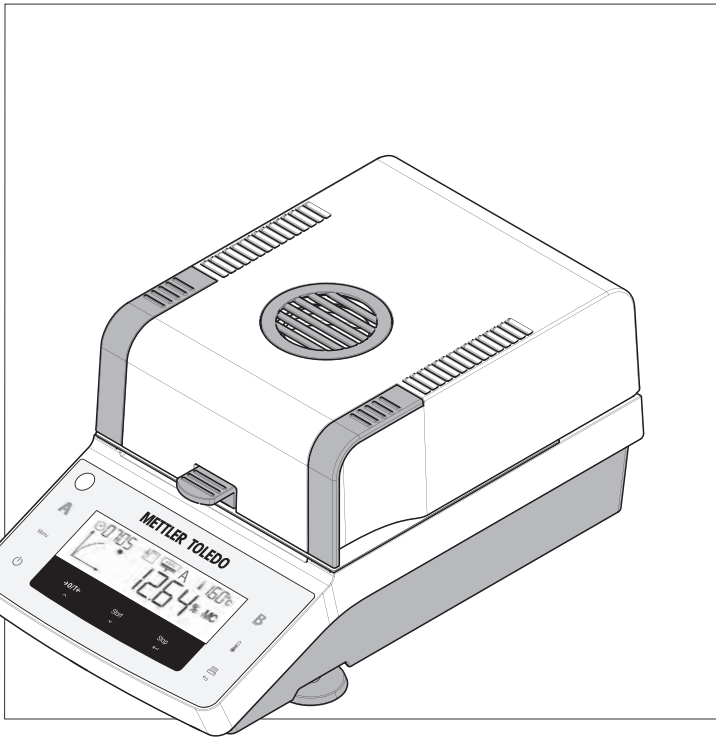
User Manual

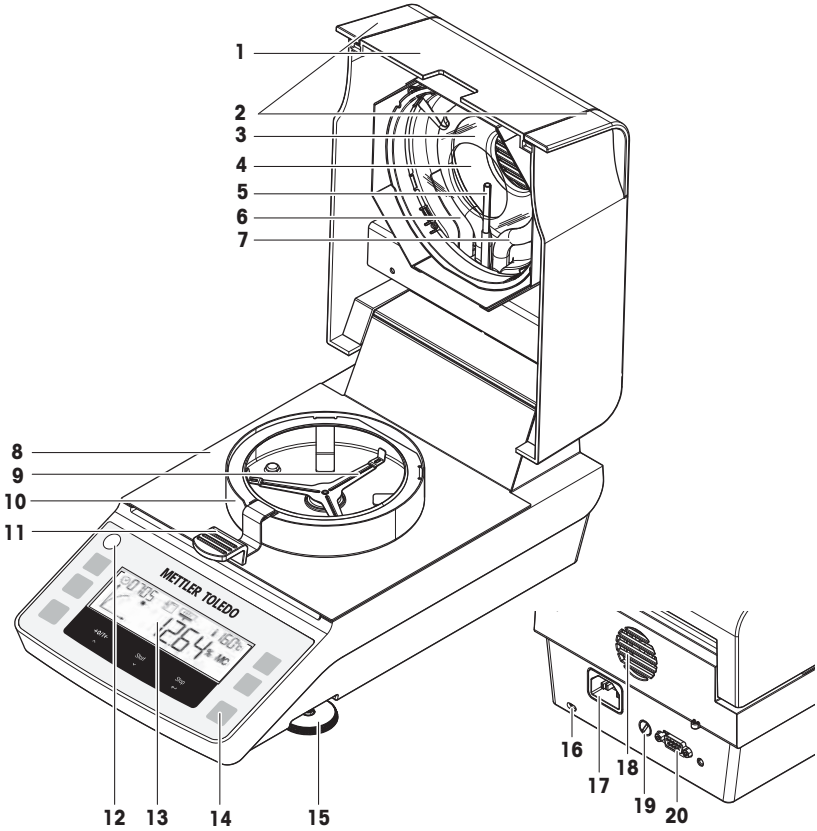
Moisture Analyzer

HE73



METTLER TOLEDO

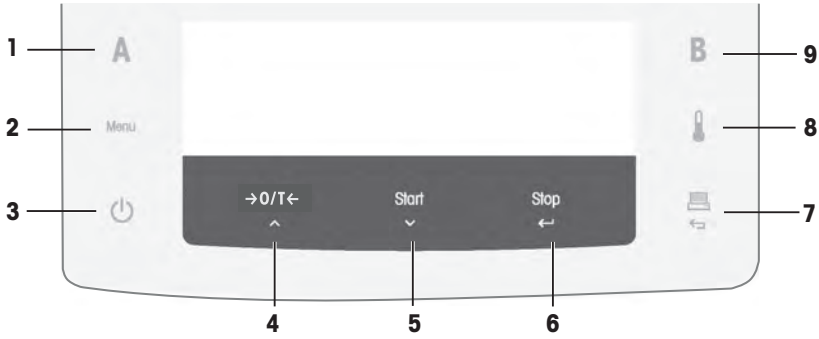
Overview Heating Module



Legend

1	Heating module	**2**	Handles for opening heating module
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 antitheft purposes
17	Power supply socket	**18**	Fan
19	Power line fuse	**20**	RS232C serial interface

Overview Operation Keys



Legend operation keys

No.	Key		Behavior in general	Behavior during drying proces	Behavior in menu mode
1	A	Method A	Activate method A.	—	—
2	Menu	Menu	Enter user menu.	—	Scroll in level 1.
3		– On – Off	– Switch on. – Switch off into standby mode.	Switch off into standby mode.	
4	→0/T← ^	– Tare / Zero – Up	Execute tare or zero.	—	Scroll to previous item.
5	Start v	– Start – Down	Start drying process.	—	Scroll to next item.
6	Stop ↵	– Stop – Enter	—	Stop drying process.	– Confirm current item. – Down one level.
7	 ⇦	– Print – Cancel / Exit	– Print the parameters and settings.	Print the intermediate value.	Up one level.
8		Temperatur e	Set drying temperature.	Display preset temperature and switch off criterion for 2 seconds.	—
9	B	Method B	Activate method B.	—	—

1 Safety Information

1.1 Definition of Signal Warnings and Symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

Signal Words

WARNING	for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	for a hazardous situation with low risk, resulting in damage to the device or the property or in loss of data, or minor or medium injuries if not avoided.
NOTICE	(no symbol) for important information about the product.
Note	(no symbol) for useful information about the product.

Warning Symbols


General hazard


Electrical shock


Hot surface


Inflammable or explosive substance


Toxic substance


Acid / Corrosion

1.2 Product Specific Safety Notes

Product Safety Information

Intended Use

Your Moisture Analyzer is used for determining the humidity in samples. Use the instrument exclusively for this purposes. Any other type of use and operation beyond the limits of technical specifications without written consent from Mettler-Toledo GmbH is 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.


It is not permitted to use the instrument in explosive atmosphere of gases, steam, fog, dust and flammable dust (hazardous environments).

General safety information

