in imperfect drying, incrustation or burning. For that reason the preparation of a sample is of great importance.

15.3 Adjustment to existing measuring method

Quite frequently the KERN DLT replaces a different drying method (such as a drying cabinet) as the KERN DLT achieves shorter measuring times during a simplified operation. For that reason the conventional measuring method must be matched to the KERN DLT in order to achieve comparable results.

- Carry out parallel measurement
- Result of KERN DLT does not match reference
 -  Repeat measurement with changed temperature setting
 -  Vary shutoff criterion

15.4 Preparing a sample

Prepare one sample at a time for measuring. This prevents the sample from exchanging moisture with its surroundings. If several samples have to be taken at the same time, they should be packed in airtight boxes so that they do not undergo changes during storage.

To receive reproducible results, spread the sample thinly and evenly on a sample dish.

Patchy spreads will produce inhomogeneous heat distribution in the sample to be dried resulting in incomplete drying and increased measuring time. Sample clusters generate increased heating of the upper layers resulting in combustion or incrustation. The high layer thickness or possibly arising incrustation makes it impossible for the moisture to escape from the sample. Due to this residual moisture, measured results calculated in this way will not be comprehensible or reproducible.

Preparing a sample from solids:



- Spread powdery or grainy samples evenly on the sample dish.
- Grind coarse samples using a mortar or a shredder. When grinding the sample avoid any heat supply as this may cause loss of humidity.

Preparing a sample from liquids:



For liquids, pastes or melting samples we recommend to use a glass fiber filter. The glass fiber filter has the following advantages:

- even distribution thanks to capillary attraction
- no formation of droplets
- fast evaporation due to a greater surface

15.5 Sample material

Easy to determine are usually samples with the following characteristics:

- Grainy to powdery, pourable solids
- Thermally stable materials, emitting the moisture to be determined easily without other substances evaporating at the same time
- Liquids that vaporize to leave a dry substance without developing a film

Difficult to determine may be samples that are:

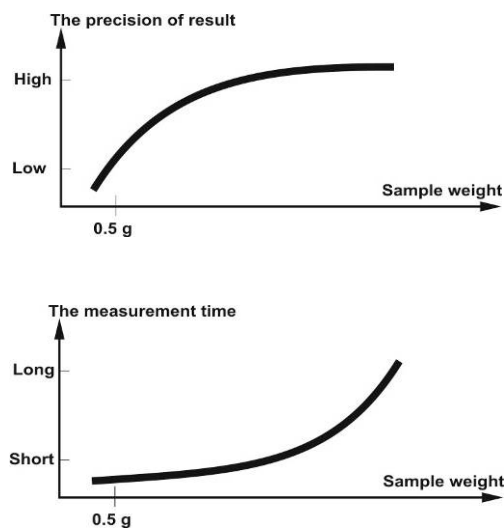
- Glutinous or sticky
- Become incrustated easily or tend to form a film
- Decompose easily under the influence of heat or emit various elements

15.6 Sample size / originally weighted in quantity

Drying times, as well as achievable accuracy, are significantly influenced by sample distribution. In the course of this arise two opposed requirements:

The lighter the originally weighted in quantity, the easier it is to achieve shorter drying times.

However, the heavier the originally weighted in quantity, the more accurate a result.



15.7 Drying temperature

Bear in mind the following factors when setting the drying temperature:

15.7.1 Surface of the sample:

Compared with powdery or grainy samples, liquid and spreadable samples have a smaller surface for the transmission of heat energy.

The use of a glass fibre filter improves the heat application.

15.7.2 Colour of sample:

Light-coloured samples reflect more heat radiation than dark ones and therefore require a higher drying temperature.

15.7.3 Availability of volatile substances:

The better and faster the water or other volatile substances can be disposed, the lower a drying temperature is required. If water is difficult to get to (e. g. in synthetics), it has to be calcined at high temperatures (the higher the temperature, the higher the water vapour pressure).

Results equivalent to other moisture analysing methods (e. g. drying chamber) can be achieved by experimentally optimising the setting parameters such as temperature, heating level and shutoff criteria.

