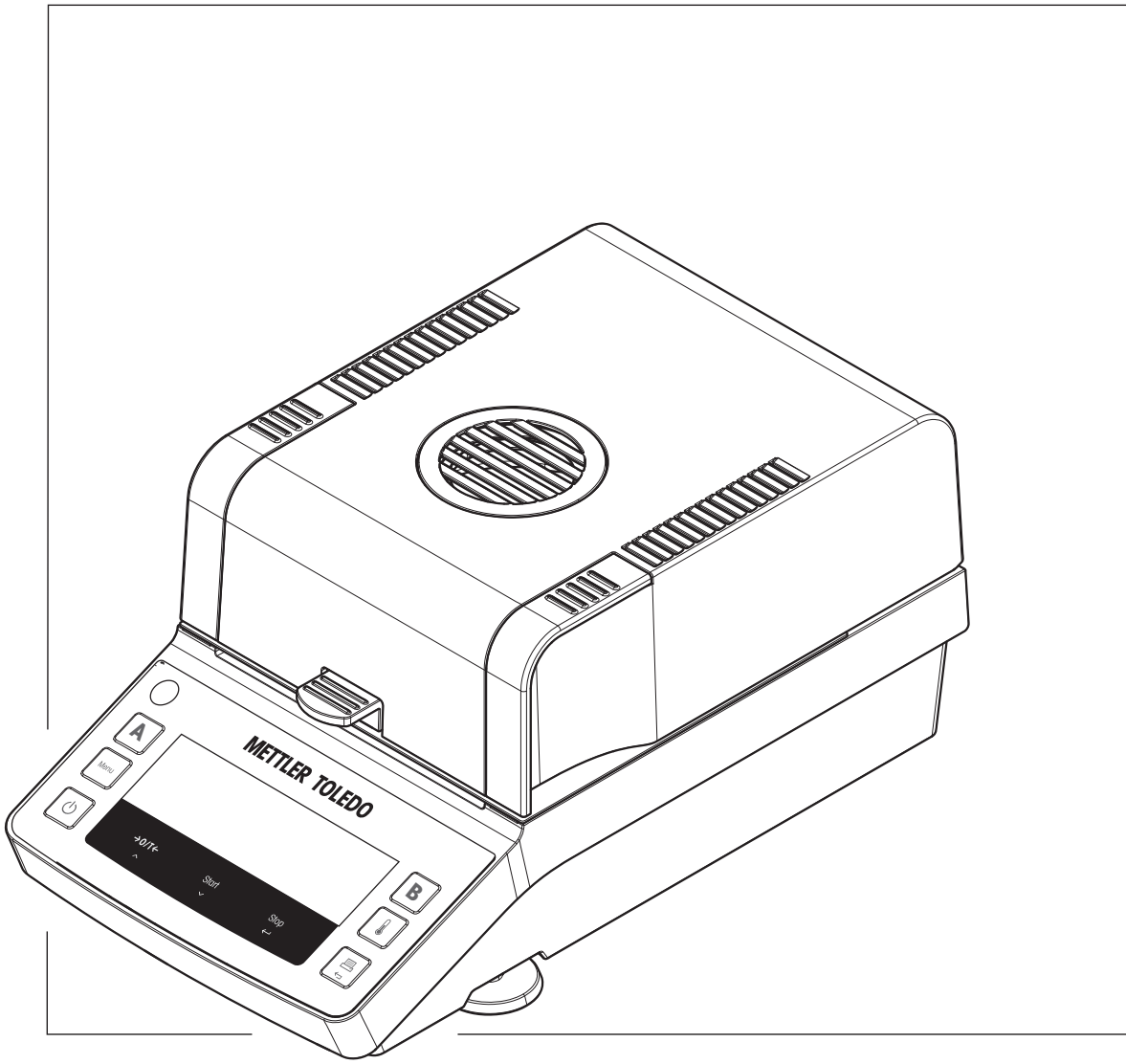
Reference Manual

Moisture Analyzer

HE73



METTLER TOLEDO

Table of Contents

1 Introduction

Thank you for purchasing a halogen moisture analyzer from METTLER TOLEDO. The moisture analyzer combines high performance with ease of use.

This document is based on the software version V1.02.

EULA

The software in this product is licensed under the METTLER TOLEDO End User License Agreement (EULA) for Software. ▶ www.mt.com/EULA

When using this product you agree to the terms of the EULA.

1.1 Further documents and information

▶ www.mt.com/moisture

This document is available in other languages online.

▶ www.mt.com/HE73-RM

Search for documents ▶ www.mt.com/library

For further questions, please contact your authorized METTLER TOLEDO dealer or service representative.

▶ www.mt.com/contact

1.2 Explanation of conventions and symbols used

Conventions and symbols

Key and button designations are indicated by a picture or bold text (e.g. **Save**).

Note For useful information about the product.

Refers to an external document.

Elements of instructions

In this manual, step-by-step instructions are presented as follows. The action steps are numbered and can contain prerequisites, intermediate results and results, as shown in the example. Sequences with less than two steps are not numbered.

- Prerequisites that must be fulfilled before the individual steps can be executed.

1 Step 1

➡ Intermediate result

2 Step 2

➡ Result

1.3 Acronyms and abbreviations

Original term	Explanation
AC	Alternating Current
DC	Direct Current
EMC	Electromagnetic Compatibility
FCC	Federal Communications Commission
RM	Reference Manual
SNR	Serial Number
SOP	Standard Operating Procedure
UM	User Manual
USB	Universal Serial Bus

1.4 Compliance information

National approval documents, e.g., the FCC Supplier Declaration of Conformity, are available online and/or included in the packaging.

▶ http://www.mt.com/ComplianceSearch

Contact METTLER TOLEDO for questions about the country-specific compliance of your instrument.

▶ www.mt.com/contact

United States of America

This equipment has been tested and found to comply with the limits for a **Class A** digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canada

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

2 Safety Information

Two documents named "User Manual" and "Reference Manual" are available for this instrument.

- The User Manual is printed and delivered with the instrument.
- The electronic Reference Manual contains a full description of the instrument and its use.
- Keep both documents for future reference.
- Include both documents if you transfer the instrument to other parties.

Only use the instrument according to the User Manual and the Reference Manual. If you do not use the instrument according to these documents or if the instrument is modified, the safety of the instrument may be impaired and Mettler-Toledo GmbH assumes no liability.

2.1 Definition of signal words and warnings symbols

Safety notes contain important information on safety issues. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results. Safety notes are marked with the following signal words and warning symbols:

Signal words

DANGER	A hazardous situation with high risk, resulting in death or severe injury if not avoided.
WARNING	A hazardous situation with medium risk, possibly resulting in death or severe injury if not avoided.
CAUTION	A hazardous situation with low risk, resulting in minor or moderate injury if not avoided.
NOTICE	A hazardous situation with low risk, resulting in damage to the instrument, other material damage, malfunctions and erroneous results, or loss of data.

Warning symbols


General hazard


Hot surface


Notice

2.2 Product-specific safety notes

Intended use

This instrument is designed to be used by trained staff. The instrument is intended for determining the weight loss during drying of samples.

Any other type of use and operation beyond the limits of use stated by Mettler-Toledo GmbH without consent from Mettler-Toledo GmbH is considered as not intended.

Moisture determination applications must be optimized and validated by the user according to local regulations. Application-specific data provided by METTLER TOLEDO is intended for guidance only.

Responsibilities of the instrument owner

The instrument owner is the person holding the legal title to the instrument and who uses the instrument or authorizes any person to use it, or the person who is deemed by law to be the operator of the instrument. The instrument owner is responsible for the safety of all users of the instrument and third parties.

Mettler-Toledo GmbH assumes that the instrument owner trains users to safely use the instrument in their workplace and deal with potential hazards. Mettler-Toledo GmbH assumes that the instrument owner provides the necessary protective gear.

⚠ WARNING

Death or serious injury due to electric shock

Contact with parts that carry a live current can lead to injury and death. If the instrument cannot be shut down in an emergency situation, people can be injured and the instrument can be damaged.

1 Check that the voltage printed on the instrument is the same as your local power supply voltage. If this is not the case, under no circumstances connect the instrument to the power supply, but contact a METTLER TOLEDO representative.
2 Only use the three-core power cable with equipment grounding conductor supplied by METTLER TOLEDO to connect your instrument.
3 Only connect it to a three-pin power socket with earthing contact.
4 Only use standardized extension cables with equipment grounding conductor for operating the instrument.
5 Make sure that the power plug is accessible at all times.
6 Arrange the cables so that they cannot be damaged or interfere with the operation.
7 Keep all electrical cables and connections away from liquids.

⚠ WARNING

Injury or death due to toxic or corrosive substances

Heating up toxic or corrosive substances, e.g., acids, can result in toxic or corrosive vapors that can cause injuries if they come in contact with the skin or the eyes or if they are inhaled.

1 When using chemicals and solvents, comply with the instructions of the manufacturer and the general laboratory safety rules.
2 Set up the instrument in a well-ventilated location.
3 When using dry substances that form toxic gases, place the instrument in a fume hood.

⚠ WARNING

Death or serious injuries due to flammable solvents

Flammable solvents in the vicinity of the instrument can ignite and lead to fire and explosions.

1 Keep flammable solvents away from the instrument.
2 When using chemicals and solvents, comply with the instructions of the manufacturer and the general laboratory safety rules.

⚠ CAUTION

Burns due to hot surfaces

During operation, parts of the instrument can reach temperatures that can cause burns if touched.

1 Do not touch the area marked with the warning symbol.

2 Ensure sufficient free space around the instrument to avoid heat accumulation and overheating (approx. 1 m free space above the heating module).

3 Never cover, tape or clog the vent over the sample chamber. Do not tamper with the vent in any other way.

4 Exercise caution when removing a sample. The sample itself, the sample chamber, the draft shield and the sample pan may be very hot.

5 Do not open the heating module during operation. Always let it cool down completely before opening.

6 Do not modify the heating module in any way.

NOTICE

Damage to the instrument due to corrosive substances and vapors

Corrosive substances and corrosive vapors can damage the instrument.

1 When using chemicals and solvents, comply with the instructions of the manufacturer and the general laboratory safety rules.

2 Ensure that the instrument parts touching your sample substance can not get altered by it.

3 Wipe off any condensation of corrosive vapours after an operation.

4 Work with small samples.

NOTICE

Damage to the instrument or malfunction due to the use of unsuitable parts

– Only use parts from METTLER TOLEDO that are intended to be used with your instrument.