Your instrument corresponds to the state of the art technology and complies with all recognized safety rules, however, certain hazards may arise in extraneous circumstances. Do not open the housing of the instrument: It does not contain any parts which can be maintained, repaired or replaced by the user. If you ever have problems with your instrument, contact your authorized METTLER TOLEDO dealer or service representative.

Always operate and use your instrument only in accordance with the instructions contained in this document. The instructions for setting up your new instrument must be strictly observed.

If the instrument is not used according to the Operating Instructions, protection of the instrument may be impaired and METTLER TOLEDO assumes no liability.

Staff Safety

The Moisture Analyzer may be operated only by trained personnel who are familiar with the properties of the samples used and with the handling of the instrument.

These printed document must be read and understood before using the instrument. These printed document must be retained for future reference.

The instrument must not be altered or modified in any way. Only use METTLER TOLEDO original spare parts and accessories.

Protective Clothing

It is advisable to wear protective clothing in the laboratory when working with the instrument.

A lab coat should be worn.

A suitable eye protection such as goggles should be worn.

Use appropriate gloves when handling chemicals or hazardous substances, checking their integrity before use.

Safety Notes

⚠ WARNING

Risk of electric shock

Your instrument is supplied with a 3-pin power cable with an equipment grounding conductor. Only extension cables which meet this relevant standards and also have an equipment grounding conductor may be used. Intentional disconnection of the equipment grounding conductor is prohibited.

⚠ CAUTION

The Halogen Moisture Analyzer works with heat!

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

2 The vent over the sample must never be covered, plugged, taped over or tampered with in any other way.

3 Do not place any combustible materials on, under or next to the instrument since the area around the heating module may be hot.

4 Exercise caution when removing the sample. The sample itself, the sample chamber, the draft shield and any sample vessels used may still be very hot.

5 During operation, you should never open the heating module itself as the ring-shaped heating reflector or its protective glass can reach 400 °C! If you have to open the heating module e.g. for maintenance, disconnect the instrument from the power supply and wait until the heating module has cooled down completely.