15.8 Recommendations / Guidelines

15.8.1 Prepare standard sample:

- Chop up sample, as required, and spread it evenly on the sample dish.

15.8.2 Prepare special samples:

- For sensitive or hard to spread test materials (e. g. mercury) a glass fibre filter is available for use.
- Apply the sample equally on the glass fibre filter and cover it with a second glass fibre filter.
- The glass fibre filter is also useful as a protection when splashing materials are dealt with (each splash falsifies the final result).

15.8.3 Table of applications:

Material	Weight Sample (g)	Drying temperature (°C)	Drying period (approx.) (min)	Moisture % (approx.)	Solid body % (approx.)
ABS (Novodur P2H-AT)	10	60	10	0.11	
Accumulator lead	10	110	2.6	0.19	
Acryl granulate	10-15	80	12	0.18	
Activated carbon	10	80	9.8	13.33	
Activated carbon	7.6	80	4.1	6.12	
Sliced pineapple	5	110	14.4	6.71	
Sliced apple (dry)	5-8	100	10-15	76.5	
Sliced apple (humid)	5-8	100	5-10	7.5	
Artesan powder	0.5	80	3.5		98.44
Aspartame granulate	0.5	105	3.4		96.84
Bath milk	3	80	27.4	83.87	
Cotton seed	3-4	110	6.3	6.8	
Blue-veined cheese	2	160	13.3		53.06
Body lotion	3	80	31.6	87.76	
Beans	4.5	150	9.7	11.85	
Butter	1.7	140	4.3		84.95
Acetyl cellulose	5.5-6	50	1.3	0.81	
Chinese Virility powder	2.5-3	110	5.5	6.24	
CN photographic paper	2	150	6.4	5.81	
Cornflakes	2-4	120	5-7	9.7	
Roof tile mass	2.5	160	10		81.74
Roof tile mass	7	160	20		81.74
Dialysis membrane (Polyethes – polycarbonate)	0.5	80	2.2	7.85	
Dialysis membrane (Polyethes – polycarbonate)	0.5-0.7	80	2.0	7.86	
Indoor sealing compound	3	160	7		64.04
Dispersion adhesive	1.5	140	9.5		55.69
Dispersion adhesive (watery)	2.5	155	7.2	43.77	
Dolomite	10-12	160	6.1	0.06	
Printer ink fluid	1.5	120	10		19.15
E-filter dust of waste incineration	7-10	135	7	26.23	
Peas, „danish yellow“	3.5	135	7.9	15.19	
Peanut cores	2.8	100	4	1.97	
Peanut cores	3	100	6	3.2	
Refreshment candies	3-3.4	90	2.9	0.29	
Dye powder	1.5	120	3.5		99.07
Fine ceramic mass	2.5	160	9		86.89
Film waste	8-9	60	1.2	0.4	
River water	4	160	20	99.2	
Fudge/sugar mass	5	130	20	8	
Formaldehyde urea dispersion	2	155	7.6	34.07	
Cottage cheese	1.4	70	15		41.03
Forage pellets	3-4	150	5.7	6.35	
Dried beans	3-4	105	5	7.3	
Dried peas	5-7	110	9.6	5.89	
Dried carrots	5.5-6	120	3	4.92	
Dried chicken dung	4	140	8	14.81	
Dried corn	5-7	110	10	6.21	
Glass powder	8-10	160	5	0.26	