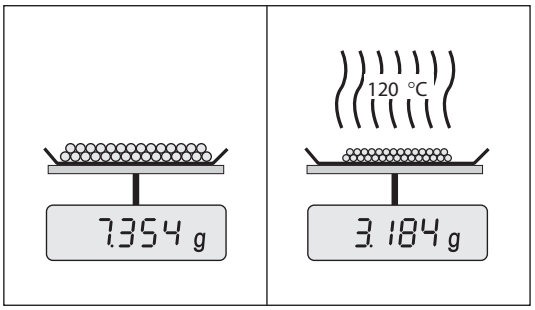
3 Design and Function

3.1 Function description

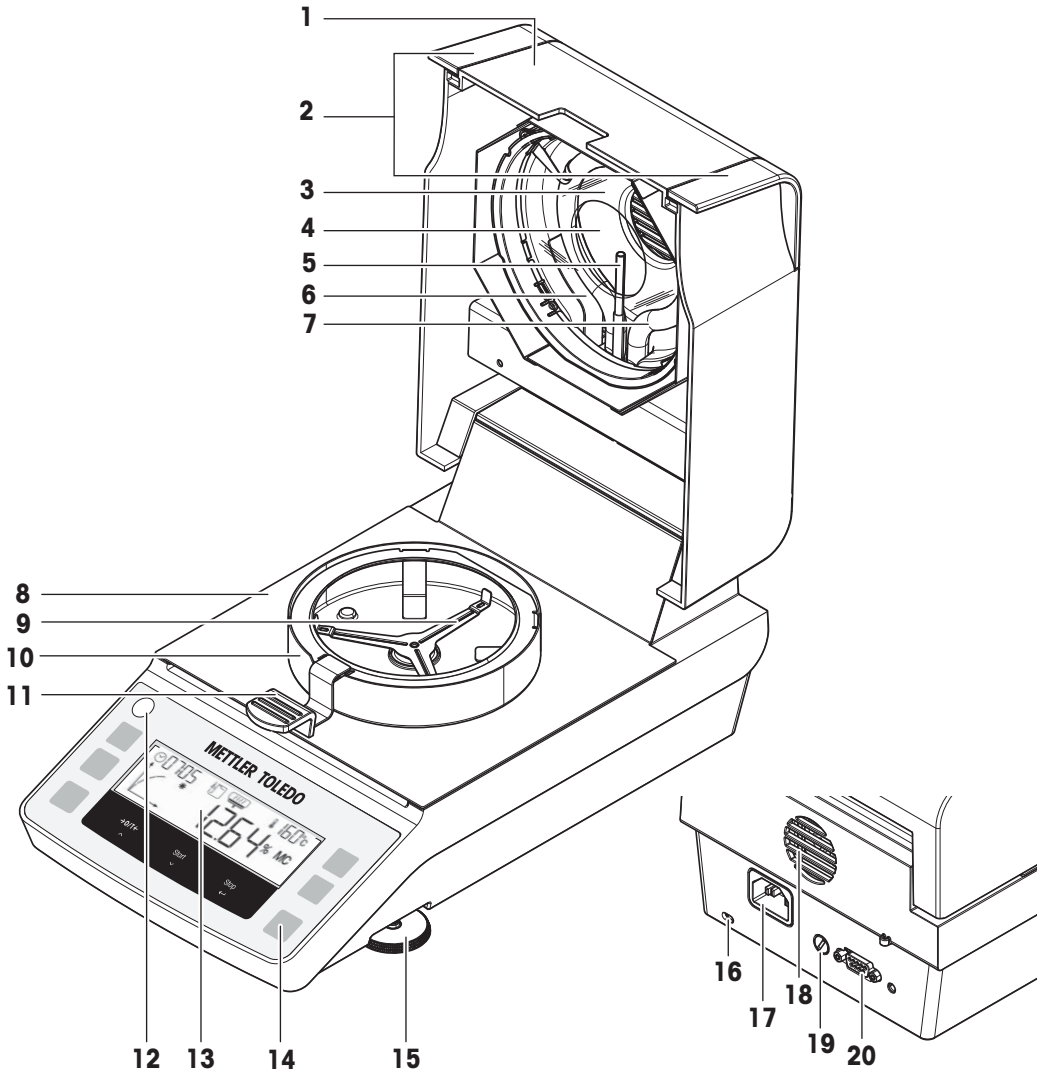
METTLER TOLEDO moisture analyzers work on the thermogravimetric principle. At the start of the measurement the moisture analyzer determines the weight of the sample, the sample is then quickly heated by the absorption of the emitted infrared radiation. During the drying process the instrument continually measures the weight of the sample and displays the weight reduction, up to the final result.

With halogen heating technology, maximum heating power is quickly reached and allows use of high temperatures. Uniform heating of the sample material ensures repeatability of the drying results and makes it possible to use small amounts of sample.

The METTLER TOLEDO moisture portfolio comprises a range of moisture analyzers that differ from each other in both hardware and software.



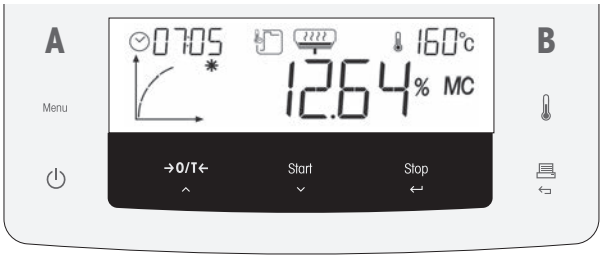
3.2 Drying unit



1	Lid	**2**	Handles for opening the lid

3	Protective glass	**4**	Reflector
5	Temperature sensor	**6**	Temperature overload protection
7	Halogen lamp	**8**	Sample chamber
9	Sample pan holder	**10**	Draft shield
11	Sample pan handler	**12**	Level indicator
13	Display	**14**	Operation keys
15	Leveling foot	**16**	Slot for anti-theft purposes
17	Power supply socket	**18**	Fan
19	Power line fuse	**20**	RS232C serial interface

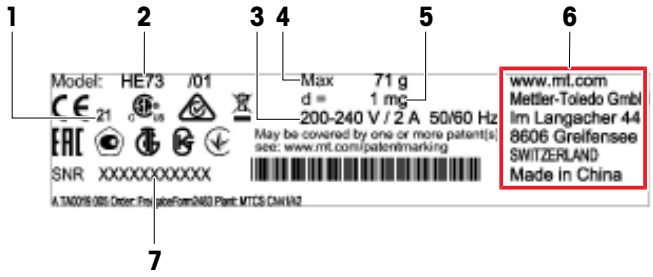
3.3 Overview terminal



	Name	Behavior in general	Behavior during drying process	Behavior in menu mode
A	Method A	Activate method A.	–	–
Menu	Menu	Enter user menu.	–	Scroll in level 1.
⏻	– On – Off	– Switch on. – Switch to standby mode.	Switch to standby mode.	
→0/T← ∧	– Zero or tare – Up	Execute zero or tare.	–	Scroll to previous item.
Start ∨	– Start – Down	Start drying process.	–	Scroll to next item.
Stop ↵	– Stop – Enter	–	Stop drying process.	– Confirm current item. – Down one level.
🖶 ⇦	– Print – Cancel / Exit	Print the parameters and settings.	Print the intermediate value.	Up one level.
🌡	Temperature	Set drying temperature.	Display preset temperature for 2 seconds.	–
B	Method B	Activate method B.	–	–

3.4 Overview type plate

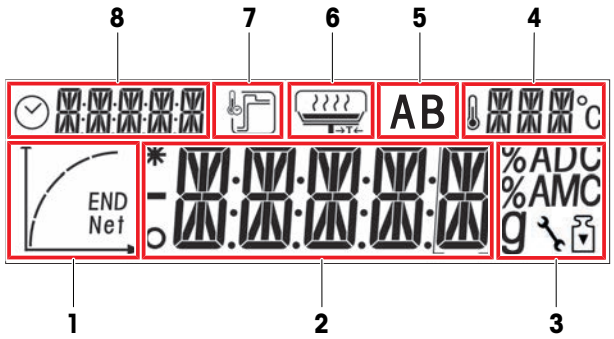
The balance type plate is located at the side of the balance and contains the following information (example illustration):



1	Year of manufacture	**2**	Model designation
3	Power supply	**4**	Maximum capacity
5	Readability	**6**	Manufacturer
7	Serial number (SNR)		

3.5 Display

3.5.1 Overview display areas



1	Progress indicator area	**2**	Main area
3	Unit / Adjustment area	**4**	Temperature area
5	Method area	**6**	User guidance area
7	Heating mode area	**8**	Switch-off and time area

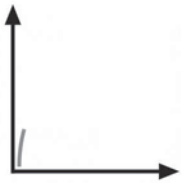
3.5.2 Icons

Icon	Function	Icon	Function
O	Indicates unstable values		Drying temperature
*	Indicates calculated values	°C	Temperature unit
−	Indicates negative values		Service mode (only relevant for service technician)
	Switch-off criteria: automatic or timed		Weight adjustment

Icon	Function	Icon	Function
	Drying mode «Standard»		User guidance
	Drying mode «Rapid»		Progress indicator
AB	Shows active Method A or B	END	End of moisture determination

3.5.3 Progress indicator

The progress indicator shows the progress of the drying process.

Status	Diagram	Automatic Switch-off	Timed Switch-off
1		The drying process starts.	The drying process starts.
2		After 30 seconds.	After 1/5 of time.
3		After 1 minute.	After 2/5 of time.
4		When mean weight loss is 1 mg per 15 seconds.	After 3/5 of time.
5		When mean weight loss is 1 mg per 30 seconds.	After 4/5 of time.
6		When auto-switch-off is reached. The result and **END** is displayed.	The total time is reached. The result and **END** is displayed.

3.5.4 User guidance

The user guidance icons lead through the drying process step by step. When the icon flashes, the next step can be performed.

Icon	Status	Explanation
	–	Place the empty sample pan and execute a tare. **Note** Tare is only possible with the lid closed.
	Ready for measurement	Place the sample on the sample pan.
	–	Close the lid.
	Ready for start	Start the measurement.
	Measurement was started with the lid still open.	Close the lid.
no icon	–	Measurement is running or completed. No action is required from the user.

4 Installation and Putting into Operation

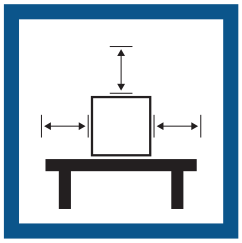
4.1 Selecting the location

A moisture analyzer is a sensitive precision instrument. The location where it is placed will have a profound effect on the accuracy of the results.

Requirements of the location

Place indoors on stable table

Ensure sufficient spacing



Level the instrument

Provide adequate lighting

Avoid direct sunlight

Avoid vibrations

Avoid strong drafts

Avoid temperature fluctuations

Take into account the environmental conditions. See "Technical Data".

Sufficient spacing for moisture analyzers: > 15 cm next to the instrument, > 1 m above the lid.

4.2 Unpacking the moisture analyzer

Check the package, the packaging elements and the delivered components for damages. If any components are damaged, please contact your METTLER TOLEDO service representative.

See also

Transporting, packing, and storing ▸ Page 18

4.3 Scope of delivery

Moisture analyzer

- Drying unit
- Draft shield
- Sample handler
- Sample pan holder
- Country-specific power cable
- Country-specific spare fuse

Documentation

- User Manual
- Guide to Moisture Analysis
- Declaration of Conformity

Accessories

- Aluminium sample pans, 80 pcs
- Specimen sample (glass fiber filter)
- In-use cover
- SmartCal samples, 2 pcs

4.4 Installation

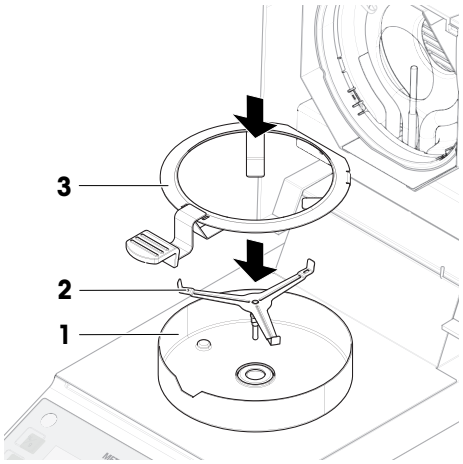
NOTICE

Erroneous results due to incorrect use of the sample pan handler

Incorrect handling of the sample and sample pans can cause erroneous results.

