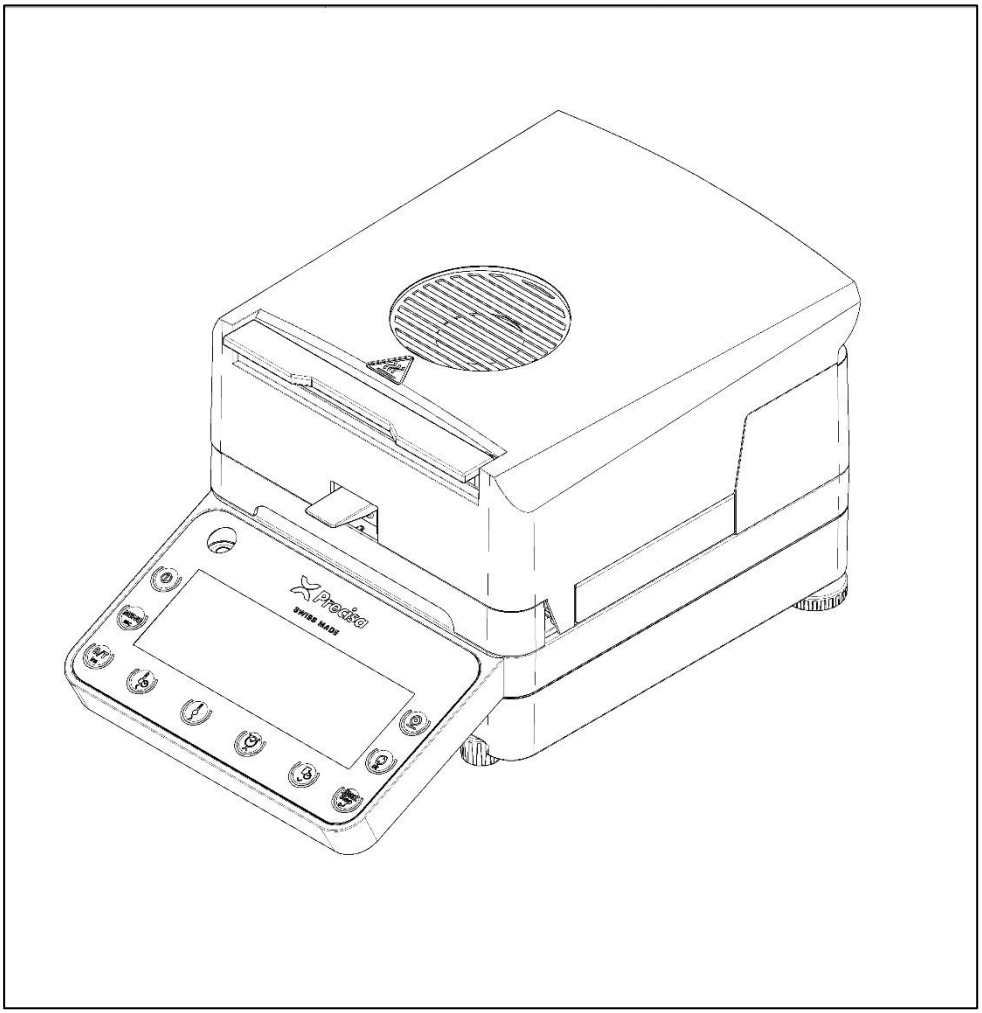
530 PBM



Operating instructions

Precisa
THE BALANCE OF QUALITY

350-8196-000 a1

Declaration of conformity

Declaration of conformity for apparatus with CE mark
Konformitätserklärung für Geräte mit CE-Zeichen
Déclaration de conformité pour appareils portant la marque CE Declaración de conformidad para aparatos con disitintivo CE
Dichiarazione di cofnromitá per apparecchi contrassegnati con la marcatura CE

English	We hereby declare that the product to which this declaration refers conforms with the following standards.
German	We hereby declare that the product to which this declaration refers complies with the standards below.
Français	Nous déclarons avec cela responsabilité que le produit, auquel se rapporte la présente déclaration, est conforme aux normes citées ci-après.
Español	Manifestamos en la presente que el producto al que se refiere esta declaración est´´a de acuerdo con las normas siguientes
Italiano	Dichiariamo con ciò che il prodotto al quale la presente dichia-razione si riferisce è conforme alle norme di seguito citate.

Moisture Balance: Precisa PBM 60
Precisa PBM 60 HR
Precisa PBM 66

with infrared radiator, halogen radiator or dark radiator

Mark applied	EU Directive	Standards
CE	2014/30/EU 2014/35/EU	EN61326 EN61010-1:2010

Date: 08.05.2024

Signature:

R. Grolimund R&D Manager

Precisa Gravimetrics AG, Moosmattstrasse 32,

P.O. Box 352, CH-8953 Dietikon

Identification

This instruction manual applies to the Precisa 530 Series PBM moisture analyzers with ten-button control panel and multifunction display.

Customer service

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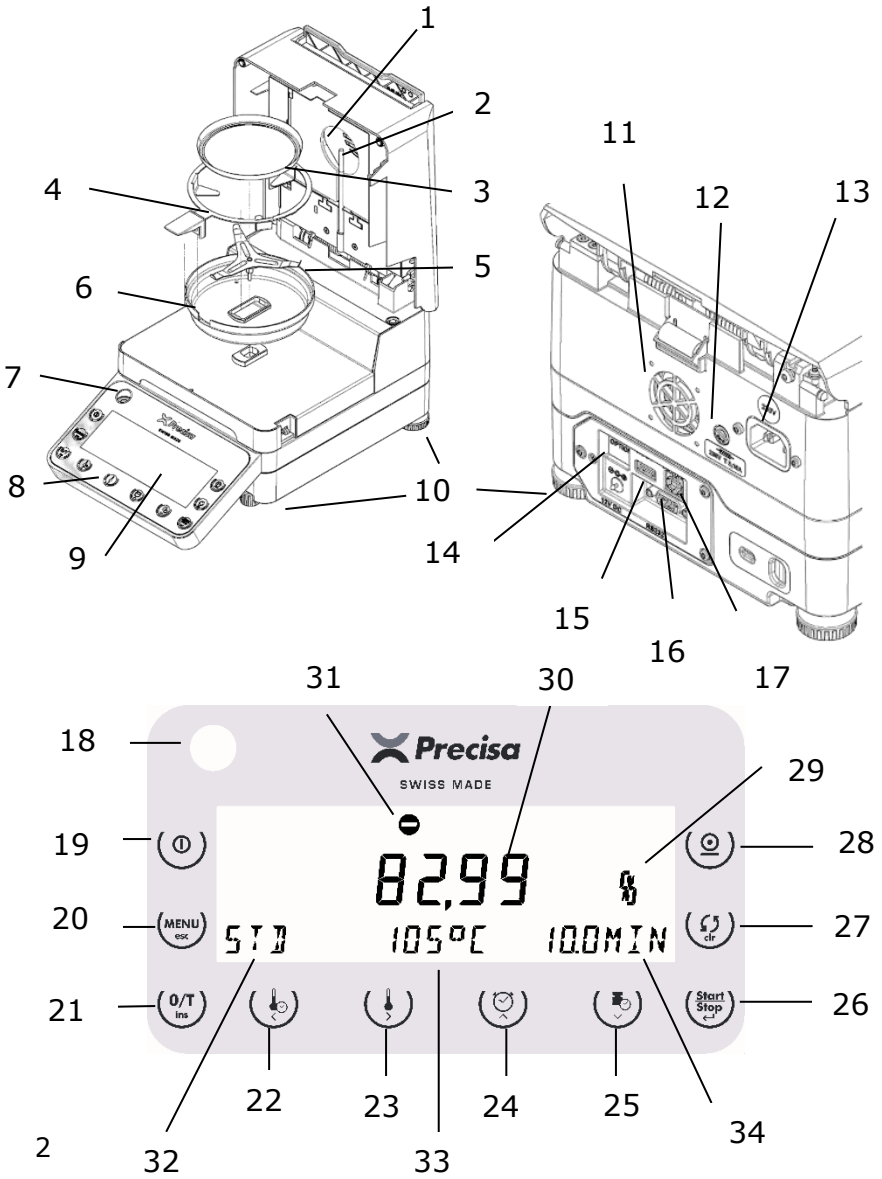
http://www.precisa.com
Information and addresses of local customer service points can be found on our website.

Copyright

Overview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Precisa
SWISS MADE
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10.0MIN
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MENU
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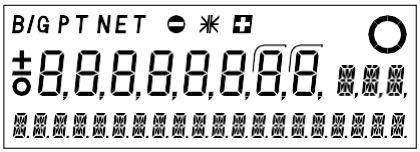
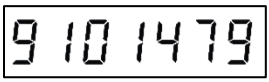
Start
Stop
clr

No.	Description	Paragraph
1	Heaters (halogen/IR/dark radiator heaters)	6.1
2	Temperature sensor PT1000	0
3	Sample dish	3.3/ 6.2
4	Sample dish Holder	3.3
5	Weighing pan	3.3
6	Draftshield	3.3
7	Level	3.7
8	10 key membrane keypad	5.1
9	Display	
10	Adjustable feet	3.7
11	Fan	4
12	Mains fuse, T 3.15 A, 230 V; T 6.3 A, 115 V	9.2
13	Mains connection socket	3.5
14	Ethernet port, optional	5.3.11
15	USB host port for connecting keyboard, barcode reader, ...	5.3.11
16	Serial port port, DB9 female	5.3.11
17	USB device socket for connection to a PC	5.3.11
18	Level	
19	ON/OFF button	4
20	Menu Button	5.3.1/ 5.4.1
21	Tare Button	5.5.1
22	Heating Mode Button	6.3.1
23	Temperature button	6.3.2
24	Time Button	6.3.3
25	Stop Mode Button	6.3.4
26	Start/Stop button	5.5.4
27	Change button	5.5.3
28	Print Button	5.5.2
29	Unit Display	5.3.25
30	Display	4
31	Weighing aid	5.3.24
32	Heating mode display (info line)	4
33	Temperature display (info line)	4
34	Drying time display (info line)	4

Firmware and serial number

After reconnecting the moisture analyzer to the mains and switching it on for the first time, the serial number and firmware are displayed after the short initialization sequence.

Display	Remark
Miscellaneous information	Start-up sequence
	All display elements of the screen must light up
	Serial Number: 9101422
	Firmware: H00-0000. P02 H00: Hardware Code 00.00: Version P02: Release
PBM 60	Model

Accessories

Accessories	Article
Printer LP4024, 230V / 115V	350-8391
Bluetooth connection for printer LP4024	350-8391-001
Paper roll LP4024, set of 4 pieces	350-8392
Adhesive paper roll LP4024, set of 5 pieces	350-8396
Ribbon for printer LP4024	PN 3953-013
Adapter RJ45-DB9f, (PC/Printer LP4024)	350-8522
Data cable DB9m-DB9f, 1.5m, (PC/Printer LP 4024, 1:1)	350-8672
USB cable A-B, 1.5m, (PC)	PN 3950-125
Interface box, LAN Ethernet connection	350-8940-001
Interface box, WiFi connection	350-8940-002
Interface box, Bluetooth connection	On request
Anti-theft, mechanical	350-8555
Dust cover for display (20 pieces)	350-8590
Aluminum trays with collar (box of 80 pieces)	350-1015
Stainless Steel Sample Tray, Reusable (1 Piece)	330-2018
Fiberglass filters (80 pieces)	350-4130
Temperature Sensor Plate (Sensor - Type K)	350-8580
Temperature calibration set (sensor - type K), with certificate	350-8585
Temperature calibration set (sensor - type K), without certificate	350-8584
Dust filter complete	350-8587
Adjustment weight 50 g	350-8241

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1 Introduction

The moisture analyzer is easy and functional to use. It is used for fast and reliable determination of material moisture in liquid, porous and solid materials using the thermogravimetry method.

The moisture analyzer impresses with:

- Easy and quick cleaning
- High-end weighing technology according to the highest international standards
- Optimal resolution
- Large, bright display (LCD)
- LED status indicator (ready/cold or operating/cooling)
- Memory for 30 methods (PBM 60, PBM 60-HR), with all drying settings
- Automatic endpoint detection (as per setting)
- Securing the device configuration and drying parameters against unauthorized modification by password
- Anti-theft code
- Printout according to GLP guidelines (Good Laboratory Practice)
- Software update via Internet
- High-resolution version PBM 60-HR with 10 times higher readability for weight and individual units of humidity calculation. For details, please refer to chapter 5.3.25 "Units".

1.1 Useful information about the operating instructions

Read these operating instructions completely and carefully so that you can make the most of the full potential and the many possibilities of the device in your daily work.

This instruction manual contains orientation aids in the form of pictograms and button representations, which should make it easier for you to find the information you are looking for:

- Key names are enclosed in quotation marks and highlighted in bold letters: "**ON/OFF**" or "".
- When explaining the operating steps, the corresponding display is graphically displayed to the left of the list of operating steps:

Display	**Key**	**Step**
- - - - - - - - Language German	« »	*Press repeatedly until the currently enabled language is displayed.*

1.2 Warranty

The instruction manual is accompanied by a warranty card, which was completed by your Precisa representative before handing over the moisture analyzer.