Material	Weight Sample (g)	Drying temperature (°C)	Drying period (approx.) (min)	Moisture % (approx.)	Solid body % (approx.)
Setting lotion	0.01	145	9	98.76	
Setting lotion (extra strong)	1	130	8	97.85	
Hair styling gel	5	105	37.0	94.71	
Oat flakes	2	105	5.6	9.35	
Hazelnut cores	2.2	100	3.8	4	
Hazelnut cores (peeled)	2.6	100	4.5	3.74	
Hydranal sodium tatrata – 2 – hydrate	1.6	160	12	15.67	
Yoghurt	2-3	110	4.5-6.5	86.5	
Coffee	2	150	8	4.99	
Coffee cream	2-3	130	6-8	78.5	
Coffee seed	3.5-4	120	8	8.53	
Cocoa	2.5	105	4	3.45	
Cocoa seed	4-5	130	7.8	6.23	
Limestone	12-14	160	5	0.05	
Potato powder	2.5-3.0	130	5.8	12.46	
Potato chips	3-4	106	7.5	6.9	
Ketchup	2	120	18	74.44	
Silica gel	9.5	115	4.5	0.63	
Adhesive	2-5	136	6-8	54.3	
Garlic, powder	2	100	7.3	5.36	
Coal powder	4	160	3.4	2.11	
Chalk (natural)	8	160	1.7	0.06	
Crystal sugar	3	90	2.8	0.05	
Synthetic resin dispersion (diluted)	2	160	5.9	60.21	
Latex	1-2	160	5.2	38.64	
Latex LE ¹	3-5	125	10.8	46.58	
Latex LE ²	3-5	125	9.4	50.37	
Latex O44	3-5	125	9.4	50.65	
Lentils	4	135	5.4	12.49	
Loam soil	10-15	160	5.5	9.89	
Loam clay	2.5	160	14.5		80.75
Skim milk powder	4	90	5.5	3.67	
Low fat curd cheese	1.2	130	8		18.5
Corn starch	2	160	5.2		89.1
Almonds (caramelised)	3.5	80	4.8	1.81	
Almonds (natural)	2.5	100	5.3	4.19	
Almonds „californian“	3	100	5.3	4.34	
Margarine	2.2	160	4	19.15	
Brick mass	7	160	20		80.13
Mayonnaise	1-2	138	10	56.5	
Flour	8-10	130	4.5	12.5	
Micronyle	7-8	60	8	0.4	
Milk	2-3	120	6-8	88	
Milk powder (MMP)	4.5	100	6.3	2.46	
Milk powder (VMP)	4.5	100	5.5	2.56	
Mozzarella	1.5	160	11.1		45.78
Multivitamin candies	3-3.4	115	3.3	0.4	
Natural latex	1.4	160	5.3	42.56	
Nougat mass	2.5	103	10	0.6	
Noodle dough	0.55	160	5	12	
Concentrated orange juice	2-3	115	13	52.1	

Material	Weight Sample (g)	Drying temperature (°C)	Drying period (approx.) (min)	Moisture % (approx.)	Solid body % (approx.)
Paper	2-4	106	10	6.4	
PA 6 (Ultramide B3WG5)	10	60	10	0.05	
PA 6.6 (Ultramide B3WG5)	10	80	10	0.15	
PBTP (Crastin SK645FR)	10	80	10	0.05	
PC (Macrolon 2805)	10-12	80	15	0.08	
PC/ABS (Babyblend T65MN)	9-11	80	10	0.12	
Pepper, black, powder	2	85	8,8	7.97	
PMMA (Plexiglass 6N)	10	70	10	0.12	
Polypropylene	13	130	9	0.23	
Polypropylene	3,3	120	2,2	0.09	
Polystyrene sulfonic acid Sodium salt solution	2-2,5	120	8,7	19.01	
POM (Hostaform C9021))	10	80	10	0.13	
PS (Polystyrene 168 N)	10	80	10	0.05	
Purine	2	105	3,8	8.64	
Curd	1	140	7		18
Curd cheese, „Fat curd cheese“	1.2	130	8		23
Silica sand	10-14	160	1.9	0.24	
Raclette cheese	1.5	160	14.4		56.9
Canola seed	3-4	90	7.4	6.18	
Rice (US parboiled)	3.5	105	12.5	10.98	
Rye	4.5	150	11.5	10.72	
Red wine	3-5	100	15-20	97.4	
Sugar beet pulp pellets	4.5	150	8.6	11.77	
Salt	2	100	3	4.9	
Pretzel sticks	3-4	75	4.5	1.67	
Sludge	11-12	130	90	80	
Melted cheese	1.5	70	15	35.65	
Chocolate	2.5	103	10	0.5	
Chocolate powder	2-4	100	4	1.9	
Chocolate water	2-3	90	10		6
Hogwash of kitchen waste	4-5	160	21		17.67
Lard	0.70	160	3.5	1.2	
Shampoo	2	100	14.1	75.89	
Soap	3	120	6	7.86	
Mustard	2.5-3	80	19		34.69
Sesame seed	3	130	8	5.48	
Soya bean flour	4.6	95	4.9	4.8	
Soya beans, granulate	5	110	22.6	12.16	
Bruised sunflower seed	3-3.5	100	4	5.92	
Sunflower oil	10-14	138	2	0.1	
Spaghetti	3	105	15.1	10.63	
Rinsing agent	2	80	13.7	59.64	
Dust	5-10	104	8-15	7.3	
Starch derivative	2.5	150	12.3		30.29
Starch glue	1.5	100	8.9		17.96
Spread cheese	2.5-2.8	160	4.5		36.81
Soup (instant product)	2-3	80	4.5-7	3	