– Always set the sample pan handler correctly and carefully onto sample pan holder.

1 Open the lid.
2 Place the draft shield (**1**). Only one position is possible.
3 Place the sample pan holder (**2**). Turn the sample pan holder until it engages in the correct position.
4 Place the sample pan handler (**3**).



4.5 Putting into operation

4.5.1 Connecting the instrument

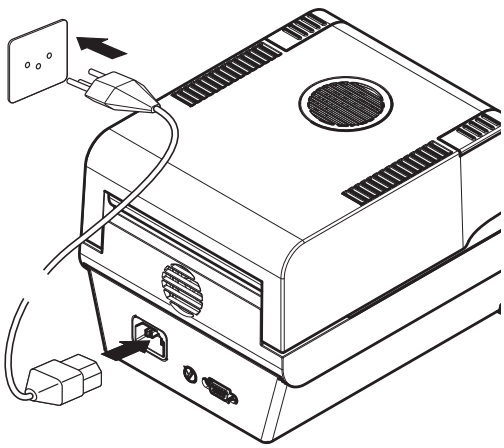
⚠ WARNING

Death or serious injury due to electric shock

Contact with parts that carry a live current can lead to death or injury.

1 Only use the METTLER TOLEDO power cable designed for your instrument.
2 Connect the power cable to a grounded power outlet.
3 Keep all electrical cables and connections away from liquids and moisture.
4 Check the cables and the power plug for damage and replace them if damaged.

1 Install the cables in such a way that they cannot be damaged or interfere with operation.
2 Insert the plug of the AC/DC adapter in the power inlet of the instrument.
3 Insert the plug of the power cable into a grounded power outlet that is easily accessible.



Note

Do not connect the instrument to a power outlet controlled by a switch. After switching on the instrument, it must warm up before giving accurate results.

See also

General data ▸ Page 39

4.5.2 Switching on the instrument

Warming up

Before the moisture analyzer gives reliable results, it must warm up. This takes at least 1 hour after connecting the instrument. When the instrument is switched on from standby, it is ready immediately.

1 Instrument is connected to the power supply.

2 To switch on, press [⏻].

➡ The display lights up.

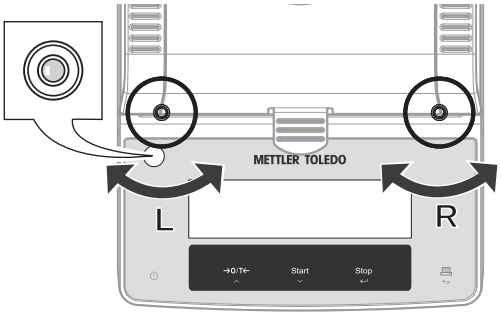
➡ Instrument is ready to use.

4.5.3 Leveling the instrument

Exact horizontal positioning and stable installation are prerequisites for repeatable and accurate results. To compensate for small irregularities or inclinations (±2%) at the location, the instrument must be leveled.

The instrument should be re-leveled each time its location is changed.

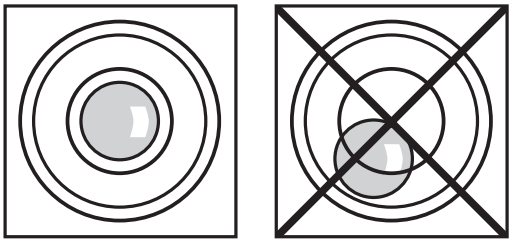
For exact horizontal positioning, the instrument has a level indicator (level) and two leveling screws. When the air bubble in the level indicator is exactly in the center, the instrument is perfectly level. To level it, proceed as follows:



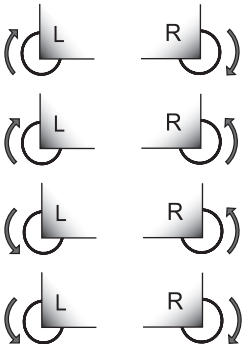
1 Position the instrument at the selected location.

2 Turn the two leveling feet until the air bubble is in the center of the level indicator.

L = left foot
R = right foot



Air bubble at 12 o'clock:		turn both feet clockwise.
Air bubble at 3 o'clock:		turn left foot clockwise, right foot counter-clockwise.
Air bubble at 6 o'clock:		turn both feet counterclockwise.
Air bubble at 9 o'clock:		turn left foot counterclockwise, right foot clockwise.



4.5.4 Performing a function check

After installation, test the correct function of the moisture analyzer with a SmartCal test. Two SmartCal samples are included in the delivery.

See also

SmartCal test ▸ Page 25

4.5.5 Setting the instrument to standby mode

The instrument can be set to standby by pressing ⏻. Exit the standby by pressing ⏻ again.

4.5.6 Switching off the instrument

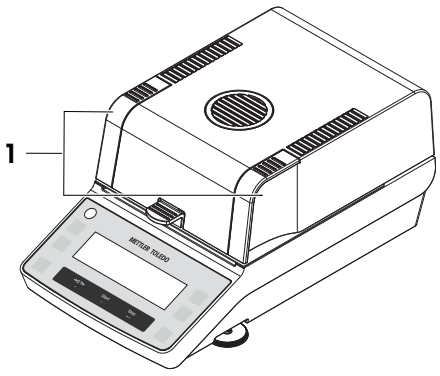
To completely switch off the instrument, it must be disconnected from the power supply.
By pressing ⏻, the instrument is only set to standby.

4.6 Performing a simple measurement

Use the supplied specimen sample (absorbent glass fiber filter) for the first measurement.
The factory settings for method **A** and **B** are the same. Use either of the methods for the first measurement.

4.6.1 Opening and closing the lid

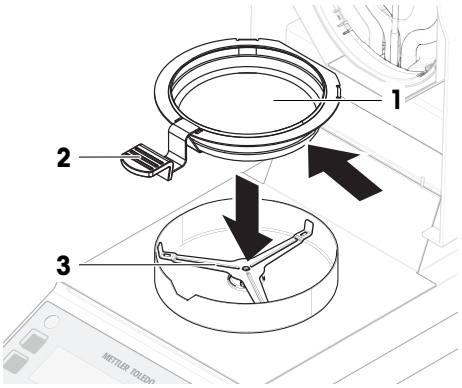
– To open the lid, lift it by the opening handles (**1**).



4.6.2 Taring the instrument

Before a subsequent measurement, the instrument must be tared.

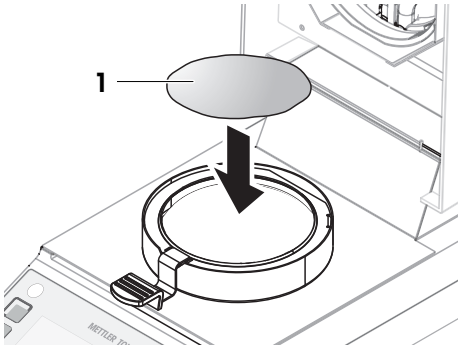
1 Press the key **A** or **B** to select a method.
2 Open the lid.
   ➡ The user guidance icon prompts you to place the empty sample pan.
3 Slide the empty sample pan (**1**) from the side into the sample pan handler (**2**).
4 Place the sample pan handler (**3**) in the draft shield. Make sure that the tongue of the sample pan handler lies exactly in the slot of the draft shield. The pan must lie flat in the pan holder.
5 Close the lid.
   ➡ The instrument is tared automatically.



4.6.3 Performing a measurement

1 Open the lid.

2 Place the glass fiber filter (**1**) in the sample pan.

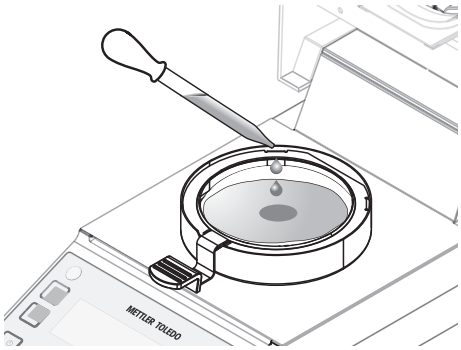


3 Wet the specimen sample with a few drops of water until the displayed weight is at least 0.5 g (required minimum weight of sample).

Note

The drying process cannot start until the minimum sample weight is reached.

➡ The user guidance icon prompts you to close the lid.



4 Close the lid.

➡ The measurement starts automatically (factory setting).

➡ The display shows the following during the measurement:
- state of the drying progress (progress indicator)
- current temperature in the sample chamber
- elapsed time since the start of the measurement process
- current result in the chosen display mode

➡ When the measurement is finished, the progress indicator shows **END**.

4.6.4 Completing the measurement

⚠ CAUTION

Burns due to hot surfaces

The sample, sample pan and other parts inside the sample chamber may still be hot and can cause injuries if touched.

1 Do not touch the housing where it's marked with the warning symbol.

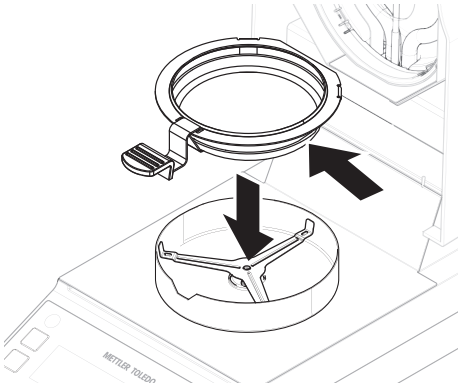
2 Only remove the sample pan using the sample pan handler.

■ The measurement is finished.

1 Open the lid.

2 Remove the sample pan handler from the sample chamber.

3 To remove the sample pan from the handler, lift the pan slightly from below and pull it sideways out of the handler.
If you no longer need the sample and the pan, tilt the handler until the pan slides out.



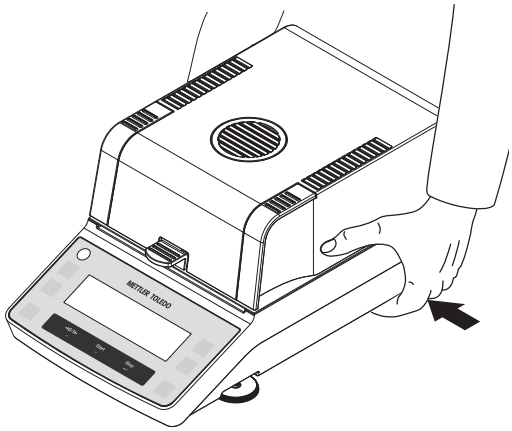
4.7 Transporting, packing, and storing

4.7.1 Transporting over short distances

1 Disconnect the AC/DC adapter and unplug all interface cables.
2 Hold the moisture analyzer with both hands and carry it in horizontal position to the target location. Consider the requirements of the location.