NOTE
Check that the warranty card is included in this instruction manual and that it is filled out.

2 Safety

2.1 Representations and Symbols

Important instructions relating to safety are highlighted in the respective job description:

⚠ DANGER

Warning of a possible hazard that could lead to death or serious bodily injury.

⚠ WARNING

Warning of a potentially dangerous situation that may result in minor bodily injury or property damage.

NOTE

Tips and important rules for working correctly with the moisture analyzer.

2.2 Safety

- If the device is used in environments with increased safety requirements, the relevant regulations must be observed.
- Only use extension cords with a protective conductor.
- If the power cord is damaged, the device must be immediately unplugged and the power cord replaced.
- If, for any reason, it can be assumed that it is no longer possible to operate the moisture analyzer safely, it must be immediately disconnected from the power supply and secured against unintentional operation.
- When carrying out maintenance work, it is essential to comply with the requirements set out in Chapter 9.1 "Maintenance and Care" become.

- The operating instructions must be read by each operator of the equipment and must be available at the workplace at all times.

⚠ DANGER

Do not place flammable materials on, under or next to the device.

Keep enough space around the appliance to prevent heat build-up.

Potentially explosive, highly flammable samples must not be analyzed with the moisture analyzer.

Do not operate the moisture analyzer in potentially explosive atmospheres.

Sample materials that release toxic substances must be dried under a special suction device. It must be ensured that no harmful fumes can be inhaled.

Make sure that no liquid gets inside the device or into ports on the back of the device.
If liquid is spilled on the device, it must be immediately unplugged.
The moisture analyzer must not be operated again until it has been checked by a Precisa service technician.

⚠ WARNING

Individual parts can heat up heavily during operation. Touch the device only by the handles provided for this purpose.

Be careful when taking the sample. The sample itself, the heating unit and the sample trays used can still be very hot.

The moisture analyzer should be used primarily for drying water-containing substances. Sample materials that emit aggressive fumes (e.g. acids) can lead to corrosion problems on equipment parts.

In the event of damage, liability and responsibility lie with the user.

3 Commissioning

3.1 Unwrap

The moisture analyzer is supplied in an environmentally friendly packaging specially developed for this precision instrument, which optimally protects the device during transport.

NOTE
Keep the original packaging to avoid damage during shipment or transport of the moisture analyzer and to be able to store the device optimally in the event of a longer period of decommissioning.

To avoid damage, the following points must be observed when unpacking the moisture analyzer:

- Unpack the device with calm and care. It is a precision instrument.
- At very low outside temperatures, the appliance should first be stored for a few hours in the unopened transport packaging in a dry, normally temperature-controlled room so that no condensation moisture settles on the appliance during unpacking .
- Immediately after unpacking, check the moisture analyzer for any externally visible damage. If you notice any transport damage, please inform your Precisa service representative immediately.
- If the moisture analyzer is not to be used immediately after purchase, but will only be put into operation at a later date, it should be stored in a dry place with as little temperature variation as possible (see chapter 3.2.2 "Storage").
- Read this instruction manual, even if you have previous experience with Precisa equipment, before using the device. and observe the safety instructions (see chapter 2 "Safety").

3.2 Transport, storage

3.2.1 Transport & Shipping

Your moisture analyzer is a precision device. Treat it with care.

Avoid shocks or vibrations during transport.

Make sure that there are no strong temperature fluctuations during transport and that the device cannot become damp (condensation).

NOTE

It is preferable to ship and transport the moisture analyzer in its original packaging to avoid damage during transport.

3.2.2 Storage

If you want to take the device out of service for a longer period of time, disconnect it from the mains, clean it thoroughly (see chapter 9 "Service") and store it in a place that meets the following conditions:

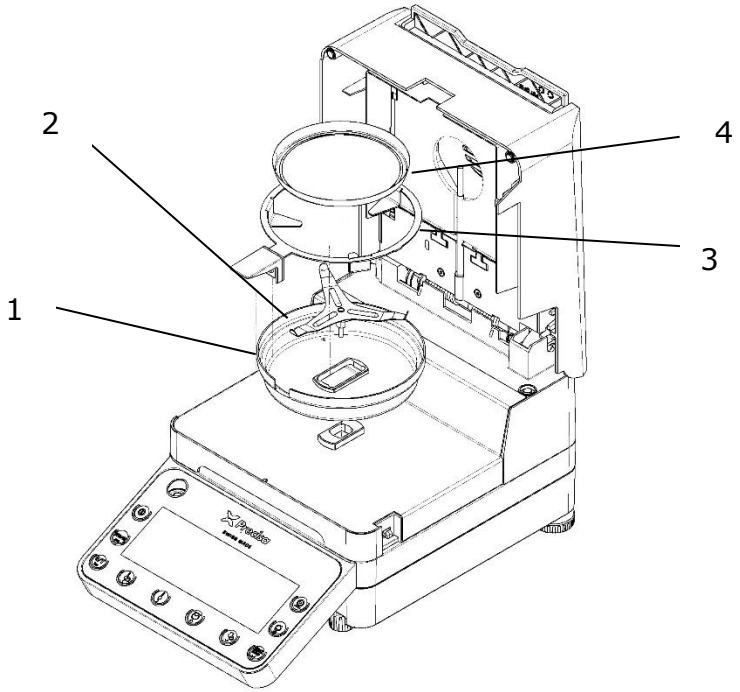
- No strong shocks, no vibrations
- No major temperature fluctuations
- No direct sunlight
- No moisture

NOTE

It is preferable to store the moisture analyzer in its original packaging, as this provides optimal protection for the device.

3.3 Scope of delivery and installation

The moisture analyzer is delivered in a partially disassembled state. Immediately after unpacking all the parts, check whether the delivery is complete and assemble the individual components in the order given below.



Delivery Components	Delivery Components
Moisture analyzer	Sample Holder (3)
Power cord	20 Sample Trays (4)
Draft shield (1)	5 Fiberglass Filters
Weighing pan (2)	Operating instructions

- Open the hood and insert the draft shield (1), making sure that it lies flat
- Insert the weighing pan (2) and rotate it so that the anti-twist device clicks into place
- Insert the sample holder (3) as shown
- Now you can place an aluminium tray (4) on the weighing pan

NOTE
All parts must be able to be put together without effort. Do not use force. If you have any problems, Precisa customer service will be happy to help you.

3.4 Selection of the appropriate location

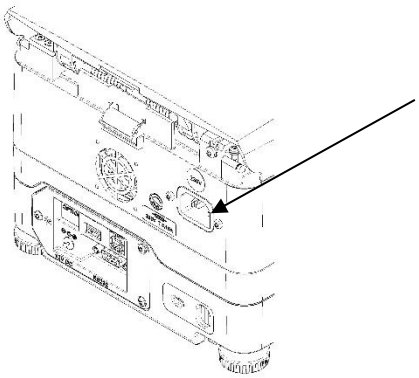
To ensure proper functioning of the moisture analyzer, the location must be chosen in such a way that the following conditions are met:

- Permissible environmental conditions
  - Temperature: 10°C ... 35°C (storage and transport 0 ... 50 °C)
  - Relative humidity: 15% - 85%, (at T to 30 °C) non-condensing, linearly decreasing up to 50% at 50 °C
  - Max. permissible altitude: <= 4000 m
- Place the device on a rigid, firm horizontal surface, exposed to as little vibration as possible.
- Protect the device against shaking and falling
- No direct sunlight and no dusty environment
- No draughts and no excessive temperature fluctuations
- Sufficient free space in the vicinity of the device to prevent heat build-up

Do not expose the device to high humidity for long periods of time. Avoid condensing humidity on the instrument. First, disconnect very cold appliances from the mains at room temperature (approx. 20°C).

When the device is connected to the mains, condensation is practically impossible.

3.5 Creating a power connection



When connecting the device to the mains, the following safety instructions must be observed:

⚠ DANGER

The device may only be operated with the original power cord supplied.

If the length of the supplied power cord is insufficient, only use an extension cable with a protective conductor.

Connect the power cord to a properly installed socket with a protective conductor (PE) connection.

For technical reasons, the heating unit is designed for a voltage value of 230 V or 115 V at the factory and is matched accordingly to your order. Does the setting match the local mains voltage?

3.6 Protective measures

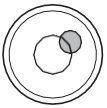
The moisture analyzer of protection class 1 may only be connected to a socket with a protective conductor connection (PE) that has been installed in accordance with the regulations. The protective effect must not be cancelled out by an extension line without a protective conductor. In the case of powersupply from networks without a protective conductor connection, equivalent protection must be provided by a specialist in accordance with the applicable installation regulations.

3.7 Leveling

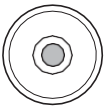
To function properly, the moisture analyzer must be positioned exactly horizontally.

The device is equipped with a "bubble level" for level control and four rotatable feet, which can be used to compensate for minor differences in height or unevenness of the equipment base.

The feet must be adjusted so that the air bubble in the bubble level is exactly in the center of the round glass marking.



False



Correct

NOTE
To obtain accurate readings, the device must be carefully re-leveled after each change of location.

3.8 Weight Calibration

Since the value of the gravitational acceleration is not the same at every place on earth, each device must be adapted to the gravitational acceleration prevailing there at the installation site - in accordance with the underlying physical weighing principle. This adjustment process, called "calibration", must be carried out at the first start-up and after each change of location. In order to obtain accurate readings, it is also advisable to calibrate the moisture analyzer periodically.

NOTE

The moisture analyzer must be calibrated at the first start-up and after each change of location.

If you work according to "Good Laboratory Practice GLP", observe the prescribed intervals for calibration (adjustment).

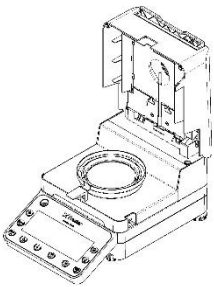
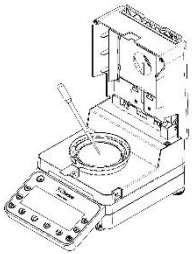
The calibration can be set in the configuration menu (see chapter 5.3.6 "Balance Calibration").

4 First measurement

After the successful commissioning of the moisture analyzer, we carry out an initial measurement to familiarize ourselves with the new device and test it for any malfunctions.

Turn on the device with the "**ON/OFF"** button. The device performs a self-diagnosis to check the most important functions. At the end of the start-up process (which takes about ten seconds), the display will show "zero", i.e. the device is now ready for use.

During the first measurement, the device works with the drying parameters set at the factory.

	Open the hood (press up on the blue handle) Place the sample holder with an empty sample tray on the sample tray holder. Note that the sample tray lies flat on the sample tray holder. Always work with the sample holder, it allows safe working and prevents burns.
	Press the "T" button
	The device is ready for weighing the sample. Add approx. 1.0 g of water to the sample tray.

	Close the hood. The device is prepared for the first measurement.
	Start the measurement with the «START/STOP» button.

The heating element heats up to 105 °C and the fan begins to cool.

The display of the moisture analyzer is divided into:

+	100.00 %	
STD	19 °C	0.1MIN

the display of measured values and

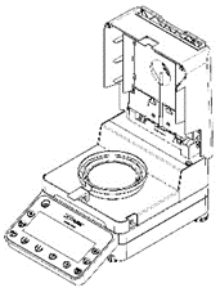
the info line

+	93.27 %	
STD	105°C	2.3MIN

- In the measured value display, the result appears in the set unit.
- The info line shows the heating mode used (standard), the current temperature (105°C) and the current duration of the measurement (2.3 minutes).
- When drying is finished, an acoustic signal sounds and the heating is switched off.

+	XX.xx %

- The measured value display shows the result in the set unit.
  By pressing the «↻» button, the measurement result is displayed in the other units.
- The info line shows the duration of the measurement.
- Open hood
- Carefully remove the sample tray, grasping the handle of the sample holder only.
- Be careful, all parts of the sample chamber are hot.
- Allow the sample tray and holder to cool down before continuing work.



- Insert a new sample tray into the instrument
- Press the "T" button, the device is prepared for a new measurement.

⚠ WARNING
The sample tray and the sample holder are hot!

5 Service

The moisture analyzer has two main menus: the configuration menu and the application menu.

In the **configuration menu**, device-specific parameters and the design of the drying protocol are defined. You can either work with the basic configuration programmed at the factory or define and save a user configuration adapted to your specific needs.

Dryer-specific parameters can be set in the **application menu**. In addition, the weighing aid is activated and defined in this menu.

5.1 Principle of operation of the menu control

The configuration menu and the application menu each have a main path and up to two secondary paths, in which the parameters for the various functions of the device are defined.

Use the cursor keys « », « », « » and « » to move within the paths.

NOTE
The geometry of the menu tree diagram corresponds to the path assignments of the two main menus.

When navigating the **Menu** (chapter 5.1 "Principle of operation of the menu control") the menu functions apply (bottom button symbols) on the double-occupied control button.

From the measurement mode, the upper application functions (large button symbols) apply.