6 No modifications must be made within the heating module. It is particularly dangerous to bend any components or remove them or to make any other changes.

Certain samples require special care!

With certain types of samples, there is a possibility of danger to personnel or damage of property. Please note that the user always has the responsibility and liability for damage caused by use of any types of samples!

⚠ CAUTION

Fire or Explosion

- Flammable or explosive substances.
- Substances containing solvents.
- Substances which evolve flammable or explosive gases or vapors when heated.

1 In cases of doubt, perform a careful risk analysis.

2 Work at a drying temperature that is low enough to prevent the formation of flames or an explosion.

3 Wear protective goggles.

4 Work with small amounts of sample.

5 **Never leave the instrument unattended!**

⚠ WARNING

Substances which contain toxic or caustic components

Toxic gases produced during drying could cause irritations (eyes, Skin, breathing), illness or death.

– Such substances may be dried only in a fume cupboard.

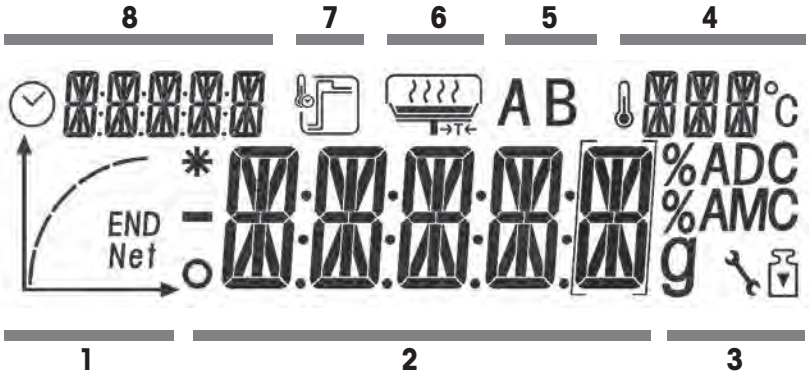
⚠ CAUTION

Corrosion

Substances which evolve corrosive vapors when heated (e.g. acids).

– Work with small amounts of samples as the vapor can condense on cooler housing parts and cause corrosion.

2 Display

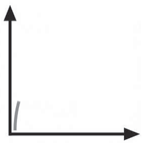
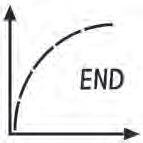


1	Progress indicator area	**2**	Main area
3	Unit/Service/Adjustment area	**4**	Temperature area
5	Method area	**6**	User guidance area
7	Heating mode area	**8**	Time area

Icons			
O	Indicates unstable values		Drying temperature
*	Indicates calculated values	°C	Temperature unit
–	Indicates negative values		Service Mode
	Switch-off criteria: Auto or Time		Weight Adjustment (callibration)
	Drying mode «Standard»		User guidance
	Drying mode «Rapid»	END	Progress indicator
AB	Shows active Method A or B	END	End of moisture determination

Progress indicator

The progress indicator informs you about the state 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.

User guidance

This graphical help guides you through the preparation process. It prompts you by flashing to execute the next operating step.

User guidance	Status	Explanation
	Basic weighing	Load the empty sample pan and execute a tare. **Note** Tare is only possible with closed heating module.
	Ready for weighing	Place the sample on the sample pan.
	Close heating module	Close heating module.
	Ready for start	Start the drying process.
	Measurement started, while heating module is still open.	Close heating module.
empty	Drying and measuring	Drying process is running.
empty	Drying complete	Drying process is completed.
empty	Taring	Taring process is running.

3 Installation and Putting into Operation

Finding More Information

▶ www.mt.com/moisture

3.1 Scope of Delivery

Open the package and remove carefully the instrument and the accessories. Check the completeness of the delivery. The following accessories are part of the standard equipment of your Moisture Analyzer.

- 80 aluminum sample pans
- 1 Sample handler
- 1 Sample pan holder (pan support)
- 1 Draft shield
- 1 Specimen sample (circular, absorbent glass fibre filter)
- 1 Power cord (country specific)
- 1 Spare fuse (country specific)
- 1 In use cover
- 1 Application brochure «Guide to Moisture Analysis»
- 1 Operating instructions or User Manual; printed or on CD-ROM, depending on country of use
- 1 CD ROM (Installation videos, Operating Instructions, User Manual, Moisture Guide, SOPs Routine Testing and further information)
- 1 Declaration of conformity

Remove the packaging from the instrument. Check the instrument for transport damage. Immediately inform your METTLER TOLEDO representative if you have any complaints or parts are missing.

Note

Store all parts of the packaging. This packaging guarantees the best possible protection for the transport of your instrument.