To put the moisture analyzer back into operation, proceed as follows:

1 Connect in reverse order.
2 Give the moisture analyzer sufficient time to warm up.
3 Level the moisture analyzer.
4 Perform tests and, if necessary, adjustments.



See also

- Selecting the location ▸ Page 13
- Switching on the instrument ▸ Page 15
- Leveling the instrument ▸ Page 15

4.7.2 Transporting over long distances

For transporting the moisture analyzer over long distances, always use the original packaging.

4.7.3 Packing and storing

Packing the moisture analyzer

Store all parts of the packaging in a safe place. The elements of the original packaging are developed specifically for the moisture analyzer and its components, and ensures optimal protection during transportation and storage.

Storing the moisture analyzer

Store the moisture analyzer under following conditions:

- Indoor and in the original packaging.
- According to the environmental condition, see "Technical data".

Note

When storing for longer than six months, the rechargeable battery may be down (date and time get lost).

See also

- General data ▸ Page 39

5 Operation

5.1 User menu

5.1.1 Entering the user menu

– Press [Menu] to enter user menu.

5.1.2 Browsing the user menu

- To browse the menu options on the same level, use →0/T← and Start.
- To select a menu option (e.g. **PROG**) and go one level deeper, press Stop.
- To exit a menu option and go one level up, press 🖶.

5.1.3 User menu structure

Level 1	Level 2	Level 3	Explanation
METH.A			Defines the method.
	PROG		Defines the drying program.
		STD	Drying mode: Standard (**Factory setting**)
		RAPID	Drying mode: Rapid
	TEMP		50 - approx. 200 °C (105 **Factory setting**)
	SOC		Switch-off criterion
		AUTO	Switch-off is based on a weight loss per unit of time. (**Factory setting**)
		TIMED	Switch-off is based on a preset time.
		FREE	Switch-off is based on 1 mg/10 s - 1 mg/140 s.
	ST.MOD		Start Mode
		AUTO	Automatic start mode (**Factory setting**)
		MAN.	Manual start mode
	DISP.U		Displays/Defines the unit displayed
		UNIT MC	
		UNIT DC	
		UNIT AM	
		UNIT AD	
		UNIT g	
METH.B			same as **METH.A**
CAL			Adjustments (calibration)
	S.CAL		Activates the SmartCal test.
		70	Temperature in °C
		100	
		130	
		160	
	WEIGH		Activates weight adjustment.
	TEMP		Activates temperature adjustment.
PRINT			Defines auto printing
	ON		Auto print is activated. (**Factory setting**)
	OFF		Auto print is inactivated.

Level 1	Level 2	Level 3	Explanation
P.INT			The Interval printing simulates a [🖶] key press briefly according to the settings. The interval printing starts when the drying process starts and stops when the switch-off criterion is reached.
	OFF		Disables interval printing. (**Factory setting**)
	00:30		Interval time in minutes
	01:00		
	02:00		
	05:00		
DATE			Defines the current date on the printout. The date is not visible on the instrument.
	YEAR	XXXX	Range 2000 - 2099 (2015 **Factory setting**)
	MONTH	XX	Range 01 - 12 (01 **Factory setting**)
	DAY	XX	Range 01 - 31 (01 **Factory setting**)
	TIME	XX:XX	Range 00:00 - 23:59 (08:00 **Factory setting**)
RS232			Defines the RS232 interface for connecting to a peripheral device e.g. printer or PC. Character set is IBM/DOS. Auto baud rate is supported.
	BAUD		Defines the speed of the data transmission (data transfer rate / baud rate)
		1200	
		2400	
		4800	
		9600	(**Factory setting**)
		19200	
		38400	
	BIT.P		Defines Bit/Parity
		8-N	8 data bits/no parity (**Factory setting**)
		7-N	7 data bits/no parity
		7-E	7data bits/even parity
		7-O	7 data bits/odd parity
		7-M	7 data bits/mark parity
		7-S	7 data bits/space parity
	STOP.B		Defines the stop bits
		1BIT	1 Stop bit (**Factory setting**)
		2BITS	2 Stop bits
	HAND.S		Defines the type of flow control (handshake)
		NONE	No handshake
		SW	Xon/Xoff (**Factory setting**)
		HW	RTS/CTS
	E.O.L.		End of Line character
		CR.LF	<CR><LF> Carriage Return followed by Line feed (ASCII-Codes 013+010) (**Factory setting**)
		CR	<CR> Carriage Return (ASCII-Code 013)
		LF	<LF> Line feed (ASCII-Code 010)

5.2 Defining a method

A method contains all settings for measuring the moisture content of a particular sample (substance). For each of the two keys [A] and [B] a method can be assigned. The optimal setting of parameters and the drying time depends on the type and size of the sample and the desired accuracy of the measurement result. The exact parameters can only be determined experimentally.

Resources on methods and method definition:

▶ www.mt.com/moisture-guide

▶ www.mt.com/moisture-methods

5.2.1 Setting the drying program

Navigation: [**Menu**] > **METH.A** or **METH.B** > **PROG**

The drying program determines how the sample is heated.

Standard drying

STD

The instrument is heated up to the set drying temperature and kept at this temperature until the measurement ends.

The standard drying program is suitable for most samples.

(**Factory setting**)

Rapid drying

RAPID

Following the start, the set drying temperature is exceeded by 40% (up to the max. temperature capacity, see "Technical Data") for 3 minutes. The temperature is then lowered to and kept at the set drying temperature.

The rapid drying program is primarily suitable **for samples with a moisture content over 30%**, to compensate for the cooling due to vaporization and accelerate the drying process.

5.2.2 Setting the temperature

This setting defines the drying temperature.

1 Press the [🌡] key to set the temperature.

2 Use [∧] or [∨] to set the temperature.

- Factory setting: 105 °C
- Setting range: see "Technical Data"

5.2.3 Setting the switch-off criterion

Navigation: [**Menu**] > **METH.A** or **METH.B** > **SOC**

The switch-off criterion defines at what point the instrument ends the drying process.

AUTO The automatic switch-off criterion is set to a weight loss of 1 mg per 50 seconds.

This setting is suitable for most kind of samples. (**Factory setting**)

TIMED Switch-off is based on a preset time.

1 up to 120 minutes are possible in steps of 10 seconds. Use the [∧] or [∨] key to set the number of seconds.

FREE Switch-off is based on 1 mg weight loss per unit of time.
[1 mg/10 s - 1 mg/140 s]

5.2.4 Setting the start mode

Navigation: [**Menu**] > **METH.A** or **METH.B** > **ST.MOD**

The start mode defines whether the drying is started automatically or manually.

AUTO	The instrument weighs the wet weight and starts drying automatically when the lid is closed. (**Factory setting**)
MAN.	The user must press the [Start] key for the instrument to weigh the wet weight. After that, the instrument starts the measurement automatically as soon as the lid is closed. METTLER TOLEDO recommends the manual start mode for samples that contain highly volatile substances.

5.2.5 Setting the display mode

Navigation: [**Menu**] > **METH.A** or **METH.B** > **DISP.U**

The display mode defines the type of value for displaying and printing.

The following types are available:

%MC	Moisture Content (calculated value)
%DC	Dry Content (calculated value)
%AM	ATRO Moisture Content (calculated value)
%AD	ATRO Dry Content (wet weight, calculated value)
g	Weight in grams

Calculated values are indicated with an asterisk in the display.

Detailed information

g – Weight in Grams

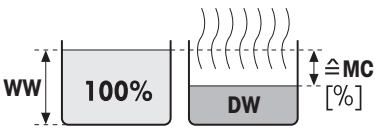
The weight of the sample is displayed (and printed out) in grams. With this setting, the moisture analyzer is used as a precision balance.

During the measurement the current weight is constantly displayed in grams.

%MC – Moisture Content

The moisture content of the sample is displayed (and printed out) as a percentage of the wet weight (WW = initial weight = 100 %). This is the **factory setting**.

During the measurement the value is constantly displayed in percent. The measured value is marked by "%MC" (Moisture Content, e.g. 11.35 %MC) also for the printed results.



Before drying After drying

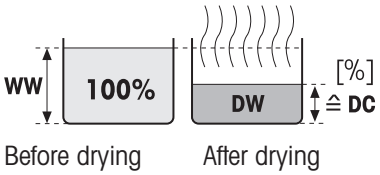
$$MC = \frac{WW - DW}{WW} \cdot 100\ \%$$

MC = Moisture Content [0…100 %]
WW = wet weight
DW = dry weight

%DC – Dry Content

The dry content of the sample is displayed (and printed out) as a percentage of the wet weight (WW = initial weight = 100 %).

During the measurement the value is constantly displayed in percent. The measured value is marked by "%DC" (Dry Content, e.g. 88.65 %DC) also for the printed results.



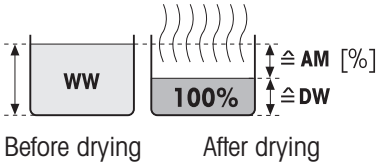
$$DC = \frac{DW}{WW} \cdot 100\ \%$$

DC = dry content [100…0 %]
WW = wet weight
DW = dry weight

%AM – ATRO Moisture Content [1)]

The moisture content of the sample is displayed (and printed out) as a percentage of the dry weight (DW = final weight = 100 %)

During the measurement the value is constantly displayed in percent. The measured value is marked by "%AM" (ATRO Moisture Content, e.g. 255.33 %AM) also for the printed results.



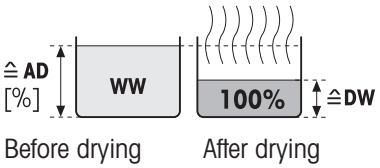
$$AM = \frac{WW - DW}{DW} \cdot 100\ \%$$

AM = ATRO moisture content [0…1000 %]
WW = wet weight
DW = dry weight

%AD – ATRO Dry Content (Wet weight)[1)]

The wet weight of the sample is displayed (and printed out) as a percentage of the dry weight (DW = final weight = 100 %)

During the measurement the value is constantly displayed in percent. The measured value is marked by "%AD" (ATRO Dry Content, e.g. 312.56 %AD) also for the printed results..



$$AD = \frac{WW}{DW} \cdot 100\ \%$$

AD = ATRO dry content [100…1000 %]
WW = wet weight
DW = dry weight

[1)] **Comment on the ATRO display mode**

If the current measured value in the ATRO display mode is greater or less than the predefined limit value (i.e. greater than 999.99 %AD or less than –999.99 %AM), the ATRO result values are limited to 999.99%.

5.3 Preparing the sample

The quantity and preparation of the sample is crucial for the speed of the measurement process and the quality of the measurement results.

- Choose a sample size that is as small as possible but as large as necessary.
- The more inhomogeneous the sample substance, the larger the amount of sample needed to obtain a repeatable result.
- Distribute the sample evenly over the sample pan. This increases the surface area of the sample and facilitates heat absorption.
- Use the glass fiber filter (available as accessory) for the following sample types:
  - liquid samples
  - fat-containing samples

– melting samples
– highly reflective samples
– samples that form a skin on the surface when heated

Tare the glass fiber filter together with the sample pan before adding the sample.