Button(s)	Designation	Function from measurement mode
	« », «⇨»	• Switch from the main menu path to the side paths and back
	«⇧» «⇩»	• Move up/down within the main or secondary paths. • Changing selected parameters
	«↵»	• Selecting parameters • Saving the modified parameters
	«esc»	• Aborting an input • Leaving the menu
	«ins»	• Set insertion point (for text input)
	«clr»	• Deleting Input (for Text Input)

	«PRINT»	• Entering a decimal point (for text input)

The device can also be operated remotely. Among the relevant For remote control commands, see chapter 8.2 "Remote Control Commands".

5.2 Setting and Saving the Configuration

See chapter 5.3.18 " Set Configuration ".

5.3 Device

This section explains the structure of the configuration menu and its functions.

Main Path	definable functions
SET DATA PRINT	*Print formats; Define the type of values to be printed*
SET APP. MENU	*Define application menu*
SET GLOW.	*Define ignition residue determination (PBM 66 only)*
SET BALNCE CAL.	*Define balance calibration mode*
TEMP. ADJUST-MENT	*Activate temperature adjustment*
STABILITY	*Define the quality of the weighing location*
QUICK-START	*Enable QUICK-START*
REFILL	*Activate solvent addition option*
SET RS 232	*Define baud rate, parity, handshake functions of the peripheral interface*
SET USB DEVICE	*Define the operating mode for the USB device connection*
SET USB HOST	*Define the operating mode for the USB host connection*
SET DATE AND TIME	*Date and time (standard format or American format p.m. and a.m.)*
PASSWORD	*Password protection for the menu definitions*
THEFT CODE	*Activation/deactivation and modification of the anti-theft code*
KEYNOTE	*Enable/set keyboard sound*
ALERT TONE	*Activate/set notification sound*
BACKLIGHTING	*Adjust screen brightness*
LANGUAGE	*Language (E, D, F, T, S)*
SET CONFIGURA-TION	*Load/save configuration*

Display conventions:

- The factory-programmed settings are in **bold**
- For a better overview, only the part of the menu tree that corresponds to this function is displayed for each function description.
- Explanations of the menu functions are printed in *italics*.

5.3.1 Activating the Configuration Menu

- Press "**ON/OFF**" to turn on the device.
- During the start-up process, press and hold the "**MENU**" button until the "SET DATA PRINT" indicator appears.
- Now you can change the settings in the configuration menu.

5.3.2 Language Function

• **LANGUAGE**	
LANGUAGE GERMAN **LANGUAGE ENGLISH** LANGUE FRANCAISE DIL TURKEY IDIOMA ESPANOL	*Select language*

To change the language, follow these steps:

Display	Key	Step
LANGUAGE ENGLISH	«⇩»	*Press repeatedly until the current enabled language is displayed.*
LANGUAGE ENGLISH	« »	*The language flashes and can be changed.*
LANGUAGE GERMAN	« »	*Press repeatedly until the desired language is displayed.*
LANGUAGE GERMAN	«↵»	*Input confirm.*

You can exit the menu by pressing the "**esc**" key.

5.3.3 Configuring Log Expression

In the menu item "SET DATA PRINT" the drying protocol can be configured. The items marked "ON" are included in the protocol and are printed.

With the "MODE PC" function, the measured value printout can be output in a format that is convenient for the PC. This format only has an influence on the print rate printout and is used for the graphical evaluation of the drying process with the help of a PC program (e.g. Excel). The individual measured values are output separately by a tab and can therefore be easily imported into a table.

• SET. DATA PRINT			
	SET PRINT FORMAT	DATE AND TIME BALANCE ID METHOD ID NUMERATOR DRYER SETUP PRINT RATE OPERATOR ID CAL.-INFO	**ON**/OFF **ON**/OFF ON/**OFF** **ON**/OFF **ON**/OFF ON/**OFF** ON/**OFF** **ON**/OFF
		PRINT RATE	**1.0** MIN
		OPERATOR	ttt...
	SET HEADLINES	TITLE 1 TITLE 2	ON/**OFF** ON/**OFF**
		TITLE 1	ttt...
		TITLE 2	ttt...
	MODE **PRINTER** PC	*Printout in text format (40 characters)* *Print rate printout in PC-compatible format. The individual measured values are separated by a tab*	

The elements set to "SET PRINT FORMAT" are printed.

- With "PRINTRATE" the interval in which the intermediate results are printed is set. The print interval is from 0.1 ... 10.0 min adjustable in 0.1 min increments.
- In the case of "OPERATOR ttt..." , the operator can be entered alphanumerically.

When connecting a peripheral device (e.g. a printer), the device interface must be selected in the submenu "SET RS 232" (see chapter 5.3.11 "Interface Functions").

Example of a drying protocol with all selectable options.

Precisa PBM 60 ********** ..... Date: 03/05/2024, Time: 11:06:01 AM Name : PBM 60 Radiator : Halogen / 50Hz Software : H00-0000 P02 Serialist : 9101422 Method : Boost/100C Number : 1 Id : 4006381333672 Heating Mode : Boost / 3.0 Min Temperature : 100 C Stop Time : 10.0 min Auto Stop : 2/20 D/s StandBy Temp. : 40 C Weighing : + 2,186 g Mode Temp Time 100-0% ..... B 105 C 1.0 min + 86.81 % B 140 C 2.0 min + 68.08 % B 140 C 3.0 min + 51.97 % 102 C 4.0 min + 44.05 % 98 C 5.0 min + 37.70 % 100 C 6.0 min + 29.84 % 100 C 7.0 min + 24.38 % 100 C 8.0 min + 22.64 % END 100 C 8.2 min + 22.60 % 100-0% : + 22.60 % Remainder : + 0.494 g Stop : Auto Stop Duration : 8.2 min Last Balance Calibration : 04.03.2024 Last Temp. Calibration : 15.01.2024 Operator : PATTERN	*Protocol title, will only be output in the mode printer.* *Date and time if turned on* *Balance ID if turned on* *Method ID if enabled* *Measuring series counter if switched on* *Identification if entered using a USB keyboard or scanner* *Dryer setup if switched on* *Starting weight is always output* *Measured value printout in the unit set for drying, only when print rate is turned on.* *In the "MODE PC" the individual values are displayed separately by tabs.* *Drying results are always output* *Date of last calibration if enabled* *Operator ID if enabled*

5.3.4 Configuring the Application Menu

• SET APP. MENU		
	EDIT METHOD	**ON**/OFF
	METHOD ID	**ON**/OFF
	WEIGHING	**ON**/OFF
	UNIT	**ON**/OFF
	PRINT RATE	**ON**/OFF
	STANDBY TEMP.	**ON**/OFF
	STARTUP	**ON**/OFF
	OPEN AUTO	ON/**OFF**

The items activated under "SET APP. MENU" are displayed in the application menu and can be changed and set there (See chapter 5.3.19 "Application Menu Operation").

5.3.5 Configuring Ash Residue Program

This menu item is only available on PBM 66 devices. This moisture analyzer model includes a special ignition residue determination program.

• SET ASH RESIDUE		
	MODE	MANUAL/**AUTO**
	MEMORY CHOICE	ON/**OFF**

Under "SET GLOW LEVEL" you can define the recording of the weight and the calculation method. (See chapter 7 "Ash residue")

- With the memory choice "ON", four weights can be saved. With "OFF" only one weight can be stored.
- If "AUTO" is activated in mode, the dry weight is stored after each drying as a weight for determining the ash residue.

5.3.6 Balance Calibration

• SET BALANCE CAL.		
	MODE OFF	*Disabled*
	EXTERNAL	*External*
	EXT.-DEF.	*External with freely defined weight (DEF. n.nnn g)*
	INTERNAL	*If int. weight prev.*
	AUTO	*If int. weight prev.*
	DEF. **0.0000 g**	*Calibration Weight for EXT. DEF. Mode*

For the calibration of the balance, see chapter 3.8 "Weight Calibration" and see chapter 9.3.1 "Calibrate the balance".

5.3.7 Temperature Adjustment

• TEMP. ADJUSTMENT	
TEMP. ADJUSTMENT **ON** OFF	*Activate Temperature Adjustment*

5.3.8 Stability

• SET STABILITY	
STABILITY **HIGH** MEDIUM	*Adjustment of the stability of the balance (e.g. "High" provides more stable values)*

5.3.9 Quick-Start

• SET QUICKSTART		
QUICK-START	ON **OFF**	*Setting the starting conditions*

QUICK-START OFF:
Drying starts when the "**START**" button is pressed as soon as a stable weighing value is reached.
QUICK-START ON:
Drying starts immediately when the "**START**" button is pressed or when the lid is closed. This makes it easier to dry highly volatile samples.

5.3.10 Refill

Refill ON:
Within 5 seconds of starting, the moisture analyzer hood can be opened again to add a solvent.

5.3.11 Interface Functions

• SET RS 232			
	BAUD RATE	300 600 1200 2400 4800 **9600** 19200 38400 57600	*Select baud rate*
	PARITY	7-EVEN-1STOP 7-ODD-1STOP 7-NO-2STOP **8-NO-1STOP**	*Select Parity*

	8-EVEN-1STOP 8-ODD-1STOP	
	HANDSHAKE **NO** XON-XOFF HARDWARE	*Select hand-shake function*

With the help of the interface functions, the RS232/V24 interface of the device is matched to the interface of a peripheral device (See chapter 8 "Data Transfer").

• SET USB DEVICE		
	MODE **COM PORT** HID PORT	
	BAUD RATE 300 600 1200 2400 4800 **9600** 19200 38400 57600	*Mode COM*
	PARITY 7-EVEN-1STOP 7-ODD-1STOP 7-NO-2STOP **8-NO-1STOP** 8-EVEN-1STOP 8-ODD-1STOP	*Mode COM*
	HANDSHAKE **NO** XON-XOFF	*Mode COM*
	KEYBOARD **NARROW** SPEAR FRA TUR SPA	*Mode HID*
	FORMAT **LINES** TABLE	*In HID mode, select the output format as a row or table mode with a tab stop for each row*
	COLUMN FOR o OFF ON/**OFF** COLUMN FOR o OFF **ON/OFF**	*In HID mode, select output of a separate column for identification.* *In HID mode, select the output of a separate Column for the "<" and ">" display of the Checkweighers*

MODE:
- "COM port": The USB connection behaves like a standard RS232 interface and appears on the PC in the COM interfaces.
Make sure that the baud rate, parity, and handshake settings match the settings in your PC.

- "HID port": Direct connection to a PC. The values transmitted by the balance are being handled by the PC as they were entered via a computer keyboard.

• **SET USB HOST**			
	Mode	**KEYBOARD**	*Keyboard*
		SCANNER	*Scanner Language*
		FOOT SWITCH	*Type*
			Single
			Double
			Function
			Print
			Tare
			OFF
		USB STICK	*Protection*
			ON/OFF

– "KEYBOARD": If a USB keyboard is connected.
– "SCANNER": If a USB scanner is connected.
Inputs via keyboard and scanner are assigned to the identifier "Id". "Id" is displayed in the info line of the balance display and inserted in the report output (see chapter 5.3.3.)

– "FOOT SWITCH": If a single or double USB foot button is required, is connected.

– "USB STICK": If a USB flash drive is connected.
Logs are saved as a text file "sssssss.TXT", where "sssssss" is the serial number of the balance, e.g. "9101422.TXT".

5.3.12 Date and Time

• **SET DATE AND TIME**		
	DATE [DD.MM.YY] TIME [HH.MM.SS] FORMAT **STANDARD**/US	*Setting the date and time*

NOTE
In the event of a power outage, the clock continues to run. If this is not the case, the device's backup battery is exhausted and must be replaced by Precisa customer service.

5.3.13 Password

The two main menus and the drying parameters of the device can be protected against unwanted changes by means of a freely selectable, four-digit password.

- If password protection is deactivated, any operator can change the device at will.
- When password protection "Medium" is activated, the configuration menu is protected against unwanted changes.
- When password protection "High" is activated, the configuration, application menu, and drying parameters are protected.
- Only by deactivating password protection, by entering the correct password, can the locked menu items and parameters be changed again.

NOTE
Password protection is disabled by default.
The **pre-programmed password** is: **7 9 1 4**
This password is the same for all Precisa devices and is always valid, in parallel with a password of your choice.
Write down your **personal password**.