3.2 Location

⚠ WARNING

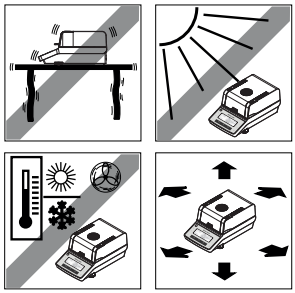
Substances which contain toxic or caustic components

Toxic gases produced during drying could cause irritations (eyes, Skin, breathing), illness or death.

– Such substances may be dried only in a fume cupboard.

Your Moisture Analyzer is a precision instrument. An optimum location guarantees accuracy and dependability. Make sure that the following environmental conditions are met:

- Operate the instrument only indoors and at an altitude of less than 4000 m above sea level.
- Before switching on the instrument, allow all its parts to reach room temperature (+5 to 30°C). Make sure that the relative humidity is between 20% and 80% and non-condensing conditions are met.
- The power plug must be easily accessible.
- Firm, horizontal location as free from vibrations as possible.
- Avoid direct sunlight.
- No excessive temperature fluctuations.
- No powerful drafts.
- Surroundings as free from dust as possible.
- Sufficient clearance around the instrument to allow warm air to dissipate.
- Sufficient distance from heat-sensitive materials in the vicinity of the instrument.



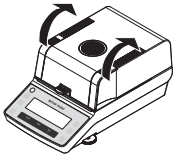
3.3 Assembling the instrument

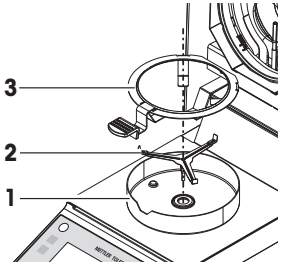
1 Open the heating module.

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).





3.4 Connecting the instrument

⚠ WARNING

Risk of electric shock

1 To connect the instrument, only use the supplied three-core power cable with equipment grounding conductor.
2 Only connect the instrument to a three-pin power socket with earthing contact.
3 Only standardized extension cable with equipment grounding conductor must be used for operation of the instrument.
4 Intentional disconnection of the equipment grounding conductor is forbidden.

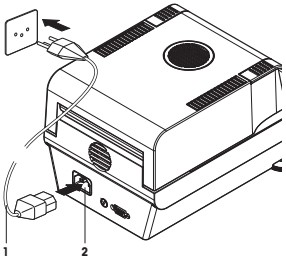
NOTICE

- Check whether the voltage printed on the type plate matches your local line voltage. If this is not the case, under no circumstances connect the power cable to the power supply, but contact a METTLER TOLEDO representative.

  Two different versions of drying units with country-specific power cable are available (115 V AC or 230 V AC).
- The power plug must be always accessible at all times.
- Prior to use, check the power cable for damage.
- Guide the cables so that they cannot become damaged or interfere with the measuring process.

▪ Instrument is at the final location.

1 Connect the power cable (1) to the power supply socket (2) on the instrument.
2 Connect the power cable (1) to the power line outlet.



3.5 Setting up the instrument

Note

Allow your instrument to warm up for 60 minutes before performing measurements. The instrument adapts itself to the ambient conditions during this time. When the instrument is in standby mode, no warming-up time is needed after switching on.

Switching on the instrument

1 Instrument is connected to the power supply.
2 To switch on, press [⏻].
   ⇨ Display appears.

⇨ Instrument is ready to use.

Leveling

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.

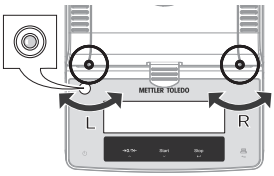
Note

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

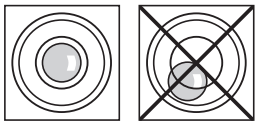
For exact horizontal positioning, the instrument has a level indicator (level) and 2 leveling screws. When the air bubble in the level indicator is exactly in the center, the instrument is standing perfectly horizontally. To level it, proceed as follows:

1 Position your instrument at the selected location.

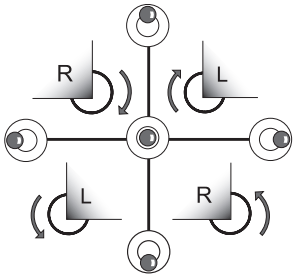
2 Turn the two leveling feet until the air bubble is in the center of the level indicator.



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 counter-clockwise
Air bubble at	"9 o'clock"	turn left foot counter-clockwise, right foot clockwise



Switching off

– Press [⏻] to switch the instrument off into standby.