See also

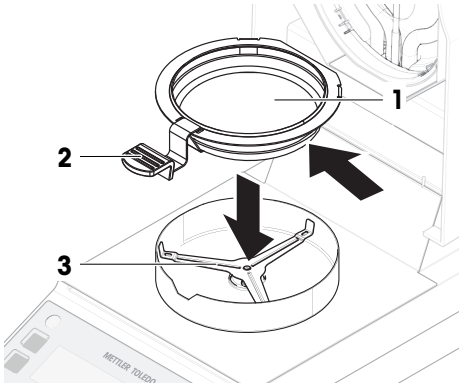
Accessories ▸ Page 44

5.4 Performing a measurement

5.4.1 Taring the instrument

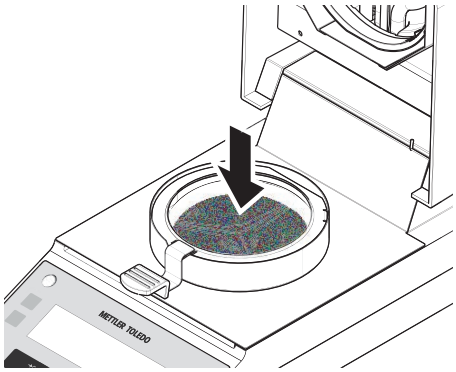
Before a subsequent measurement, the instrument must be tared.

1 Press the key **A** or **B** to select a method.
2 Open the lid.
➡ The user guidance icon prompts you to place the empty sample pan.
3 Slide the empty sample pan (**1**) from the side into the sample pan handler (**2**).
4 Place the sample pan handler (**3**) in the draft shield. Make sure that the tongue of the sample pan handler lies exactly in the slot of the draft shield. The pan must lie flat in the pan holder.
5 Close the lid.
➡ The instrument is tared automatically.



5.4.2 Starting the measurement

1 Add the sample to the sample pan and distribute evenly, see [Preparing the sample ▸ Page 23]. The minimum sample weight required is 0.5 g.
2 Close the lid.
➡ The measurement starts automatically (factory setting).
➡ The display shows the following during the measurement:
– state of the drying progress (progress indicator)
– current temperature in the sample chamber
– elapsed time since the start of the measurement process
– current result in the chosen display mode
3 Read the final result on the display. If a printer is connected, press [🖶] to print the result (if automatic printing is not activated).



5.4.3 Completing the measurement

⚠ CAUTION

Burns due to hot surfaces

The sample, sample pan and other parts inside the sample chamber may still be hot and can cause injuries if touched.

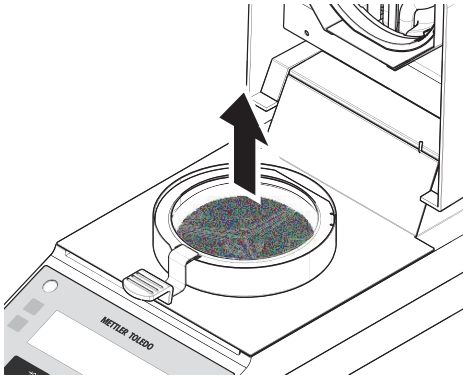
1 Do not touch the housing where it's marked with the warning symbol.
2 Only remove the sample pan using the sample pan handler.

■ The measurement is finished.

1 Open the lid.

2 Remove the sample pan handler from the sample chamber.

3 To remove the sample pan from the handler, lift the pan slightly from below and pull it sideways out of the handler.
If you no longer need the sample and the pan, tilt the handler until the pan slides out.



5.4.4 Cancelling the measurement

– To cancel a running measurement, press [**Stop**]
  ➡ The display shows **ABORT**.

➡ The measurement is cancelled.

5.5 Tests

Introduction

Routine tests can be performed to ensure accurate measurement results. The tests should be performed in fixed, regular intervals depending on your quality management system and the results should be documented in a traceable way.

5.5.1 SmartCal test

A SmartCal test is a quick and integral test of the instrument functions. SmartCal™ is a granular test substance whose moisture content value, when heated at a specific temperature for a specific time, is precisely defined. By performing a measurement with SmartCal™ and comparing the results to the control limits, it can be tested if both the integrated balance as well as the temperature sensor work well together and if the instrument functions correctly.

However, SmartCal tests do not supersede the recommended periodic weight or temperature tests.

5.5.1.1 Handling SmartCal

- Store SmartCal™ at room temperature.
- Remove SmartCal™-stick from the blister pack right before use.
- Do not use damaged or expired sticks (the expiry date is printed on the blister pack and on the stick (e.g. Exp08.2021).
- After a SmartCal™ test, the test substance can be disposed of as normal waste.

Additional information about SmartCal™ can be found under:

www.mt.com/smartcal

5.5.1.2 Performing a SmartCal test

A SmartCal test is carried out in the same way as a measurement but needs specific method settings to deliver a comparable result.

For more detailed information on the recommended test settings, refer to the documentation delivered with SmartCal.

■ The instrument is at room temperature.

1 Press **Menu**.

2 Use [∧] or [∨] to select **CAL**.

3 Use [∧] or [∨] to select **S.CAL**.

4 Use [∧] or [∨] to set the temperature to 70 °C, 100 °C, 130 °C, or 160 °C. Select the temperature that most closely matches your application.

5 Confirm your entry with [↵].

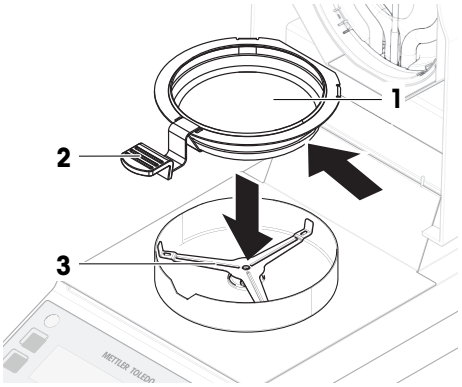
6 Open the lid.

7 Slide the empty sample pan (**1**) from the side into the sample pan handler (**2**).

8 Place the sample pan handler (**3**) in the draft shield. Make sure that the tongue of the sample pan handler lies exactly in the slot of the draft shield. The pan must lie flat in the pan holder.

9 Close the lid.

➡ The instrument is tared automatically.

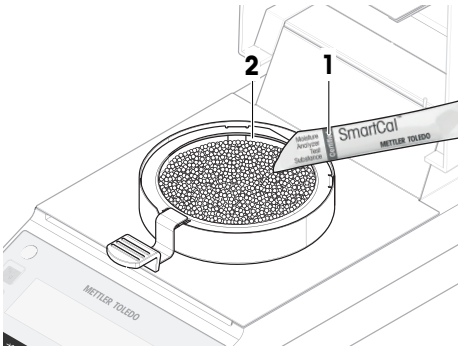


10 Remove a SmartCal stick (**1**) from the blister pack, open it and distribute the whole content evenly over the sample pan (**2**). If necessary, carefully rotate and tilt the sample pan until it is fully and uniformly covered with granulate.

11 Close the lid.

➡ The test measurement starts automatically.

➡ The test measurement takes 10 minutes and stops automatically.



5.5.1.3 Evaluating the test results

Compare the SmartCal test result with the control limits below and evaluate whether the result exceeds the defined control limits.

Drying temperature	cSmartCal	SmartCal
70 °C	3.3...4.3 %MC_N	3.2...4.4 %MC_N
100 °C	5.3...6.3 %MC_N	5.2...6.4 %MC_N
130 °C	7.5...8.7 %MC_N	7.4...8.8 %MC_N
160 °C	10.0...11.6 %MC_N	9.9...11.7 %MC_N

MC_N = Normalized moisture content (Calculated value in consideration of temperature and humidity).

Normalizing the test results

To normalize the measured SmartCal results, measure the ambient room temperature and relative humidity. Normalize the test result using the values in the table below:

		Ambient Temperature [°C]						
		10	**15**	**20**	**25**	**30**	**35**	**40**
Relative humidity [%]	**20**	-0.31	-0.28	-0.24	-0.18	-0.12	-0.03	+0.07
	25	-0.29	-0.25	-0.20	-0.13	-0.05	+0.06	+0.19
	30	-0.27	-0.22	-0.16	-0.08	+0.02	+0.15	+0.31
	35	-0.24	-0.19	-0.12	-0.03	+0.09	+0.24	+0.42
	40	-0.22	-0.16	-0.08	+0.03	+0.16	+0.33	+0.54
	45	-0.20	-0.13	-0.04	+0.08	+0.23	+0.42	+0.66
	50	-0.18	-0.10	0.00	+0.13	+0.30	+0.51	+0.77
	55	-0.16	-0.07	+0.04	+0.18	+0.37	+0.60	+0.89
	60	-0.14	-0.04	+0.08	+0.24	+0.44	+0.69	+1.01
	65	-0.12	-0.01	+0.12	+0.29	+0.51	+0.78	+1.12
	70	-0.09	+0.02	+0.16	+0.34	+0.58	+0.87	+1.24
	75	-0.07	+0.04	+0.20	+0.39	+0.64	+0.96	+1.36
	80	-0.05	+0.07	+0.24	+0.45	+0.71	+1.05	+1.47

Example:

		Example A	**Example B**
Displayed result after SmartCal test	[%MC]	5.94	5.55
Room temperature	[°C]	15	32
Relative humidity	[%RH]	55	40
Correction value (from SmartCal normalization table)	[$\%MC_{CV}$]	-0.07	+0.24
Normalized moisture content	[$\%MC_{N}$]	**5.87**	**5.79**

5.5.1.4 Taking measures after a failed test

If a SmartCal test has failed, take the following measures:

1 After the instrument has cooled down to room temperature, repeat the test and ensure that all steps have been carried out correctly.

2 If the failure persists, see "Troubleshooting".

See also

Troubleshooting ▸ Page 35

5.5.2 Temperature test

Navigation: [**Menu**] > **MENU** > **CAL** > **TEMP**

Validate if the temperature sensor delivers correct results. With the calibrated temperature kit, the difference between the temperature measured at the kit and the one measured at the temperature sensor is compared.

If the test result is out of specification, an automatic temperature adjustment may be performed directly at the end of the test, if desired.

Equipment

- Temperature kit.

See also

Accessories ▸ Page 44

5.5.2.1 Calculating the actual temperature

The temperature kit has an individual slight deviation that must be taken into account when calculating the actual temperature ($T°_{actual}$). Find the correction values ($T°_{dev}$) in the certificate of the temperature kit.

Calculation: $T°_{kit} - T°_{dev} = T°_{actual}$

$T°_{kit}$ = Displayed value at temperature kit during testing (e.g. 99 °C)

$T°_{dev}$ = Individual deviation value noted in certificate of the temperature kit (e.g. –2 °C)

$T°_{actual}$ = Actual temperature (needed to enter during testing)

Example 1: 99 °C – [–2 °C] = 101 °C

Example 2: 162 °C – [±0 °C] = 162 °C

5.5.2.2 Evaluating the results

When evaluating the temperature results, consider the two following limits:

- Evaluate whether corrected values ($T°_{actual}$) exceed the "warning limits" (if defined).
- Evaluate whether the corrected values ($T°_{actual}$) exceed the "control limits".

Warning limits

The warning limits are defined by your internal SOPs.

If a warning limit is exceeded, perform a temperature adjustment, see "Adjustments".