• **PASS-WORD**		
PASS-WORD	DATA PROTECTION **OFF** MEDIUM HIGH	*No protection* *The configuration menu is protected* *The configuration, application menu and drying parameters are protected*
	NEW PASSWORD_ _ _ _	*Enter a new password*

To enable password protection, follow these steps:

Display	Key	Step
PASSWORD----	« »	*Press repeatedly until "PASSWORD" is displayed.*
PASSWORD 0000	«⏎»	*The first digit of the password flashes and can be changed.*
PASSWORD 8000	« »	*Press until the first digit of the password is set.*
PASSWORD 80 00	«⇨»	*The second digit flashes. Now the password can be completely entered.*
PASSWORD 8000	«⏎»	*Confirm password.*
PRIVACY OFF	« »	*Data protection can be activated*
PRIVACY OFF	«⏎»	*The indicator flashes and the data protection can be activated*
DATA PROTECTION HIGH	«⇩»	*Enable data protection.*
DATA PROTECTION HIGH	«⏎»	*Confirm data protection.*

To change the password, follow these steps:

Display	Key	Step
PASSWORD NEW 7914	«⇩»	*Press until "PASSWORD is displayed. Set new password as described above.*

5.3.14 Anti-Theft Code

The device can be protected against theft by a freely selectable, four-digit numerical code:

- If the anti-theft coding is deactivated, the device can be switched on and operated again after a power interruption without entering a code.
- When anti-theft coding is enabled, the device will prompt you to enter the code after each voltage interruption.
- If the code is entered incorrectly, the device will be blocked.
- If the device is blocked, it must first be disconnected from the mains, then reconnected to the mains and unlocked by entering the correct code.
- After seven consecutive incorrect entries, the display "BLOCKED, CALL SERVICE" appears. In this case, only a Precisa service technician can unlock the device.

NOTE

Anti-theft coding is disabled as factory standard.

The **pre-programmed code** from the factory is: **8 9 3 7**
This code is the same for all Precisa devices. Therefore, for security reasons, always enter a code of your choice. Keep your **personal code** in a safe place.

• **THEFTCODE**		
THEFTCODE ----	THEFT PROTECTION ON/**OFF**	*Switch encoding on/ off*
	CODE NEW ----	*enter new code*

To enable anti-theft encoding, follow the same procedure as described for password protection.

5.3.15 Key tone

• **KEYNOTE**		
KEYNOTE	OFF/**1-9**	*Key tone off and on (volume)*

If the key tone is switched on, a short beep sounds every time a key is pressed.

5.3.16 Alert Tone

• **ALERT TONE**		
ALERT TONE	OFF**/1-9**	*Alert sound off and on (volume)*

If the alert tone is switched on, a short beep will sound at each alert .

5.3.17 Backlight

• **BACKLIGHT**		
BACKLIGHT	**/1-9**	*Brightness of the screen back-light)*

5.3.18 Set Configuration

• **SET CONFIGURATION**		
	LOAD FACTORY CONFIG.	*Loading the factory configuration*
	LOAD APPLICATION CONFIG.	*Loading the user configuration*
	SAVE APPLICATION CONFIG.	*Saving the user configuration*

NOTE

Loading the factory configuration overwrites the current settings, but does not delete any saved user configurations.

5.3.19 Application Menu Operation

This section explains the structure of the application menu and its functions.

The structure of the application menu is dynamic and can be adjusted in the Configuration Menu (See chapter 5.3.4 "Application Menu Configuration").
If a menu item in the configuration menu is deactivated, it is not included in the current application menu.

– The menu item "**LOAD METHOD"** cannot be switched on/off, it is always included in the application menu.

Main Path	Definable functions
LOAD METHOD	*Setting a Stored Methods*
SAVE METHOD	*Save Method*
DELETE METHOD	*Deleting a Saved Method*
METHOD	*Entering the Method Label*
SETTING WEIGHT	*Definition of the weighing aid*
UNIT	*Choice of drying unit*
PRINT RATE	*Entering the interval time for the print rate* *Present when "*PRINTRATE"* is enabled in print format*
STANDBY TEMP.	*Definition of the Stand-By Temperature Function*
STARTUP	*Automatic start when the lid is closed*
AUTO OPENING.	*Setting the Automatic Hood Opening*

Display conventions:

- The factory-programmed settings are in **bold**.
- For a better overview, only the part of the menu tree that corresponds to this application is displayed for each function description.
- Explanations of the menu functions are printed in *italics*.

5.4.1 Activation of the application menu

- Press «**MENU**» after the startup process has been completed to access the application menu.

5.4.2 Methods

The PBM 60 and PBM 60-HR moisture analyzers offer the ability to store 30 different methods. One method includes the settings for the drying program and the weighing aid.

The PBM 66 moisture analyzer contains two freely definable methods such as the PBM 60 or PBM 60-HR and three fixed, non-changeable methods, which are specially designed for drying sewage sludge:

Method	105	150/105	220/150/ 105
Interval 1			
• Temperature	105°C	150°C	220°C
• Stop Mode	10d/60s	20%	30%
Interval 2			
• Temperature		105°C	150°C
• Stop Mode		10d/60s	10%
Interval 3			
• Temperature			105°C
• Stop Mode			10d/60s

For each definable method, the following data is stored:

- Method name
- Weighing with:
  – Nominal Weight, Lower, Upper Weight Limit, Display Mode
- Drying program with:
  – Autostart setting (PBM60 only);
  – Drying Method
  – Drying Temperature
  – Stop Time
  – Auto Stop
  – Unit of the result

– Standby Temperature
– Auto hood opening

If the moisture analyzer is in weighing mode and the current weight is less than the minimum sample weight (< 0.2 g), the name of the currently loaded method (if available, alternating with the entered identifier "Id") is displayed in the info line.

In the configuration menu, under Set Application, the option "EDIT METHOD" is turned off (see chapter 5.3.4 "Configure Application Menu"), the menu items "SAVE METHOD" and "DELETE METHOD" are no longer active. This means that the stored methods are protected from modification. can only be worked with the methods that have already been saved.

All current methods and their settings can be accessed by pressing and holding the «PRINT» button until "PRINT APPLICATIONS" is displayed (see chapter 5.5.2 "The Print Button").

5.3.20 Save Method

• STORE METHOD	
STORE METHOD	*Saving a Method*

To save a method, do the following:

Set the drying parameters and weight for the desired method and give the method a name.

Activate the application menu by briefly pressing the "**MENU**" button.

Display	Key	Step
SAVE METHOD	« »	*Press repeatedly until "SAVE METHOD" appears.*
SAVE METHOD	« »	*If the method can be saved, the menu will automatically exit and the dryer will switch back to weighing mode.*

The method cannot be saved if the method label is the same as a method that has already been saved:

Display	Key	Step
	«⇧» «⇩»	*"YES" override existing method or "NO" save method under a new name.*
		

« » *The method is saved and the dryer switches to weighing mode.*

or

REPLACE METHOD NO « » *The method name needs to be changed.*

METHOD TEST *Enter a new method name.*

METHOD TEST « » *The method is saved and the dryer switches to weighing mode.*

If all memory spaces are occupied, no new method can be saved. You need to delete an old method first.

NOTE
A memory sequence can be cancelled at any time by pressing the "esc" key .

5.3.21 Load Method

The arrow to the right takes you to the list of methods.

The up/down arrow displays the existing methods.

• LOAD METHOD		
LOAD METHOD	ttt... ttt... ttt... ttt... ttt...	*Choosing a Method* *Only the actual methods are shown!*

Only the currently saved methods are displayed in the menu. If no methods are saved, it is not possible to jump to the "LOAD METHOD" menu.

By pressing the " " button, the selected method is loaded and the dryer switches back to weighing mode.

5.3.22 Delete Method

The arrow to the right takes you to the list of methods.

The up/down arrow displays the existing methods.

• CLEAR METHOD		
CLEAR METHOD	ttt... ttt... ttt... ttt... ttt...	*Choosing a Method* *Only the existing methods are displayed!*

Only the currently saved methods are displayed in the menu. If no methods are saved, it is not possible to jump to the "DELETE METHOD" menu.
By pressing the " " button, the selected method is deleted and the dryer switches back to weighing mode.

5.3.23 Method Name

• METHOD		
METHOD	ttt...	*Entering the Method Name*

5.3.24 Weighing-In

• SET TARGET WEIGHT		
	WEIGHT CHECK ON/**OFF**	*Switch check on/off*
	NOM. **5,000 g** TOLERANCE g/% TO MAXIMUM 6,000 g TU MINIMUM 4,000 g TOLERANCE+ 10 % TOLERANCE- 10 % SET AD RANGE- SYMBOLS TONE STABLE OK	*Nominal weight* *Tolerance abs./rel.* *Upper Limit abs.* *Lower Limit abs.* *Upper Limit rel.* *Lower Limit rel.* *0..TU / 50%.. TU* *Permanent/stable* *div. possibilities*

With the help of the "TARGET WEIGHT", you can weigh the sample weight exactly to its conformity with a defined reference value plus/minus permissible deviation.

With "Set Display" you can specify when (% of the lower limit) the display of the weighing aid is displayed and whether it is always visible or only when the weight is constant.

"**+**", "**–**" and "**II**" are active in the display.

If "**II**" lights up, the measured value is within the defined tolerances and the drying process can be started. If the sample weight is outside the weight tolerance, drying cannot be triggered. In this case, the weight tolerances are displayed as an error message.

5.3.25 Units

• UNIT	
UNIT	**100-0%**
	0-100%
	ATRO 100-999%
	ATRO 0-999%
	G/KG
	REMAINDER
	LOSS

In the menu item "UNIT" you can select the unit of the measurement results printed out in the protocol. The defined unit is also used for the expression of intermediate values. The unit for the printout can only be changed before a measurement and not during the measurement.

The selected unit is also used as a display unit but can be adjusted during and after the measurement (see chapter 5.5.3 "The Change Button").

The PBM 60-HR high-resolution moisture analyzer has 10 times higher readability for weight and 10 times higher readability for some moisture calculations.

Description / Calculation of Units

Character explanation of the variables used
- FG: Wet weight (weight value at the beginning of the measurement)
- TG: Dry weight (weight value at the end of the measurement)

Unit	Calculation
Dry matter in percentage:	$100 - 0\% = \frac{DW}{MW} * 100\%$
Humidity in percent:	$0 - 100\% = \frac{MW - DW}{MW} * 100\%$
ATRO Dry Matter:	$ATRO\ 100 - 999\% = \frac{MW}{DW} * 100\%$

Unit	Calculation
ATRO Humidity:	$\text{ATRO 0 - 999\%} = \frac{MW - DW}{DW} * 100\%$
Residual weight in g/kg [‰]:	$g / kg = \frac{DW}{MW} * 1000$
Residual weight in g:	RESIDUAL WEIGHT = DW
Humidity in g:	WEIGHT LOSS = MW - DW

Explanations of the ATRO units

The ATRO unit is used exclusively in the timber industry.

In practice, wood always has a different water content, which can change continuously. The water content has an influence on the combustion behaviour of the wood and the calorific value. During drying, the water evaporates. In open-air storage, the wood reaches the so-called air-dry state (lutro) of 15% to 20% water content. By heating it to temperatures above 100 °C, the moisture from the wood can be completely removed. This condition is called absolutely dry (ATRO).

The wood moisture content (ATRO) is the proportion of water contained in the wood, expressed as a percentage of the mass of the anhydrous wood and is calculated from the difference between fresh weight (FG) and dry weight (TG).

5.3.26 Print Rate

• PRINT RATE		
PRINT RATE	**1.0** MIN	*Print rate interval*

With "PRINTRATE" the interval in which the intermediate results are printed is set. The print interval is from 0.1 ...
10.0 min adjustable in 0.1 min increments.

5.3.27 Stand-By Temperature

• STANDBY TEMP.	
STANDBY TEMP. ON/**OFF**	*Switch stand-by temperature on/off*
TEMPERATURE **50°C**	*Temperature value, only when stand-by temperature is turned on*

Regulates the temperature in the sample chamber to the set temperature value if the sample chamber is closed. The available temperature range ranges from 40°C ... 100°C. The circle in the display flashes as long as the stand-by temperature has not yet been reached. The indicator light turns red when the standby temperature is maintained.

5.3.28 Autostart

• AUTOSTART
AUTOSTART ON/**OFF**

If autostart is enabled, the measurement will start as soon as the sample chamber is closed. The prerequisite is that the moisture analyzer is prepared for a new measurement.

5.3.29 Auto Opening

• AUTO OPENING	
AUTO OPENING ON/**OFF**	*Opening temperature*
OPENING TEMP. **80**°C 120°C 160°C DEF.	*Temperature*
DEF. TEMP. --- °C	*Temperature freely definable (50-230°C)*

Choose whether you want the hood to open automatically after the measurement. If so, enter the opening temperature.

5.5 Specially operated buttons

5.5.1 The Tare Button

- Make sure that no drying is running, i.e. the device is in weighing mode.

- **Triggering a buoyancy**
  - Short press «**T**»
  - A taring procedure is performed.
- **Select High Resolution Mode (HR)**
  (This option is only available in HR models.)
  - Press and hold "**T**" until "HR MODE ON" or "HR MODE OFF" appears.
  - Release «**T**»
  - If "HR MODE OFF" is selected, the dryer works in low-resolution mode, which is 10 times less accurate than high-resolution mode.
- **Activating Calibration**
  - Press and hold «**T**» until "BALANCE CALIBRATION" is displayed.
  - Release «**T**»
  - The device performs a calibration according to the settings in the configuration menu and logs it by printout (See chapter 5.3.6 "Balance Calibration" and chapter 9.3.1 "Calibrate the Balance").
- **Activating a Temperature Calibration**
  - Press and hold «**T**» until "TEMP. CALIBRATION" is displayed.
  - Release «**T**».
  - The device performs a calibration according to the settings in the configuration menu and logs it by printout (See chapter 5.3.7 "Temperature Adjustment"

NOTE
Balance calibration is only active if it is enabled in the configuration menu. A calibration or adjustment can be cancelled with "**ON/OFF**". This applies to the balance calibration as well as to the temperature calibration.