Material	Weight Sample (g)	Drying temperature (°C)	Drying period (approx.) (min)	Moisture % (approx.)	Solid body % (approx.)
Tobacco	1.5	100	16	10.18	
Tea. black	2	105	4	7.67	
Pasta	1.5	120	8	10.64	
Textile fibre	0.8-1.2	85	3.6	14.03	
Theophylline	1.5	130	1.9	7.33	
Thermoplastic PUR – granulate	15-18	80	18	0.08	
Walnut	2.8	100	5.6	3.5	
Washing powder	2	160	12	7.32	
Wheat spring water	2-3	90	10		6
Sausage casing	0.2	150	3.5		78.56
Toothpaste	2	100	7.7	34.28	
Pulp	2.5	130	4.5	7.32	
Cement	8-12	138	4-5	0.8	
Sugar	4-5	138	10	11.9	
Sugar beets	2	130	13.4		30.94

i You will find further examples taken from actual use in our application manual, available from the KERN home page (www.kern-sohn.com).

16 Servicing, maintenance, disposal

16.1 Cleaning



☞ Before any maintenance, cleaning and repair work disconnect the instrument from the operating voltage.



☞ Only carry out cleaning tasks when the instrument has cooled down.

1. Display	Do not apply cleaning agents containing solvents or abrasive ingredients.
2. Wind protection ring	Remove wind protection ring / sample dish, wet clean and dry thoroughly before fitting
3. Sample dish	
4. Housing	Please do not use aggressive cleaning agents (solvents or similar agents), but a cloth dampened with mild soap suds. Take care that the instrument is not penetrated by fluids and polish it with a dry soft cloth. Loose residue sample/powder can be removed carefully with a brush or manual vacuum cleaner. Remove any spilt sample material immediately.

16.2 Servicing, maintenance

- ☞ The instrument may only be opened by trained service technicians who are authorized by KERN.
- ☞ Ensure that the integrated balance is regularly calibrated, see chap. Monitoring of test resources.

16.3 Disposal

- ☞ Disposal of packaging and instrument must be carried out by operator according to valid national or regional law of the location where the instrument is used.

17 Instant help

Fault

Possible cause

Display is not lit up.

- The instrument is not switched on.
- The rechargeable battery is empty.

The display does not change when a sample is being loaded

- Sample dish / dish holder is fitted incorrectly.

The weight display changes constantly / the stability display does not appear.

- Sample dish has contact with wind protection device or heated cover.
- Draught/air movement
- Table/floor vibrations
- Electromagnetic fields / static charging (choose different location/switch off interfering instrument if possible)

Incorrect measuring result

- Check adjustment
- No resetting to zero before loading the sample

Measurement is taking too long

- Incorrect setting shutoff criterion

Measurement is not reproducible

- Sample is not homogenous
- Drying time is too short
- Drying temperature too high (e.g. oxidation sample material, boiling point of sample exceeded)
- Temperature sensor soiled or defective