Control limits

The control limit for moisture analyzers is ±3 °C.

If a control limit is exceeded, contact your METTLER TOLEDO service representative.

5.5.2.3 Performing the temperature test

⚠ CAUTION

Burns due to hot surfaces

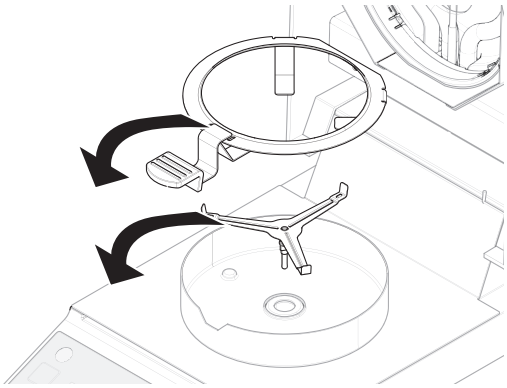
Parts of the instrument can reach temperatures that cause injuries if touched.

– Hold the temperature kit by its handle only.

- The instrument is at room temperature.

1 In the menu, select **CAL** > **TEMP** and press [↵].

2 Remove the sample pan handler and sample pan holder.

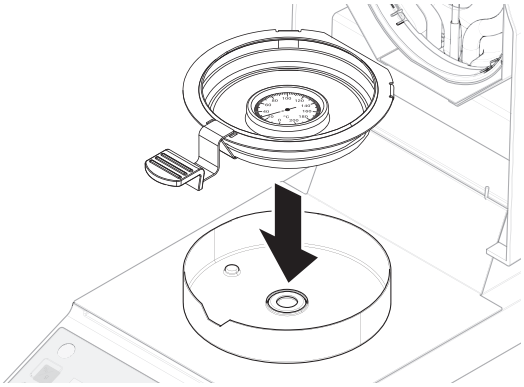


3 Place the temperature kit into the draft shield.

4 Close the lid.

➡ The instrument heats up to 100 °C.

➡ After 15 minutes, the instrument prompts with a signal (beep) to read the measured value.



5 Do not open the lid but read the temperature on the temperature kit through the viewing window in the lid.

6 Calculate the actual temperature ($T°_{actual}$) (see above).

7 Enter $T°_{actual}$ on the instrument with [∧] or [∨].

8 Confirm your entry with [↵].

➡ The heating module heats up to 160 °C.

➡ After 15 minutes, the instrument prompts with a signal (beep) to read the measured value.

9 Do not open the lid but read the temperature on the temperature kit through the viewing window in the lid.

10 Calculate the actual temperature ($T°_{actual}$) (see above).

11 Check if the values are within the warning limits.

➡ If within tolerance, end the test by pressing [Stop ↵].

➡ If not within tolerance and no adjustment shall be done, do not enter the actual temperature, but stop the test by pressing [Stop ↵].

➡ If not within tolerance and an adjustment shall be done, enter $T°_{actual}$ on the instrument with [∧] or [∨] and confirm with [↵]. When the adjustment is completed, the instrument displays **DONE** and automatically quits the menu.

12 Remove the temperature kit.

13 Insert the sample pan holder and the sample pan handler.

➡ The Instrument is ready for measuring.

5.6 Adjustments

Adjust the instrument in the following cases:

- Before the instrument is used for the first time.
- If a test has failed.
- If the instrument has been disconnected from the power supply or in the event of power failure.
- After significant environmental changes, e.g., temperature, humidity, air draft or vibrations.
- At regular intervals during weighing service.

METTLER TOLEDO offers an adjustment service. For more information, contact your METTLER TOLEDO service representative.

5.6.1 Weight adjustment

Navigation: [**Menu**] > **MENU** > **CAL** > **WEIGH**

In an external weight adjustment, the integrated balance is adjusted by placing a predefined weight as a reference for the instrument to re-calibrate itself.

See also

Accessories ▸ Page 44

5.6.1.1 Performing the adjustment

1 Remove the sample pan handler from the sample pan holder.

2 In the menu, select **CAL** > **WEIGH** and press [↵].

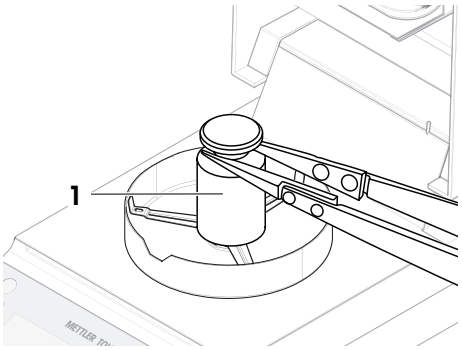
➡ The instrument tares, the weight icon is displayed and **50.000 g** is flashing.

3 Place the test weight (**1**) on the center of the sample pan holder.

➡ The display flashes **- - - - - - - -** .

4 Remove the test weight when **0.000 g** is flashing.

➡ When the adjustment is completed, the instrument displays **DONE** and automatically quits the menu.



5.6.2 Temperature adjustment

The temperature adjustment procedure is mostly identical to the temperature test: after the test measurement, an adjustment can be made.

See also

Temperature test ▸ Page 27

6 Maintenance

To guarantee the functionality of the moisture analyzer and the accuracy of the results, a number of maintenance actions must be performed by the user.

6.1 Maintenance tasks

Maintenance action	Recommended interval	Remarks
Cleaning	• After every use • After changing the sample • Depending on the degree of pollution • Depending on your internal regulations (SOP)	see "Cleaning"
Performing a routine SmartCal test	• Depending on your internal regulations (SOP)	see "Test"
Performing adjustments (weight adjustment, temperature adjustment)	• After changing the location • If a test indicates that an adjustment is needed	see "Adjustments"
Replacing the power line fuse	• If the fuse is blown	see "Replacing the power line fuse"

See also

- Adjustments ▸ Page 29
- Cleaning ▸ Page 31
- Replacing the power line fuse ▸ Page 34
- Tests ▸ Page 25

6.2 Cleaning

⚠ CAUTION

Burns due to hot surfaces

The interior parts of the heating module as well as the parts in the sample chamber can reach temperatures that can cause injuries if touched.

– Wait until the heating module has cooled down completely before performing any maintenance task.

6.2.1 Cleaning agents

The following table presents the cleaning tools and cleaning agents recommended by METTLER TOLEDO.

		Tools			Cleaning agents						
		Paper tissue	Brush	Dishwasher	Water	Acetone	Ethanol (70 %)	Isopropanol (70 %)	Hydrochloric acid (3-10 %)	Sodiumhydroxide (0.2-1.0 M)	Peracetic acid (2-3 %)
Around the instrument	Instrument housing	✓	PR	—	R	—	R	✓	PR	PR	PR
	Feet	✓	R	—	R	—	R	✓	R	R	R

		Paper tissue	Brush	Dishwasher	Water	Acetone	Ethanol (70 %)	Isopropanol (70 %)	Hydrochloric acid (3-10 %)	Sodiumhydroxide (0.2-1.0 M)	Peracetic acid (2-3 %)
Instrument terminal	Terminal	✓	—	—	✓	PR	PR	PR	R	R	R
	Display	✓	—	—	✓	PR	R	R	R	R	R
	Protective cover of display	✓	R	—	✓	—	R	R	R	PR	PR
Heating module	Temperature sensor	✓	PR	—	R	PR	R	✓	R	R	R
	Protective glass	✓	R	—	R	PR	✓	✓	R	PR	R
Sample chamber	Draft shield	✓	R	R	R	R	✓	✓	R	R	R
	Sample pan holder	✓	R	—	R	R	✓	✓	R	R	R
	Sample pan handler	✓	R	—	R	R	✓	✓	PR	PR	PR

Legend

✓ Best recommendation by METTLER TOLEDO; can be used without limitation.

R Recommended by METTLER TOLEDO; can be used without limitation.

PR Partially recommended by METTLER TOLEDO: individual resistance to acid and alkali must be evaluated, including dependence to the time exposure.

— Not recommend. High risk for damage.

6.2.2 Disassembling for cleaning

6.2.2.1 Disassembling the sample chamber

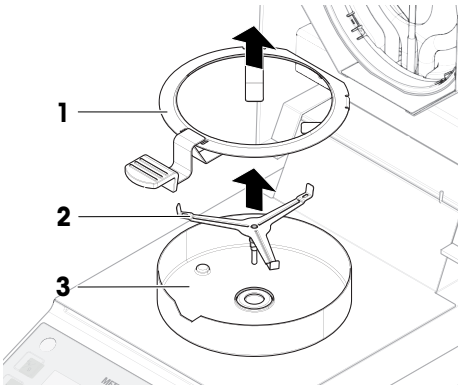
- The moisture analyzer is switched off.

1 Open the lid.

2 Remove the sample pan handler (**1**).

3 Remove the sample pan holder (**2**).

4 Remove the draft shield (**3**).



6.2.2.2 Disassembling the protective glass

The protective glass only needs to be removed if cleaning behind the glass is required.

NOTICE

Erroneous results due to dirty halogen lamp

If the halogen lamp comes into contact with adhesive substances while the protective glass is removed, the heat may be unevenly distributed and results may be distorted.

1 Do not touch the halogen lamp.

2 If you touch the halogen lamp, clean it carefully with a damp lint-free cloth and a mild solvent, e.g., isopropanol or ethanol 70%.

Required material

- Screwdriver

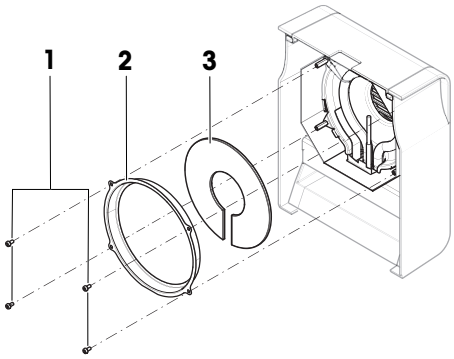
■ The moisture analyzer is switched off.

1 Open the lid.

2 Carefully remove the four screws (**1**) holding the reflector ring.

3 Remove the reflector ring (**2**) (glass holder).

4 Carefully take the protective glass (**3**) out of the reflector ring.



6.2.3 Cleaning the instrument

NOTICE

Damage to the instrument due to inappropriate cleaning methods

If liquid enters the housing, it can damage the instrument. The surface of the instrument can be damaged by certain cleaning agents, solvents, or abrasives.

1 Do not spray or pour liquid on the instrument.

2 Only use the cleaning agents specified in the Reference Manual (RM) of the instrument.

3 Only use a lightly moistened, lint-free cloth or a tissue to clean the instrument.

4 Wipe off any spills immediately.

Cleaning around the moisture analyzer

– Remove any dirt or dust around the moisture analyzer and avoid further contaminations.

Cleaning the terminal

– Clean the terminal with a damp cloth or a tissue and a mild cleaning agent.

Cleaning the removable parts

– Clean the removed part with a damp cloth or a tissue and a mild cleaning agent.