5.5.2 The Print button

– Make sure that no analysis is running, i.e. the device is in weighing mode.

- **Printing a single value or a protocol**
  – Press "**PRINT"** briefly
  – The drying protocol is printed. The protocol of the last measurement can be printed out until the start of a new drying process. The subsequently printed protocol does not contain any intermediate results. Otherwise, it is identical to the drying protocol that is printed out during the measurement. If no drying has been carried out since the device was started, the weight value is printed.
- **Printing statistics (PBM 60, PBM 60-HR only)**
  – Press «**PRINT**» until "PRINT STATISTICS" is displayed
  – Release «**PRINT**».
  – The statistics are printed out (see chapter 6.4 "Statistics (PBM 60, PBM 60-HR)")
- **Reset the counter to 1 (PBM 66 only)**
  – Press «**PRINT**» until "PRINT COUNTER" is displayed
  – Release «**PRINT**».
  – The counter resets to 1
- **Printing Device Settings**
  – Press and hold «**PRINT**» until «PRINT STATUS» is displayed
  – Release «**PRINT**». The device settings will be printed.

Status: ----------	*Status Print of Settings.*
Date: 04/03/2024, Time: 16:12:39 Name : PBM 60 Radiator : Halogen / 50Hz Software : H00-0000 P02 Serialist : 9101422	*Device Identification*
Expression: Print format: Date and time : on Balance ID : on Method ID : off Numerator : on Dryer Setup : on Printrate : off Operator ID : off Kal.Info : on Print Rate : 1.0 min Operator : Mode :Printer	*Drying Protocol Settings*

Glow level: Mode : manual Memory Choice : on	*Ignition Residue Determination Settings (PBM 66 only)*
Calibration: Mode : external Defined weight : 0.0000 g	*Balance Calibration Settings*
Temp. Just. : off	*Temperature Calibration Settings*
Stability : high	*Stability Control*
RS 232: Baud rate : 9 6 0 0 Parity: : 8-no-1stop Handshake : no	*Interface settings RS 232*
USB Device: Mode : COM port Baud rate : 9600 Parity : 8-no-1stop Handshake : no	*Interface Settings USB Device*
USB Host: Mode : Keyboard Keyboard language : English	*Interface Settings USB Host*
Privacy : off Anti-theft : off	*Security*
Key tone : 6	*Key Tone Volume*
NOTE tone : 6	*Alert Sound Volume*

- **Printing the application settings**
  - Press and hold «**PRINT**» until "PRINT APPLICATIONS" is displayed
  - Release «**PRINT**»
  - The application settings and all settings of the currently saved methods are printed.

Applications :	*Application printout of settings and saved methods.*
Dryer Setup : Heating Mode : Standard Time Boost : 3.0 min Time Ramp : 4.0 min Temperature : 105 C Time Stop : Off Time : 10.0 min Auto Stop : Digit/Time Digit/Time : 2/20 D/s Startup : off Standby Temp : off Temperature : 40 C Unit : 100-0% Auto. Opening. : on Opening Temperature : 160 C	*Current Drying Parameter Settings*
Weighing: Test Weight : off Nominal : 5.000 g Tol. : g TO : 6.000 g TU : 4.000 g Display:...	*Current Weight Settings*

```
Method : TEST Smooth Dryer Setup :
      Heating Mode          : Smooth
        Time Boost          : 3.0 min
        Time Ramp           : 4.0 min
      Temperature           : 100 C
      Time Stop             : on
        Time                : 25.0 min
      Auto Stop             : off
     Startup                : off
      Standby Temp          : on
        Temperature         : 40 C
      Unit                  : 100-0%

    Weighing:
      Test Weight           : on
      Nominal               : 6.000 g
      Tol.                  : g
      TO                    : 6.000 g
      TU                    : 4.000 g
      Display:...
```

Settings of the first method. With the PBM 66 moisture analyzer, only the definable methods are printed.

```
Method : TEST Boost  Dryer Setup :

        Heating Mode          : Boost
        Temperature           : 140 C
        Boost Time            :0 min:
        Time Ramp              4.0 min


      Temperature
      Time Stop               : off
      Time                    : 10.0 min
      Auto Stop               : AdaptStop

      Startup                 : off
      Standby Temp            : off
      Temperature             : 40 C
      Unit                    : 100-0%
      Weighing:
      Test Weight             : on
      Nominal                 : 3,500 g

      Tol.                          g
                                    6,000 g
        TO                          4,000 g

        TU

        Display:...

etc....
```

Second Method Settings (all saved methods will be printed)

5.5.3 The Change button

- **Unit Switching**
  - If drying is in progress, the displayed unit can be switched by pressing " ". Once a drying process has been completed, the drying result can be displayed in all existing units by pressing " " until a new drying process is started.
  - Release « » when the unit you want to switch to is displayed.

5.5.4 The Start/Stop button

- **Manual start of a drying process**
  - Make sure that there is no drying running, i.e. the device is in weighing mode.
  - Short press «**START/STOP»**
  - The measurement starts.
- **Manual stop of a drying process**
  - Drying is in progress.
  - Short press «**START/STOP»**
  - The measurement is stopped.
- **Statistics Info (PBM 60, PBM 60-HR only)**
  - Press «**START/STOP**» until "STATISTICS INFO" is displayed
  - Release «**START/STOP»**
- **Reset statistics (PBM 60, PBM 60-HR only)**
  - Press «**START/STOP**» until "RESET STATISTICS" is displayed.

– Let go of «**START/STOP».**

- **Ash residue determination**
  - Make sure that there is no drying running, i.e. the device is in weighing mode**.**
  - Press «**START/STOP**» until "GLOW LEVEL" is displayed.
  - Let go of «**START/STOP».**
  - The glow residue determination program is started. (See chapter. 7 "Ash residue")

6 Moisture determination

The moisture analyzer is used to quickly and reliably determine the moisture content of liquid, porous and solid materials using the thermogravimetry method.

6.1 Basics

Moisture is understood not only to mean water, but also to all substances that evaporate when heated. In addition to water, this also includes ,

- Fats
- Oils
- Alcohol
- Solvent
- etc...

There are various methods to determine the moisture content of a material.
The one used in the moisture analyzer is thermogravimetry. In this method, the sample is weighed before and after heating in order to determine the moisture content from the difference.

The conventional drying oven method works on the same principle, except that with this method the measuring time takes much longer. In the drying oven method, the sample is heated by a hot stream of air from its outside to the inside to remove the moisture.

In the case of the halogen radiation used in the moisture analyzer, the radiation mainly penetrates the sample where it is converted into heat energy, heating the sample from the inside out. A small portion of the halogen radiation is reflected by the sample; this reflection is lower in dark samples than in light samples. The penetration depth of the halogen radiation depends on the permeability of the sample. In the case of low-permeability samples, the halogen radiation only penetrates the upper layers of the sample, which may lead to incomplete drying, charring or combustion. Consequently, the sample preparation is extremely important.

6.1.1 Adjustment to the existing measurement methods

Often, the moisture analyzer replaces another drying method (e.g. the drying oven), as the device achieves shorter measuring times with simpler operation. For this reason, the conventional measurement method must be matched to the moisture analyzer in order to achieve comparable results.

- Performing Parallel Measurement
  Lower temperature setting for the moisture analyzer than for the drying oven method
- The result of the moisture analyzer does not match the reference
  – Repeat Measurement with changed temperature setting
  – Vary the switch-off criterion
- Adjustment with calibration curve or factor

6.2 Sample

Prepare only one sample at a time for measurement. This prevents the sample from exchanging moisture with the environment. If several samples need to be taken at the same time, they should be packed in airtight containers so that they do not change during storage.

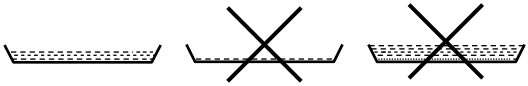
Spread the sample **evenly** and **thinly** over the sample tray to achieve reproducible results.

Uneven application leads to an inhomogeneous heat distribution in the sample to be dried, which results in incomplete drying or the extension of the measurement time. As a result of an accumulation of the sample, there is greater heating at the upper layers, which results in burns or incrustations. The high layer thickness or possible encrustation makes it impossible for moisture to escape from the sample. This residual moisture means that measurement results achieved this way are not verifiable and reproducible.

Solids:

- Distribute powdery and granular samples evenly on sample pan
- Crush coarse-grained samples with a mortar or grinder. When crushing the sample, avoid any use of heat, as this will result in moisture loss.

Liquids:



- For liquids, pastes or melting samples, it is recommended to use the fiberglass filter. The fiberglass filter has the following advantages:
  – Uniform distribution due to capillary effect
  – No formation of drops
  – Fast evaporation due to larger surface area

6.2.1 Preventing sample encrustation

To prevent the sample from crusting, additional solvent can be added to the sample after the measurement has started. The solvent added has no impact on the final result of the measurement. To allow filling immediately after the start, the option "REFILL" must be activated in the configuration menu.

- Start the measurement, automatically or by pressing the «**START/STOP**» button.
- Within 5 seconds after starting, the dryer hood can be opened again. During this time, the text "ADD SOLVENT" will be displayed in the info line of the display.
- After opening the sample chamber, you can add additional solvent at any time until the hood is closed.

Once the dryer hood is closed, the measurement is continued. In the info line of the display, "START HOOD CLOSED" is displayed.

If the "**START/STOP**" button is pressed, the measurement is aborted.

NOTE
The additional solvent is taken into account in the measured value printout, as intermediate values are calculated from the current weight value. However, this has no influence on the drying result, as the solvent is completely dried away.

6.3 Setting Drying Parameters

The drying parameter setting is started with the four function keys below the display.

Each of the four function keys starts the input of the respective drying parameter. The input or modification of the respective parameter is designed in the same way as the operation of the menus. (See chapter 5.1 "Operating Principle of Menu Control"), except that in each case only the current parameter can be changed.

6.3.1 Heating program

This function key starts the selection of the heating program.

Three heating programs are available to determine the moisture content of the material:

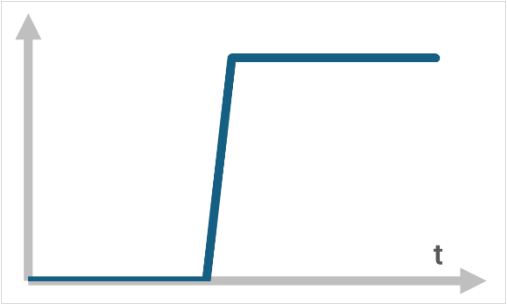
- Standard Drying
- Boost Drying
- Smooth drying

• HEATING PROGRAM		
BOOST TIME RAMP TIME	3.00 MIN 4.00 MIN	*Only adjustable on PBM 60 / PBM 60 HR (not on PBM66)*
HEATING MODE **STANDARD** BOOST SMOOTH		*Select heating program* BOOST TIME RAMP TIME	 **3.00 min** **4.00 min**

Standard Drying

The drying temperature is set by the user. The final temperature is approached with high heating power and kept constant with slight overshoot.

This program is used for most samples.

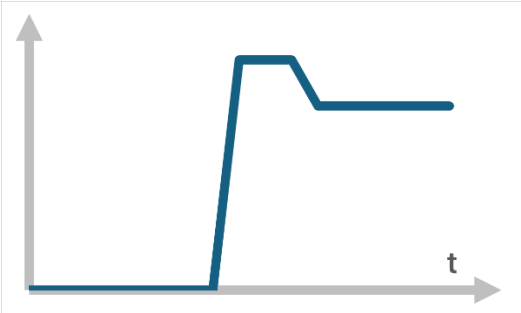


Boost Drying

The drying temperature is set by the user. During the first 3 minutes of drying, the target temperature is exceeded by 40% (for the PBM 60 and PBM 60-HR the duration is selectable from 0.1-99.9 min). At the end of this time, the temperature is reduced to the target temperature. The temperature is approached with a high heating capacity.

The maximum temperature reached during the boost is 230°C.

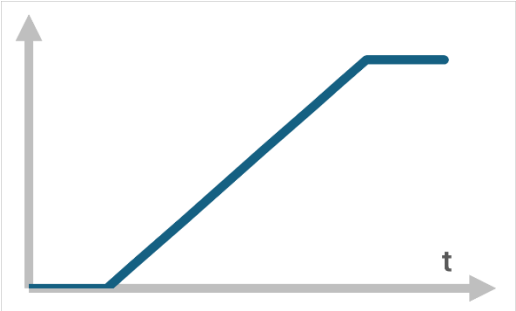
This program is used for samples with very high moisture content.



Smooth Drying

The drying temperature and ramp time are specified by the user. The final temperature is gently approached with low heating power.

This program is used for samples with low moisture content where there is a risk of burning.



6.3.2 Temperature

This function key is used to start the drying temperature input.