Cleaning the moisture analyzer

1 Use a lint-free cloth moistened with a mild cleaning agent to clean the surface of the moisture analyzer.

2 Remove powder or dust with a disposable tissue first.

3 Remove sticky substances with a damp lint-free cloth and a mild solvent, e.g., isopropanol or ethanol 70%.

6.2.4 Putting into operation after cleaning

1 Reassemble the moisture analyzer.
2 Connect the moisture analyzer to the power supply.
3 Press ⏻ to switch on the moisture analyzer.
4 Check the level status, level the moisture analyzer if necessary.
5 Respect the warm-up time specified in the "Technical Data".
6 Perform a routine test according to the internal regulations of your company. METTLER TOLEDO recommends performing a SmartCal test after cleaning the balance.

➡ The moisture analyzer is ready to be used.

See also

SmartCal test ▸ Page 25

6.3 Replacing the power line fuse

NOTICE

Damage due to faulty fuse handling

Using the wrong fuse or false handling of the fuse can lead to irreparable damage on the instrument.

1 Only use fuses of the correct type and rated value.
2 Do not short-circuit (bridge) the fuse.

If the display of your terminal remains dark after switching on, in all probability the power line fuse is blown.

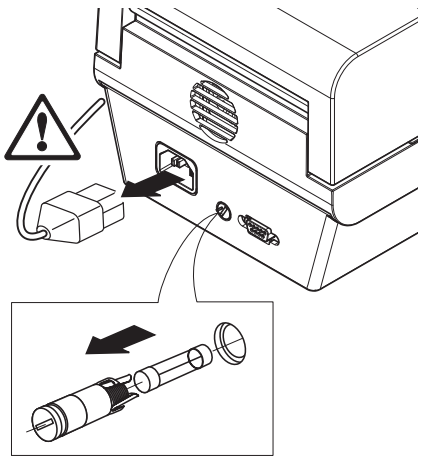
The power line fuse is located on the back of the moisture analyzer.

Required material

- Screwdriver
- Spare fuse, for correct type see [General data ▸ Page 39]

Procedure

1 Disconnect the power cable.
2 To unlock the fuse holder, press the screwdriver into the fuse holder and turn it slightly (max. half a turn).
3 Pull out the fuse holder.
4 Remove the fuse and check its condition.
5 If the fuse is blown, replace the fuse with one of the same type and the same rated value.
6 Insert the fuse holder and lock it by turning it clockwise.
7 Reconnect the power cable.



See also

General data ▸ Page 39

7 Troubleshooting

Possible errors with their cause and remedy are described in the following chapter. If there are errors that cannot be corrected through these instructions, contact METTLER TOLEDO.

7.1 Error messages

Message on Display	Beep signal	Cause	Remedy
Overload 	–	Overload – The weight on the pan exceeds the weighing capacity of the instrument.	– Reduce the weight of the sample.
Underload 	–	The sample pan holder is missing.	– Insert the sample pan holder. If needed, reboot the system by disconnecting and connecting the power supply.
Flashing zeros 	–	Out of zero range – When the instrument was switched on or upon zeroing, one or more limits were exceeded. The usual reason for this message to appear is when there is a weight on the weighing pan when the instrument is switched on.	– Remove all weight on the weighing pan.
Flashing **CLOSE**	🔈	The instrument was tared with open lid.	– Close the lid.
Flashing **NO.DAT**	🔈	Date lost - this may happen if the moisture analyzer powered off for more than a week.	– Set the date in the menu.
Flashing **TARE**	🔈	Missing tare weight	– Tare the empty sample pan before placing the sample.
Flashing **ERR.01**	🔈	No stable weight could be captured.	1 Make sure that the location of the instrument heeds the ambient conditions. See [Selecting the location ▸ Page 13]. 2 Make sure that no part of the sample or the sample pan touches the draft shield or the sample pan handler. 3 Ensure that the sample pan holder is correctly installed and is not damaged. 4 Highly volatile substances in the sample also prevent a stable weighing result being detected since the sample is continuously losing weight.
Flashing **ERR.02**	🔈	Wrong adjustment weight on the pan. Either no weight or the wrong weight has been placed on the sample pan during adjustment. (This message is also displayed if you do not remove the weight when prompted to do so by the instrument.)	– Repeat the adjustment process and place the required adjustment weight.

Message on Display	Beep signal	Cause	Remedy
Flashing **ERR.03**	🔈	Sample weight out of tolerance.	– Enlarge or reduce the sample weight. The range for the sample weight is 0.5 g to 54 g.
Flashing **ERR.08**	🔈	Temperature entry missing. The temperature adjustment was cancelled due to lack of input (timeout).	– Repeat the temperature adjustment.
Flashing **ERR.10**	🔈	The current detected temperature is higher that the target temperature.	– Wait until heating module has cooled down.
Flashing **ERR.11**	🔈≡	Over heating – the heating module exceeds the maximum temperature.	1 Wait until heating module has cooled down. 2 If the error persists, contact your METTLER TOLEDO service representative.
ERR.12	🔈≡	Wrong load cell data.	Contact your METTLER TOLEDO service representative.
ERR.13	🔈≡	Program memory is defective.	Contact your METTLER TOLEDO service representative.
ERR.14	🔈≡	Temperature sensor of load cell is defective.	Contact your METTLER TOLEDO service representative.
ERR.15	🔈≡	Temperature sensor of the heating module is defective.	Contact your METTLER TOLEDO service representative.
ERR.16	🔈≡	Wrong load cell brand.	Contact your METTLER TOLEDO service representative.
ERR.17	🔈≡	Wrong model type data set.	Contact your METTLER TOLEDO service representative.

Beep signals

🔈	Non-critical error	Quick beep three times
🔈≡	Critical error	Quick beep repeatedly
🔈🔈≡	Urgent error	Long beep repeatedly

7.2 Error symptoms

Error symptom	Possible cause	Diagnostic	Remedy
The moisture analyzer cannot be switched on.	The power supply cable is not properly connected.	Check the power cable.	Connector reconnect the power cable to the power supply.
	The power line fuse is blown.	Check the power line fuse. The fuse is located on the back of the instrument besides the power plug. See "Maintenance".	Replace the power line fuse. See "Maintenance". If the error persists, contact your METTLER TOLEDO service representative.
Keys and buttons on the terminal do not respond.	Software bug.	–	Restart the software by disconnecting and reconnecting the power supply.
The measurement takes too long.	An unsuitable switch-off criterion was set.	–	Choose a suitable switch-off criterion.

Error symptom	Possible cause	Diagnostic	Remedy
	Sample substance tends to form a skin, when heated.	–	If you use samples which tend to form a skin that hinders evaporation, perform the measurement at a higher temperature.
	An excessive amount of sample cause slow drying.	–	Enlarge the surface of the sample substance, e.g by crushing or grinding.
	Liquids take longer to dry.	–	For sample liquids, use absorbent glass fibre filters.
			Use absorbent glass filter for liquids.
			Enlarge the surface of the sample, e.g. by crushing or grinding.
The instrument does not heat up after starting a measurement.	The lid is still open.	Check.	Close the lid.
	The halogen lamp is defective.	Check the halogen lamp for damage.	Contact your METTLER TOLEDO service representative.
	The heating module is overheated and the thermal overload protection has switched off the heating.	–	Contact your METTLER TOLEDO service representative.
The printer does not function/print.	The cable is not properly connected.	Check all cable connections.	
	The printer is not correctly activated in the settings.	Check the printer settings, see "User menu".	Set the printer settings according to the descriptions in "User menu".
Incorrect characters are printed.	The bit/polarity settings are not set correctly.	Check the settings. See "User menu".	Change the bit/polarity setting of the printer and the instrument to "8/NO".
			Make sure the printer and the instrument have the same baud rate set.
			Use the correct character sets.
Measurement results are not repeatable.	Unstable environment/ location of the instrument.	–	Choose a suitable location. See "Selecting the location".
	The sample substance boils and the splashed drops continuously change the weight.	–	Lower the drying temperature.
	The drying time is too short for the "Timed" switch-off criterion.	–	Set a longer drying time for the "Timed" switch-off criterion.

Error symptom	Possible cause	Diagnostic	Remedy
	The samples are not comparable.	–	Use sample quantities as equal as possible, e.g. always within ±10% tolerance.
	The granulation of the sample is not homogenous or too large.	–	Use samples with a homogenous granulation.
	Insufficient heating power because the protective glass of the halogen radiator is dirty.	Check if the protective glass is dirty.	Clean the protective glass. See "Cleaning".
	The temperature sensor is contaminated/dirty.	Check if the temperature sensor is dirty.	Clean the temperature sensor. See "Cleaning".
	The sample substance does not become completely dry due to uneven distribution in the sample pan.	–	Evenly spread the sample substance in the sample pan and retry.
A SmartCal test failed.	The test prerequisites were not met.	–	Ensure that the test requirements are met and repeat the SmartCal test after the instrument has cooled down.
	The test substance does not become completely dry due to uneven distribution in the sample pan.	–	Evenly spread the test substance in the sample pan and repeat the SmartCal test after the instrument has cooled down.
	The instrument is no longer properly adjusted.	–	1. Perform a temperature test after the instrument has cooled down. 2. If the failure persists, perform a weight test after the instrument has cooled down. 3. If the failure persists, contact your METTLER TOLEDO service representative.

8 Technical Data

8.1 General data

Power supply

115 V AC		100 V–120 V AC, 50/60 Hz, 4 A
230 V AC		200 V–240 V AC, 50/60 Hz, 2 A
Voltage fluctuations		-15%+10%
Power load radiator		max. 400 W during drying process
Power line fuse	115 V:	5 x 20 mm, F6.3AL250V (6.3 A, fast-acting, low breaking capacity)
	230 V:	5 x 20 mm, F2.5AL250V (2.5 A, fast-acting, low breaking capacity)

Protection and standards

Overvoltage category	II
Degree of pollution	2
Standards for safety and EMC	see Declaration of Conformity (part of standard equipment)
Range of application	for use in dry interior rooms

Environmental conditions

Height above sea level	< 4000 m
Ambient temperature range	Operation: +10 °C to +30 °C (operability guaranteed +5 °C to +40 °C)
Relative air humidity	max. 80% up to +31 °C, linearly decreasing to 50% at +40 °C 20% - 80% and non-condensing conditions.
Warm-up time	At least **60 minutes** after connecting the instrument to the power supply. When switched on from standby, the instrument is ready for operation immediately.

Materials

Heating module

Housing	PBT-GB20
Inspection window grill	PPS A504X90 (UL94-V0)
Protective glass	Glass ceramics
Halogen lamp	Quartz glass
Reflector	Stainless steel, X2CrNiMo17-2 (1.4404)
Reflector bracket	PPS A504X90 (UL94-V0)
Draft shield, interior bottom plate	Stainless steel, X2CrNiMo17-2 (1.4404)

8.2 Model-specific data

Heating module

Heating Module	Halogen ring-shaped radiator
Temperature range	50–200 °C
Temperature step	1 °C
Temperature programs	standard, rapid
Drying time	max. 120 minutes

Balance

Maximum capacity	71 g
Readability	0.001 g
Minimum sample weight	0.5 g
Weighing technology	Strain Gauge
Adjustment	External weight (50 g, accessory)

Moisture Content

Readability	0.01%
Repeatability (sd) with 2 g sample	max. 0.15%
Repeatability (sd) with 10 g sample	max. 0.05%

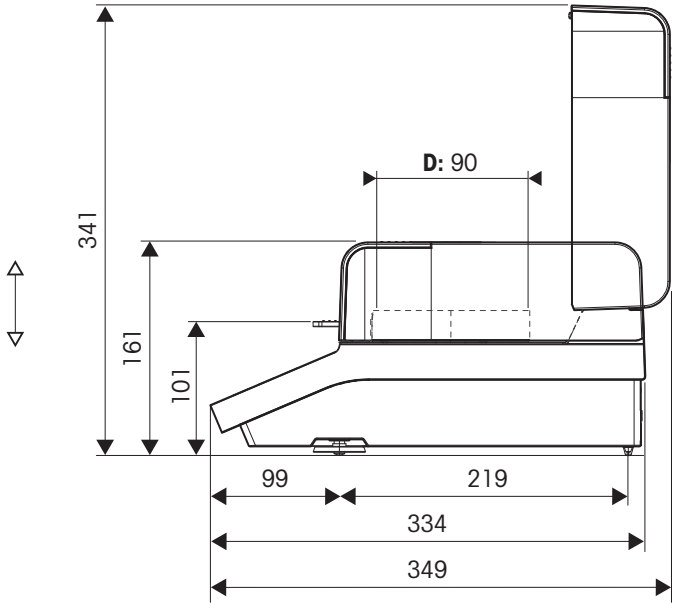
Interfaces

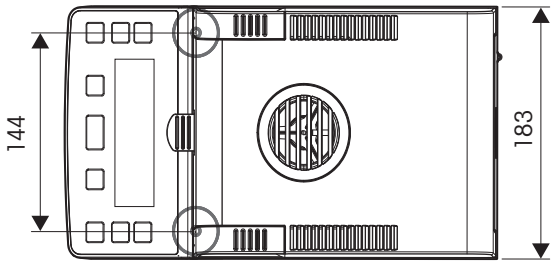
	1 x RS232C (9-pin socket)

Hardware

Leveling	2 leveling screws, Level indicator
Sample pan	Ø 90 mm
Maximum height of sample	25 mm
Thermal overload protection	Bimetallic-element switch in heating module
Dimensions with the heating module closed (w x h x d)	183 x 161 x 334 mm **See** [Dimensions ▸ Page 41]
Weight	4.1 kg

8.3 Dimensions

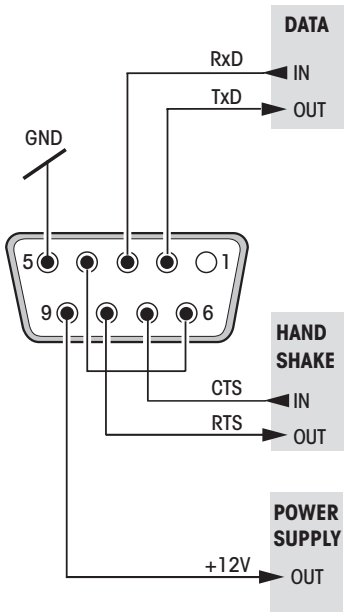




↔	Outer dimensions [mm]

8.4 Interface specification

RS232C

Schematic	Item	Specification
	Interface type	Voltage interface according to EIA RS-232C/ DIN66020 CCITT V24/V.28)
	Max. cable length	15 m
	Signal level	Outputs: +5 V … +15 V (RL = 3–7 kΩ) –5 V … –15 V (RL = 3–7 kΩ) Inputs: +3 V … +25 V –3 V … -25 V
	Connector	Sub-D, 9-pole, female
	Operating mode	Full duplex
	Transmission mode	Bit-serial, asynchronous
	Transmission code	ASCII
	Baud rates	see User menu structure
	Bits/parity	see User menu structure
	Stop bits	see User menu structure
	Handshake	None, XON/XOFF, RTS/CTS (software selectable)
	Power supply for optional devices	+ 12 V, max 150 mA (only if pin 1 is connected to Ground)

9 Disposal

In conformance with the European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties, the content of this regulation must also be related.

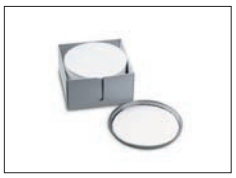
10 Accessories and Spare Parts

10.1 Accessories

Accessories are additional components that could help you in your workflow.

	Description	Order no.
Cables for RS232C interfaces		
	RS9 connection cable (to connect the instrument to a PC) Length: 1 m	11101051
	USB-RS232 cable (to connect the instrument via RS232C to a USB port)	64088427
Printers		
	RS-P25 printer with RS232C connection to instrument	30702967
	Paper roll (length: 20 m), set of 5 pcs	00072456
	Paper roll (length: 13 m), self-adhesive, set of 3 pcs	11600388
	Ribbon cartridge, black, set of 2 pcs	00065975
	RS-P26/01 (EMEA) printer with RS232C connection to instrument (with date and time)	11124303
	Paper roll (length: 20 m), set of 5 pcs	00072456
	Paper roll, self-adhesive (length: 13 m), set of 3 pcs	11600388
	Ribbon cartridge, black, set of 2 pcs	00065975
Sample Handling		
	Aluminum sample pans, set of 80 pcs	00013865
	Extra strong aluminum sample pans, set of 80 pcs	11113863
	Reusable steel sample pans, height 6 mm, set of 3 pcs	00214462

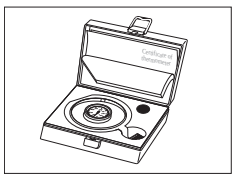
Textile cage for bulky samples (HA-cage), 1 pcs 00214695



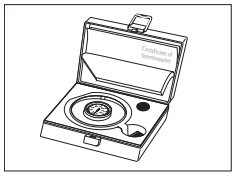
Glass fiber filter (for Liquids), set of 100 pcs 00214464

Quality Management

Certified adjustment weight, 50 g (F1) 30402574



Temperature kit HE-TCC, certified 30134141

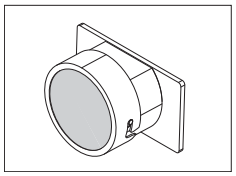


Temperature kit HE-TC 30134140

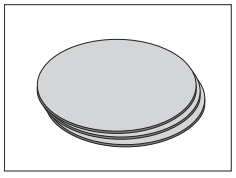
SmartCal moisture analyzer test substance

cSmartCal, certified, 12 tests	30005793
cSmartCal, certified, 24 tests	30005791
SmartCal, 12 tests	30005792
SmartCal, 24 tests	30005790
StarterPac cSmartCal	30005918
StarterPac SmartCal	30005917

Miscellaneous



HC/HE dust filter housing 30216118

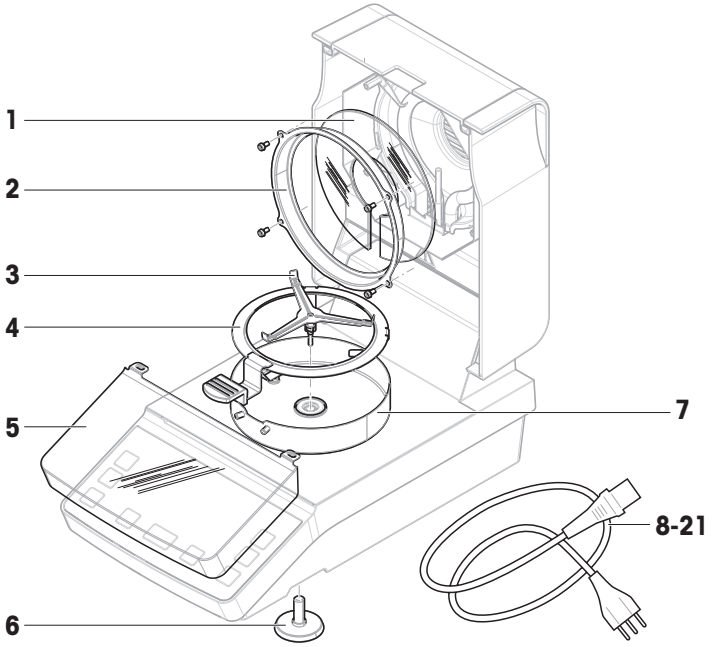


Dust filter, set of 50 pcs 11113883

10.2 Spare parts

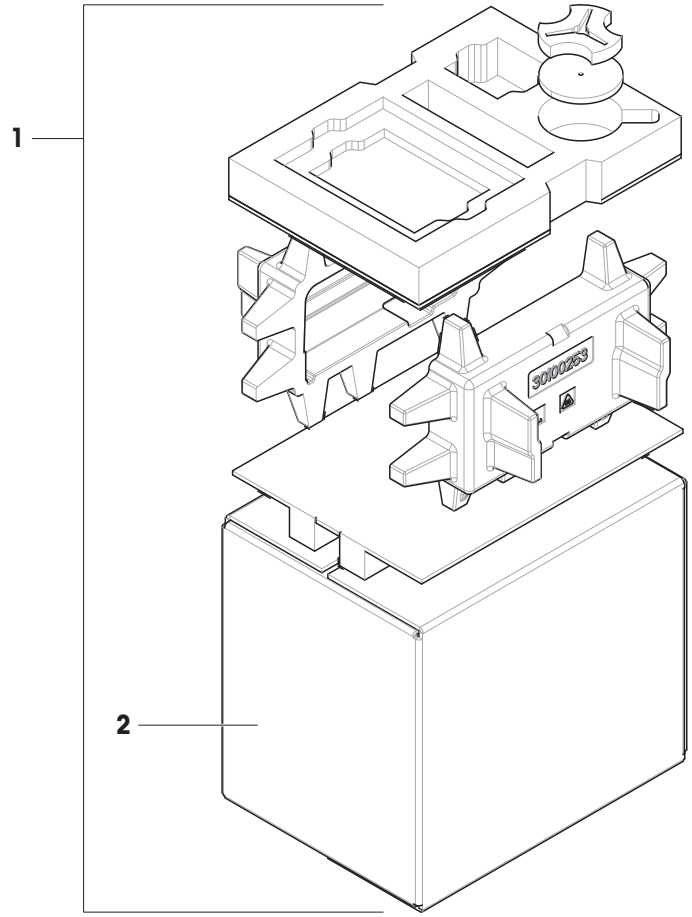
Spare parts are parts that are delivered with the original instrument but that can be replaced, if needed, without the help of a service technician.

10.2.1 Instrument



	Order no.	Designation	Remarks
1	30104845	Protection glass	–
2	30104847	Reflector ring	–
3	214642	Sample pan holder	–
4	30104816	Sample pan handler	–
5	30209145	Protective cover display	–
6	30104835	Leveling feet	Including: 2 leveling feet
7	30104817	Draft protection element	–
8	88751	Power cable AU	–
9	30015268	Power cable BR	–
10	87920	Power cable CH	–
11	30047293	Power cable CN	–
12	87452	Power cable DK	–
13	87925	Power cable EU	–
14	89405	Power cable GB	–
15	225297	Power cable IL	–
16	11600569	Power cable IN	–
17	87457	Power cable IT	–
18	11107881	Power cable JP	–
19	11107880	Power cable TH, PE	–
20	88668	Power cable US	–
21	89728	Power cable ZA	–

10.2.2 Packaging



	Order no.	Designation	Remarks
1	30104849	Packaging	Including: Export box, inner protection material
2	30104848	Export box	Excluding: Inner protection material

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