The drying temperature can range from 50°C … 230°C in 1°C increments.

Temperatures above 200°C are automatically reduced to 200°C after 10 minutes.

• **DRYING TEMPERATURE**	
TEMPERATURE **105°C**	*Temperature Input*

The drying temperature for drying with the moisture analyzer can be set lower than for drying with the drying oven method.

6.3.3 Timer Stop

This function key is used to define the drying time.

If Time Stop is enabled, the measurement will end after the set time.

The time can vary from 1.0 min … 240.0 min, in 0.1 min increments.

• **DRYING**	
STOP TIME **10.0** MIN	*Only when time-stop is activated*
TIME STOP ON/**OFF**	

6.3.4 Shutdown Criteria

This function key starts the definition of the shutdown criterion for the measurement.

PBM 60, PBM 60-HR

Two freely definable stop modes are available according to the principle of "digit per time" or "% of weight per time". In addition , there is the automatic stop mode "ADAPTSTOP".

• STOPMODE		
DIGIT/TIME	**2/20**	*If Digit/Time is selected*
%/TIME	**0.2/20**	*If %/Time selected*
AUTO STOP	**DIGIT/TIME**	
	%/TIME	
	ADAPTSTOP	
	OFF	

PBM 66

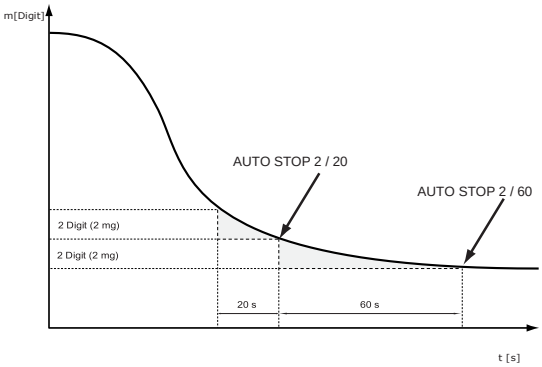
The PBM 66 is available with five fixed and one freely definable stop mode according to the "digit per time" principle. In addition, there is the automatic stop mode "ADAPTSTOP".

• STOPMODE		
AUTO STOP	**01/20** D/S	*Only if DEF. is selected*
AUTO STOP	OFF	
	2/10	
	2/20	
	2/30	
	2/60	
	10/60	
	ADAPTSTOP	
	DEF.	

Switch-off criterion digit per time

Drying is switched off as soon as the weight loss is less than the number of digits set in the set time. The weight loss must have once been greater than the cut-off criterion.

With the freely definable mode, you can choose from 1 ... 99 digits in 1-digit increments and from 10 to 90 seconds in 10 second increments.



A digit is the smallest change in measured value that can be displayed by the moisture analyzer.
PBM 60, PBM 66: 1Digit = 1mg
PBM 60-HR: 1Digit = 0.1 mg

Shutdown criterion % per time

Drying is switched off as soon as the weight loss is less than the selected percentages in relation to the weight in the set time. The weight loss must have once been greater than the cut-off criterion.

The percentages can be set from 0.1% to 99.9% in 0.1% increments and the time from 10 to 90 seconds in 10 second increments.

ADAPTSTOP

Is a fully automatic stop mode that determines the shutdown time based on the drying process.

6.4 Statistics (PBM 60, PBM 60-HR)

The results of a series of measurements are automatically transferred to the statistical evaluation.
To retrieve the information, make sure that there is no drying in progress, i.e. the device is in weighing mode.

- Press «**START/STOP**» until "STATS INFO" is displayed
- Release «**START/STOP»**
- Switch between the statistical values using "⇧" or "⇩"

• **STATISTICS INFO**	
MEDIUM	*Mean Value*
MAX	*Largest Value*
MIN	*Lowest Value*
STDDEV	*Standard deviation*
STDDEV %	*Relative standard deviation*
1 =	*Value 1*
2 =	*Value 2 etc.*

6.4.1 Printing the statistics

Exit the statistics with «**esc**»

- Keep «**PRINT**» pressed until "PRINT STATISTICS" is displayed
- Release «**PRINT**»

The statistics are printed:

Precisa PBM 60 **********	*Protocol title, is only output in the mode printer*
Date: 04.03.2024 Time 11:06:01	*Date and time if turned on*
Name : PBM 60 Spotlight : Halogen / 50Hz Software : H00-0000 P02 Serialist : 9101422	*Balance ID if turned on*
Method : 105 Date : 28.02.2024 Values : 4 Unit : 100-0%	
Mean : 57.36 % Maximum : 57.39 % Minimum : 57.34 % Stddev : 0.02 % Stddev % : 0.042 %	*Statistics*

1	: 57.34 %
2	: 57.38 %
3	: 57.34 %
4	: 57.39 %

Individual values

Last weight calibration: 02.03.2024
Last temperature calibration : 13/01/2024

Calibration Information

6.4.2 Reset the statistics

The statistics start again at:

- Restarting the device
- Changing the Method
- Manual reset:
  Reset statistics (PBM 60, PBM 60 HR only)
  – Press and hold «**START/STOP**» until "RESET STATISTICS" is displayed
  – Release «**START/STOP».**

7 Ash residue program

	• Start/stop button	
 STOP	START/STOP DRYING	*Not displayed*
	STATISTICS INFO	*Only PBM 60, PBM 60-HR*
	RESET STATISTICS	*Only PBM 60, PBM 60-HR*
	ASH RESIDUE	

The determination method of ash residue is different for the PBM 60, PBM 60-HR and PBM 66 models.

When determining the ash residue, the dried sample is used as a weight. This sample is burned in an external furnace and then weighed back in the moisture analyzer.

Calculation of the ash residue:

Unit	Calculation
Ash residue in percentage:	$\text{Glührückstand} = \frac{\text{Rückwaage}}{\text{Einwaage}} * 100\%$

After calculating the ash residue, a report is printed, which is identical for the PBM 60, PBM 60-HR and PBM 66 models.

Ignition residue protocol with all selectable options.

Precisa PBM 60 ********** ..... Date: 03/04/2024, Time: 11:06:01 Name : PBM 60 Radiator : Halogen / 50Hz Software : H00-0000 P02 Series : 9101422 Determination of the glow level: Weighing : 15.000 g Back Balance : 9.500 g incandescent : 63.33 % Operator :PATTERN	*Protocol title, will only be output in the mode printer.* *Date and time if turned on* *Balance ID if turned on* *Ignition residue calculation* *Operator ID if enabled*

7.1 Ignition residue determination for PBM 60 and PBM 60-HR

With the moisture analyzers PBM 60 and PBM 60-HR, only one weight can be stored. It is also not possible to set parameters for the determination of the ignition residue.

Determining Ash residue

Display	Key	Step
	«START»	*Press until "ASH RESIDUE " is displayed. Release the button.*
+ 15.000 g ORIGINAL 0.000 g		*Add the weight to the balance.*
+ 15.000 g ORIGINAL 15,000 g	«⏎»	*The weight is saved*

The weight remains stored in the device until an ignition residue calculation has been carried out
By pressing the "**esc**" key, the ignition residue calculation can be exited.

+ 0.000 g RESIDUAL 0.000 g	« » or «⇧»	*If a weighing is saved, the residual weight is required when the ash residue determination is restarted. (Select original weight or residual weight)*
+ 0.000 g ORIGINAL 0.000 g		*Add the residual sample to the balance.*
+ 9.500 g RESIDUAL 0.000 g		
+ 63.33 % ASH RESIDUE	«⏎»	*Save the residual weight and calculate the ash residue.*

The ash residue is automatically calculated and printed.

NOTE
Tare the instrument with an empty sample pan before starting the ash residue determination.

7.2 Ash residue PBM 66

With the PBM 66 moisture analyzer, up to four weights can be stored (memory selection on), which are not deleted after determination of the ash residue. If the device is switched off, the stored weights will be lost.

If **"MEMORY CHOICE ON"** is selected, up to four tare and initial weights can be stored.

If **"MEMORY CHOICE OFF"** is selected, only one initial sample weight can be stored. This means that the instrument can only be used after the reweighing is completed, as the tare weight has not been stored

NOTE
If "MEMORY CHOICE OFF", the moisture analyzer cannot be re-zeroed between the initial sample weight and the ash determination.

If the mode "MODE AUTO" is activated, the dry weight is automatically saved as the initial sample weight for the ash residue determination. The initial sample weight can also be entered manually.

If the "MODE MANUAL" is activated, the initial sample weight can only be entered by starting the ash residue determination.

If "MEMORY CHOICE ON", together with "MODE MANUAL", the moisture analyzer can be used for other moisture determination routines between the initial sample weight and the corresponding re-weighing value (See chapter 5.3.5 "Ash residue configure")

7.2.1 Ash residue of the dessicated samples

If the dried samples are directly incinerated without transferring them to other crucibles, work in **auto** mode (configuration).

Tare and dry weight (result of drying) are stored and are available for the calculation of the ash residue.

The ash residue is calculated using the dry mass.

Ash residue:

Ensure that no moisture analysis is taking place, i.e. that the instrument is in weighing mode.

Display	Key	Step
	«**START**»	*Weighing Numbers are displayed*
- - - - - - - - -1- -2- -3- -4-	«⇦ ⇨» «⇨»	*Select the weight number 1 (or 2-4)*
+ 0.000 g TARE	«**T**»	*Tare the device without load*
+ 2.535 g PAN TARING	«**T**»	*Place empty pan 1 on top. Measure tare value 1.*
+ 7.147 g PLACE SAMPLE		*Place the sample into the weighing pan*.

Start the drying process by closing the hood.

The result will be printed automatically

+ 726.5 gkg DURATION 3.5 MIN	«**esc**»	*Back to Weighing Mode*

Repeat these steps for all samples (up to 4 samples)

Ash the samples externally

Reweighing the ashed samples

	«**START**»	*Press and hold until "ASH RESIDUE " is displayed. Release the button.*
- - - - - - - - -1- -2- -3- -4-	«⇦ ⇨» «⇨»	*Select the return balance of sample 1 (or 2-4)*
+ 0.000 g ORIGINAL	«⇩»	*Change to residual.*
+ 0.000 g RESIDUAL	«⏎»	*Confirm the choice*

Display	Key	Step
+ 0.000 g TARE	«T»	*Tare the device without load*
+ 0.235 g RESIDUAL 0.000 g		*Place the pan with the ash onto the balance*
+ 4.52 % ASH RESIDUE	« »	*Adopt the weighing value*

The ash residue is automatically calculated and printed.

If "MEMORY CHOICE OFF", the process will run for only one sample. Selection of the initial sample weight number and re-zero are not necessary.

7.2.2 Ash residue with new tare weight

If the dry mass is transferred to a new tare vessel before ashing, or if undried samples are used, "MODE MANUAL" or "MODE AUTO" should be used.

Display	Key	Step
	«START»	*Press and hold until "ASH RESIDUE" is displayed. Release the button.*
- - - - - - - -1- -2- -3- -4-	« » « ⇨ »	*Select the weight number 1 (or 2-4)*
+ 0.000 g ORIGINAL	« ↵ »	*Confirm the choice*
+ 0.000 g TARE	«T»	*Tare the device without load.*
+ 2.535 g TARE PAN	«T»	*Place empty pan 1 on top.* *Measure tare value 1.*

Display	Key	Step
+ 4.809 G ORIGINAL 0,000	«⏎»	*Pour the sample into the pan.Confirm original weight*
+ 4.809 g ORIGINAL 4.609		

Repeat for all samples (back to the weighing mode with «**esc**»).
Ash the samples externally

Reweighing the ashed samples

	«START»	*Press until "ASH RESIDUE" is displayed.* *Release the button.*
- - - - - - - -1- -2- -3- -4-	«| » «⇨»	*Select the return balance of sample 1 (or 2-4)*
+ 0.000 g ORIGINAL	«⤋»	*Change to residual.*
+ 0.000 g RESIDUAL	«⏎»	*Confirm choice*
+ 0.000 g Tare	«**T**»	*Tare the device without load*
+ 0.235 g RESIDUAL 0.000 g		*Place the pan with the ash onto the balance*
+ 5.19 % ASH RESIDUE	«⏎»	*Confirm weighing*

The ash residue is automatically calculated and printed.

If "MEMORY CHOICE OFF", the process will run for only one sample.
Selection of the initial sample weight number and re-zero are not necessary.

8 Data transfer

For data transfers to peripheral devices, the moisture analyzer is equipped with an RS232/V24 interface and an USB interface.

Before data transfer, the RS232 interface or USB interface must be matched with the peripheral device in the configuration menu of the instrument (see chapter 5.3.11).

- **Handshake**

The handshake is factory-set to "NO". It can be set to software handshake "XON/XOFF" or to hardware handshake.

- **Baud rate**

Possible baud rates: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 baud.

- **Parity**

Possible parity: 7-even-1 stop, 7-odd-1 stop, 7-no-2 stop, 8-no-1 stop, 8-even-1 stop, 8-odd-1 stop

Pos.	0	1	2	3	4	5	6	7	8	9	10
7-even-1	SB	1. DA	2.DA	3. DA	4. DA	5. DA	6. DA	7.DA	PB	SP	-
7-odd-1	SB	1. DA	2.DA	3. DA	4. DA	5. DA	6. DA	7.DA	PB	SP	-
7-no-2	SB	1. DA	2.DA	3. DA	4. DA	5. DA	6. DA	7.DA	1.SP	2. SP	-
8-no-1	SB	1. DA	2.DA	3. DA	4. DA	5. DA	6. DA	7.DA	8. DA	SP	-
8-even-1	SB	1. DA	2.DA	3. DA	4. DA	5. DA	6. DA	7.DA	8. DA	PB	SP
8-odd-1	SB	1. DA	2.DA	3. DA	4. DA	5. DA	6. DA	7.DA	8. DA	PB	SP

SB: Start Bit PB: Parity Bit
DA: Data Bit SP: Stop Bit

- **Display**

S D7 D6 D5 D4 D3 D2 D1 D0 U U U

The data is transmitted in ASCII code:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...	...	...
B	**B**	**B**	**S**	**D7**	**D6**	**D5**	**D4**	**D3**	**D2**	**D1**	**DP**	**D0**	**B**	**U**	**...**	**CR**	**LF**

B	Blank (space)
S	Prefix (+, –, space)
DP	Decimal point
D0... D7	Digits
U ...	Unit (only if weight is stable, otherwise no unit is sent)
CR	Carriage return
LF	Line feed

NOTE

Unused positions are filled with spaces.

The decimal point DP can be between D0 and D7.

8.1 Connection Scheme

- **Standard duplex connection**

Moisture analyzer	DB9 DB25 / DB9	Peripheral
RS 232 out	2 ——► 3 / 2	RS 232 in
RS 232 in	3 ◄—— 2 / 3	RS 232 out
GND	5 —— 7 / 5	GND

- **Standard duplex connection with additional hardware handshake in the peripheral instrument**

Moisture analyzer	DB9 DB25 / DB9	Peripheral
RS 232 out	2 ——► 3 / 2	RS 232 in
RS 232 in	3 ◄—— 2 / 3	RS 232 out
GND	5 —— 7 / 5	GND
CTS	4 ◄—— 20 / 4	DTR
DTR	8 ——► 5 / 8	CTS

8.2 Remote Control Commands

Command	Function
ACKn	Acknowledgement n=0 off; n=1 on
CAL	Start Calibration (only if EXT is selected)
DN	Reset Weight Display
D.....	Describe weight display (right-aligned)
@N	Reset info display
@.....	Describe info display
N	Reset instrument
OFF	Turn off the instrument
ON	Turn on the instrument
PCxxxx	Enter anti-theft code
PDT	Print date and time
PRT	Start printing (press «**PRINT**» button)
SHH	Trigger Status Print
Pn (ttt.t)	Setting print mode n=0 Single print each value (unstable) n=1 Single print stable value (stable) n=2 Print after load change n=3 Print after each integration time n=4 Print with time base in s (ttt.t)

Command	Function
SDTttmmjj hhmmss	Set Date and Time (German: (Tag, Monat, Jahr, Stunde, Minute, Sekunde)
SDTmmddyy hhmmss	Set Date and Time (English: Month, Day, Year, Hour, Minutes, Seconds)
T (ttt)	Tare or set taring to a specific value
ZERO	Set the instrument to 0 (if weight is stable and within the zero setting range)
Rttt	Regulates the heating to the desired temperature (50°C … 230°C)
ROFF	Switch off heating
PWT (ttt.t)	Print weight value and temperature value Print with time base in sec. (ttt.t) (switch off by sending PWT)

8.2.1 Examples of remote control of the device

NOTE

Each remote control command must be completed with «CR» «LF».
The commands will be acknowledged on request.

Input	Description of the triggered function
D – – – – –	Five dashes are displayed
DTEST123	Displaying: tESt123
D	The display is dark
T10	-10,000 g (tare set to 10g)
T1	-1,000 g (tare set to 1g)
T	Instrument is being tared
R100	Adjusts the temperature to 100 °C

9 Service

9.1 Maintenance and care

The moisture analyzer must be handled with care and cleaned regularly. It is a precision instrument.

⚠ DANGER

For maintenance work, the device must be disconnected from the power supply. It must also be ensured that the device cannot be reconnected to the mains by third parties during the work.

When cleaning, make sure that no liquid penetrates the device. If liquid is spilled on the device, it must be disconnected from the power supply immediately. The moisture analyzer must not be operated again until it has been checked by a Precisa service technician.

The connections on the back of the device must not come into contact with liquids.

Regularly remove the weighing pan and weighing pan holder and remove any dirt or dust under the weighing pan and on the balance housing with a soft brush or a soft, lint-free cloth moistened with mild soapy water.

The weighing pan and the holder can be cleaned under running water. Make sure that both parts are completely dry before remounting them on the device.

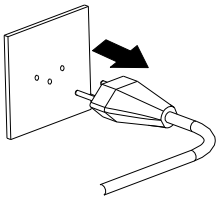
⚠ WARNING

Never use solvents, acids, alkalis, paint thinners, scouring powders or other harsh or corrosive chemicals for cleaning, as these substances can attack and damage the surfaces of the device housing.

Regular maintenance of the moisture analyzer by your Precisa service representative guarantees its unrestricted function and reliability for years and extends the service life of the device.

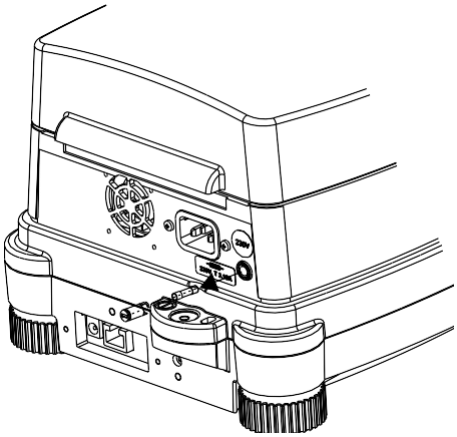
9.2 Replacing the mains fuse

If the display remains dark after switching on the device, in most cases the device fuse is defective and must be replaced.



⚠ DANGER

To replace the fuses, the device must be unplugged.



- Use a screwdriver to unscrew the fuse holder on the back of the device anticlockwise.
- Replace the defective fuse with a new one:
  – 230 Volt variant:
  T 3.15 A, 230 V, 5x20 mm
  – 115 Volt variant:
  T 6.3 A, 115 V, 5x20 mm
- If the device still does not work after changing the fuse, please contact Precisa Service Center

⚠ DANGER

Under no circumstances should you use other fuses or attempt to bridge the fuse.

9.3 Calibration, adjustment

The calibration of the moisture analyzer is done in the configuration menu (See chapter 3.8 "Weight Calibration" and chapter 5.3.6 "Balance Calibration").

NOTE
By pressing «**ON**/**OFF**», the balance calibration and temperature calibration can be cancelled at any time.

9.3.1 Calibrating the balance

Possible types of balance calibration:

- External calibration using ICM (Intelligent Calibration Mode)
- External calibration with freely selectable weight
- Internal Calibration (optional)
- Automatic internal calibration (optional)

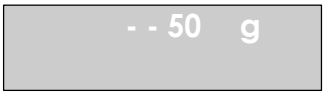
External calibration using ICM

For the moisture analyzer, calibration weights can be used in 10g increments, where the calibration weights must correspond to the precision of the instrument.

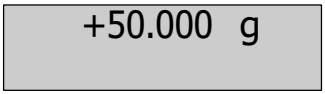
For external calibration using ICM, in the configuration menu (See chapter 5.3.6 "Balance Calibration") must be selected "SET CALIBRATION MODE EXTERNAL".

Display	Key	Step
+0.000 g		*Balance is in weighing mode.*
+0.000 g BALANCE CALIBRATION	«**T**»	*Press and hold the button until "BALANCE CALIBRATION" is displayed.*
- - 0000 g		*A zero point measurement is carried out (0000 g is displayed flashing)*

After the zero point measurement, the display flashes with the recommended calibration weight



Place calibration weight. The display continues to flash



Calibration is complete when the display stops flashing (The exact value is displayed)

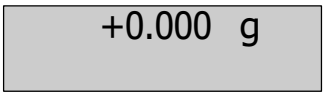
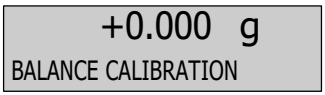
External calibration with freely selectable weight

For an external calibration with freely definable weight, the configuration menu (see Chapter 5.3.6 "Balance Calibration") "SET CALIBRATION MODE EXT.-DEF." can be selected.

After that, the RMS value of the calibration weight (DEF. n.nnnn g) must be entered with up to ten times the accuracy of the instrument.

❗ NOTE
If the calibration is carried out with the free weight, only this weight may be used.

Follow these steps:

Display	Key	Step
		*Dryer is in weighing mode.*
	«T»	*Press the button until "BALANCE CALIBRATION" is displayed.*
		*A zero point measurement is carried out (0000 g is displayed flashing)*

Display	Key	Step
- - 22 g		*After the zero point measurement, the indicator flashes with the calibration weight previously entered.*
- - 22 g		*Apply calibration weight. The indicator continues to flash rapidly.*
+22.125 g		*When the indicator stops flashing, the calibration is complete. (The exact value is displayed)*

Internal Calibration

For an internal calibration with the built-in calibration weight, the configuration menu (see Chapter 5.3.6 "Balance Calibration") "SET CALIBRATION INTERNAL MODE".

Follow these steps:

Display	Key	Step
+0.000 g		*Moisture Analyzer is in weighing mode.*
+0.000 g BALANCE CALIBRATION	«T»	*Press the button until "BALANCE CALIBRATION" is displayed.*
- 0000 g CALIBRATE INTERNALLY		*A zero point measurement is carried out (0000 g is displayed flashing)*
--Int CALIBRATE INTERNALLY		*The built-in calibration weight is measured.*

Automatic internal calibration

For automatic calibration with the built-in calibration weight, the configuration menu (see Chapter 5.3.6 "Balance Calibration") "SET CALIBRATION AUTO MODE".

The balance now calibrates itself automatically every 24 hours, depending on the definition in the configuration menu "SET CALIBRATION MODE AUTO AUTOCAL. - TIME" (e.g. 6 h for 06.00 in the morning) and/or after any temperature change of 3 degrees Celsius.

Protocol printout of the calibration.

Calibration	Balance Calibration Protocol
Date: 03/04/2024, Time: 12:51:36 PM Name : PBM 60 Radiator : Halogen / 50Hz Software : H00-0000 P02 Serialist : 9101422	Time of calibration and instrument data
Calibration OK	Status of calibration
Operator :	Operator ID, if enabled under "SET PRINT FORMAT". (See chapter 5.3.3 "Configure Log Expression")

9.3.2 Temperature Adjustment

For a temperature adjustment to be carried out, the configuration menu (see chapter5.3.7. "Temperature Adjustment") "TEMP. ADJUSTMENT".

Then follow these steps:

- Use the Temperature Calibration Kit, (see Chapter "Accessories").

Display	**Step button**
+0.000 g	*Moisture Analyzer is in weighing mode*

+0,000 9 TEMP. CALIBRATION	«**T**»	*Press the button until "TEMP. CALIBRATION" is displayed.*
- - - - - - - T100 T160 START	«⇦»	*Setting the lower temperature value for calibration.*
- - - - - - - T100 T160 START	«⇨»	*Setting the higher temperature value for calibration.*

It should be noted that the difference between the two temperature values is greater than 40°C.

- - - - - - - T100 T160 START	«**START**»	*When the temperature adjustment set is connected to the device*
- - - - - - - TEMP 25°C 20.00MIN		*The temperature calibration is started.* *The Moisture Analyzer heats up to the first temperature value.*

The info line shows the temperature measured by the Moisture Analyzer and the remaining time for temperature calibration. Heating up to a temperature takes 20 minutes.

- - - - - - - TEMPERATURE 100°C	*After 20 minutes, enter the temperature displayed on the thermometer of the temperature adjustment kit on the Moisture Analyzer.*
- - - - - - - TEMP 105°C 20.00MIN	*The Moisture Analyzer heats up to the second temperature value.*
- - - - - - - TEMPERATURE 160°C	*After another 20 minutes, please enter the temperature on the dryer as shown on the thermometer of the temperature adjustment kit.*

Choose between "use this temperature measurement as an adjustment" or "use this temperature measurement as a calibration".

After selecting JUST or KAL, the temperature adjustment or calibration is completed and the corresponding protocol is printed.

Protocol printout of the adjustment

Temperature Adjustment	
Date: 03/04/2024, Time: 12:51:36 PM Name : PBM 60 Radiator : Halogen / 50Hz Software : H00-0000 P02 Series : 9101422	Time of temperature adjustment and device data
Thermometer:	Device designation of the temperature adjustment set
Temperature 100 C : 102 C Temperature 160 C : 161 C	Result of temperature adjustment
Adjustment carried out	Device has been temperature adjusted
Operator :	Operator ID, if enabled

Calibration protocol printout

Temperature Calibration	
Date: 03/04/2024, Time: 12:51:36 PM Name : PBM 60 Radiator : Halogen / 50Hz Software : H00-0000 P02 Series : 9101422	Time of temperature calibration and instrument data
Thermometer:	Device designation of the temperature adjustment set
Temperature 100 C : 99 C Temperature 160 C : 159 C	Temperature Calibration Result
Tolerance +/- 3 C Calibration passed	Temperature calibration successful The measured values are within the required limits
Operator :	Operator ID, if enabled

9.4 Firmware update

The latest firmware version of the instrument firmware can be downloaded from our website. The instructions for the update procedure are also available there.

9.5 Error

The device displays an error description in the info line.

NOTE
If an error occurs without a description of the error in the info line, a Precisa service technician must be contacted.

Error message	**Cause**
Starting value too small	• The sample weight is too small (< 0.200 g). The sample weight must be greater than 0.200 g.
MINIMUM x.xxx g MAXIMUM x.xxx g	• The sample weight is not within the tolerance of the weight.

9.5.1 Notes on troubleshooting

The following table lists malfunctions and their possible causes. If you are unable to resolve the fault using the table, please contact a Precisa service technician.

Fault	**Possible causes**
Weight indicator does not light up	• Device is not turned on • Power cord not plugged in • Defective mains fuse
It's going to be "OL" displayed	• The weighing range has been exceeded (indication of the maximum weighing range)
"UL" is displayed	• The weighing range of the instrument is lower (sample tray or tray carrier is missing)
The weight display is constantly changing	• Too much air flow at the device location • The device support vibrates or fluctuating • The sample dish is in contact with a foreign body • The sample absorbs moisture • The sample evaporates/vaporates/sublimates • Sharp temperature changes in the sample
Measurement result is obviously wrong	• The device was not tared correctly • The device is not leveled correctly • The calibration is no longer correct • Sharp temperature changes in the sample
Configuration menu cannot be changed	• In the configuration menu, password lock is enabled

Fault	**Possible causes**
During calibration, the indicator flashes continuously	• The location of the device is too unstable (cancel calibration with "**ON/OFF"** and place the device in a more suitable location) • Use of an inaccurate calibration weight (only for external calibration)
The connected printer does not print	• The printer is not turned on • The data cable is defective or not connected • The interface settings do not match the moisture analyzer.
The printer prints incorrect characters	• The parity setting or baud rate of the interface does not match • The data cable is defective
Drying does not start	• The sample is not stable

10 Overview

10.1 Specifications

Specification	PBM 60 (-HR)	PBM 66
Heat source, radiator type	Halogen / Infra-red / Dark Radiator	Halogen / Infra-red / Dark Radiator
Weighing range [g] / readability [mg]	124 /1 (0.1)	310 /1
Drying:		
Readability [%]	0.01 (0.001)	0.01
Reproducibility at approx. 2 g [%]	0.1 (0.05)	0.1
Reproducibility at approx. 10g [%]	0.015 (0.01)	0.015
Sample weight [g]	0.2 - 124	0.2 - 310
Result Calculations:	100-0%, 0-100% ATRO 100-999%, ATRO 0-999%, G/KG, REMAINDER, LOSS	100-0%, 0-100% ATRO 100-999%, ATRO 0-999%, G/KG, REMAINDER, LOSS
Heating:		
Temperature range / step [°C]	50 - 230 / 1	50 - 230 / 1
Heating Methods	Standard, Boost, Smooth	Standard, Boost, Smooth
Intervals	Boost + 1	Boost + 1
Booster	+40%	+40%
Boost time [min.]	0.1 – 99.9	3.0
Ramp time [min.]	1.0 – 600.0	4.0
Shutdown criteria:		
Auto Stop [d/s]	selectable 1 - 99 / 10 - 90	5 fixed settings or selectable 1 - 99 / 10 - 90
Auto Stop [%/s]	selectable 0.1 - 99.9 / 10 - 90	-
Adaptstop	x	x
Timer Stop [min.]	0.1 - 240.0	0.1 - 240.0
Surveillance:		
Status indication (red/green)	x	x
Acoustic	x	x
Expression:		
GLP	x	x
Expression - Interval [min.]	0.1 - 10.0	0.1 - 10.0
Sample Numbering	x	x

Specification	PBM 60 (-HR)	PBM 66
Storage capacity:		
Methods (with all settings)	30	2+ 3 fixed
User Texts	2	2
Service:		
"Easy access" sample holder	x	x
Display	LCD	LCD
Keyboard	10 buttons	10 buttons
Password	x	x
Special Features :		
Weighing with limits / weighing aid	x / x	x / x
Software Download and Update	x	x
Automatic hood opening	x / x	x / x
Adjustment:		
Balances (internal/external)	x	x
Temperature, fully automatic	at 100°C and 160°C	at 100°C and 160°C
Miscellaneous:		
Clock for date and time	x	x
Interface for PC and printer	RS232	RS232
	USB B Device	USB B Device
	USB A Host	USB A Host
Digital I/O	optional	optional
Theft protection	Code and mechanical	Code and mechanical
Connection:		
Line voltage	230V or 115V switchable by changing the heating unit (only possible with Precisa Service)	230V or 115V switchable by changing the heating unit (only possible with Precisa Service)
Mains frequency [Hz]	50 - 60	50 - 60
Power Consumption [W]	450	450
Dimensions:		
Housing dimensions (WxHxD) [mm]	201x177x332	210x170x332
Weight [kg]	6	6

10.2 Menu Overview

10.2.1 Configuration Menu Tree

Press and hold the «**MENU»** button when switching on:

• **SET DATA PRINT**			
	SET PRINT FORMAT	DATE AND TIME	ON/**OFF**
		BALANCE ID	**ON**/OFF
		METHOD ID	ON/**OFF**
		COUNTER	**ON**/OFF
		DRYER SETUP	**ON**/OFF
		PRINTRATE	ON/**OFF**
		OPERATOR ID	ON/**OFF**
		CAL.-INFO	**ON**/OFF
		PRINT RATE	**1.0** MIN
		OPERATOR	ttt...
	SET HEADER	TITLE 1	ON/**OFF**
		TITLE 2	ON/**OFF**
		TITLE 1	ttt...
		TITLE 2	ttt...
	MODE **PRINTER** PC		

• **SET APP. MENU**		
	EDIT METHOD	**ON**/OFF
	METHOD ID	**ON**/OFF
	WEIGHING	**ON**/OFF
	UNIT	**ON/**OFF
	PRINT RATE	**ON**/OFF
	STANDBY TEMP.	**ON/**OFF
	AUTOSTART	**ON/**OFF

• **SET ASH RESIDUE**	*PBM 66 only*	
	MODE	MANUAL/**AUTO**
	MEMORY CHOICE	ON/**OFF**

■ *19 Menu trees*

• **SET BALANCE CAL.**		
	MODE	OFF **EXTERNAL** EXT.-DEF. INTERNAL AUTO
	DEF.	**0.0000 g**

• **TEMP. AD-JUSTMENT**	
TEMP. AD-JUSTMENT.	ON/**OFF**

• **STABILITY**	
STABILITY	MEDIUM **HIGH**

• **QUICK-START**
QUICK-STARTON/**OFF**

• **SET RS 232**		
	BAUD RATE	300 600 1200 2400 4800 **9600** 19200
	PARITY	**7-EVEN-1STOP** 7-ODD-1STOP 7-NO-2STOP 8-NO-1STOP 8-EVEN-1STOP 8-ODD-1STOP
	HANDSHAKE	**NO** XON-XOFF HARDWARE
	HID	ON/**OFF**

■ *19 Menu trees*

• SET USB DEVICE

MODECOM	**PORT** HID PORT	
BAUD RATE	300 600 1200 2400 4800 **9600** 19200 38400 57600	*In mode COM-PORT*
PARITY	7-EVEN-1STOP 7-ODD-1STOP 7-NO-2STOP **8-NO-1STOP** 8-EVEN-1STOP 8-ODD-1STOP	*In mode COM-PORT*
HANDSHAKE	**NO** XON-XOFF	*In mode COM-PORT*
KEYBOARD LANGUAG.	**NARROW** SPEAR FRA TUR SPA	*In mode HID-PORT*
FORMAT	**LINES** TABLES	*In mode HID-PORT*
COLUMN FOR o	ON/**OFF**	*In mode HID-PORT*
COLUMN FOR <>	ON/**OFF**	*In mode HID-PORT*
UNIT	**ON/**OFF	*In mode HID-PORT*

• **SET USB HOST**			
	MODE	**KEY-BOARD** SCAN-NER FOOT SWITCH FLASH DRIVE	
	KEYBOARD LANGUAG.	**ENG** GER FRA TUR SPA	
	SCANNER LANGUAGE	ENG GER FRA TUR SPA	
	DEVICE TYPE	**SINGLE** DOUBLE	
	FUNCTION	**PRINT** TARE OFF	*In mode KEYBOARD*
	FUNCTION L.	PRINT **TARE** OFF	*In mode SCANNER*
	FUNCTION R.	**PRINT** TARE OFF	*In mode FOOT SWITCH DOUBLE type*
	GUARD	ON/OFF	*In mode FLASH DRIVE*

• **SET DATE AND TIME**		
	DATE	[DD.MM.YY]
	DATE	[DD.MM.YY]
	TIME	[HH.MM.SS]
	FORMAT **STANDARD**/US	

■ *19 Menu trees*

• **PASSWORD**		
PASS- WORD----	PRIVACY	**OFF** MEDIUM HIGH
	PASSWORD NEW	- - - -

• **THEFT CODE**		
THEFT CODE ----	THEFT	ON **OFF**
	CODE NEW	- - - -

• **KEYNOTE**		
KEYSTROKE ----	KEYNOTE	ON 1-9 OFF

• **NOTE SOUND**		
ALERT TONE ----	KEYNOTE	ON 1-9 OFF

• **BACKLIGHT**		
LIGHTING ----	LIGHTING	1-9

• **LANGUAGE**		
	LANGUAGE	**ENGLISH**
	LANGUAGE	GERMAN
	LANGUE	FRANCAISE
	DIL	TURKEY
	IDIOMA	ESPANOL

• **SET JAM**	
	FACTORY CONFIG. LOADING APPLICATION CONFIG. SHOP APPLICATION-CON-FIG.SPOKE

10.2.2 Application Menu Tree

Press the "**MENU**" button while operating:

• **LOAD METHOD**	
LOAD METHOD	ttt... ttt... ttt... ttt... ttt...

• **SAVE METHOD**
SAVE METHOD

• **DELETE METHOD**	
DELETE METHOD	ttt... ttt... ttt... ttt... ttt...

■ *19 Menu trees*

• **METHOD**	
METHOD	ttt...

• **SETTING WEIGHT**		
	TEST WEIGHT	ON/**OFF**
	NOMINAL	**5,000 g**
	MAXIMUM	**6,000 g**
	MINIMUM	**4,000 g**

• **UNIT**	
UNIT	**100-0%**
	0-100%
	ATRO 100-999%
	ATRO 0-999%
	G/KG
	RESIDUAL WEIGHT
	WEIGHT LOSS

• **PRINT RATE**	
PRINT RATE	**1.0** MIN

• **STANDBY TEMP.**	
STANDBY TEMP.	ON/**OFF**
TEMPERATURE	**40** °C

• **STARTUP**	
STARTUP	ON/**OFF**

• **AUTO OPENING**	
AUTO OPENING	ON/**OFF**
TEMPERATURE	**160** °C

10.2.3 Button Menus

Press and hold the corresponding button until the desired menu item is displayed in the info line. The menu items "PRINT" and "TARA" are not displayed.

	• Start/stop button	
	START/STOP DRYING	*Not displayed*
	STATISTICS INFO	*Not for PBM 66*
	STATISTICAL RESET	*Not for PBM 66*
	ASH RESIDUE	

■ *19 Menu trees*

• **Print button**
PRINT
RESET COUNTER
PRINT STATISTICS
PRINT STATUS
PRINT APPLICATIONS
PRINT CALF INFO
PRINT FIRMWARE HIST

• **Tare button**	
TARE	
HR MODE	**ON**/OFF
BALANCE CALIBRATION	
TEMP. CALIBRATION	

• **Change button**
100-0%
0-100%
ATRO 100-999%
ATRO 0-999%
G/KG
RESIDUAL WEIGHT
WEIGHT LOSS

• **HEATING PROGRAM**	
BOOST TIME	3.0 MIN
HEATING MODE	**STANDARD**
	BOOST
	SMOOTH

• **DRYING TEMPERATURE**	
TEMPERATURE	**105** °C

• **DRYING**	
STOP TIME	**10.0** MIN
TIME STOP	**ON**/OFF

• **STOPMODE**	
DIGIT/TIME	**2/20**
%/TIME	**0.2/20**
AUTO STOP	OFF **DIGIT/TIME** %/TIME ADAPTSTOP

PBM 60, PBM 60-HR

• **STOPMODE**	
AUTO STOP	**1/20** D/S
AUTO STOP	OFF 2/10 **2/20** 2/30 2/60 10/60 ADAPTSTOP DEF.

PBM 66