3.6 Adjustments

If you have connected a printer to your instrument and this is activated, on completion of the adjustment an adjustment record will be automatically printed out.

3.6.1 Weight Adjustment

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

In this menu item, you can adjust the balance of your instrument.

NOTICE

- To obtain accurate results, the balance must be adjusted at the point of use under measuring condition in order to match the gravitational acceleration at its location. The instrument must be connected to the power supply for approximately 60 minutes in order to reach operating temperature before adjusting. Adjusting is necessary:
  - before the instrument is used for the first time.
  - after a change of location.
- We advice you to wait at least 30 minutes after a drying operation (or previous heating module adjustment) before performing the adjustment.

Note

You can press [⏎] to stop weight adjustment at any time.

Adjustment procedure

1 Have the required test weight (50 grams) ready.
2 Open the heating module.
3 Remove any load on the sample pan holder including the sample pan.
4 Chose the menu option **CAL** > **WEIGH** and press [↵].
⇨ The instrument tares, the weight icon is displayed and **50.000 g** is flashing.
5 Place the requested test weight in the center of the sample pan holder.
⇨ The display flashes **- - - - - - -** .
6 Remove the test weight when **0.000 g** is flashing.
⇨ The instrument displays successful adjustment with **DONE** and changes to weighing mode.

3.6.2 Temperature Adjustment

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

This function allows you to adjust the temperature control of the heating module. The adjustment is defined by two points, namely 100 °C and 160°C and takes 30 minutes. You need the optional temperature adjustment set for performing this function. To learn when an adjustment of the heating module is necessary, see Notes on Adjustment of Balance and Heating Module and Cleaning. We advise you to wait at least 30 minutes after a drying operation (or previous heating module adjustment) before performing an adjustment.

⚠ CAUTION

Danger of burns

After adjustment, the temperature adjustment set and the sample pan handler can still be hot.

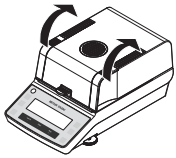
– Allow them to cool down before you remove them.

Note

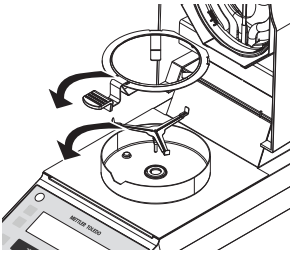
You can stop temperature adjustment at any time by opening the heating module.

Adjustment procedure

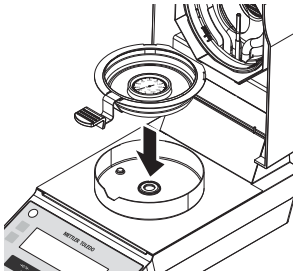
1 Chose the menu option **CAL** > **TEMP** and press [↵].
2 Open the heating module.



3 Remove the sample pan handler.
4 Remove the sample pan holder.



5 Place the sample pan handler with the inserted temperature adjustment disc with precision thermometer in the sample chamber.



6 Close the heating module to start the adjustment process

⇨ The heating module is heated to a temperature of 100 °C. You can follow this process on the display. The instrument now waits 15 minutes until the temperature adjustment set shows the correct temperature, a repeated beep is given.

7 Read the temperature adjustment set through the inspection window of the heating module.

8 Enter this temperature using [∧] or [∨].

9 After entering the value, press [↵].

Note

The temperature must be entered within 10 minutes after the start of the beep, otherwise the adjustment process will be terminated.

⇨ The heating module now heats to the second temperature (160 °C).

10 Proceed exactly as you did for the first temperature.

11 Confirm your entry with [↵].

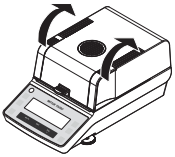
⇨ The adjustment is at the end when the instrument displays **DONE** and automatically quits the menu. The adjustment is complete.

12 Open the heating module and allow them to cool down.

13 Remove the sample pan handler with the temperature adjustment disc with precision thermometer.

14 Insert sample pan holder.

⇨ The Instrument is ready for measuring.



4 Performing a Simple Measurement

After you have successfully put your new Moisture Analyzer into operation for the first time, you can immediately perform your first measurement. In doing so, you will become familiar with the instrument.

Use the supplied specimen sample (absorbent glass fiber filter) for your first measurement to determine the moisture content. During your first measurement the instrument operates with the factory settings.

- The instrument is connected to the mains.

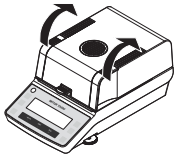
1 To switch on, press [⏻].

⇨ The instrument performs a self-test. Wait until the display shows **0.000 g**.

Your Moisture Analyzer has a graphical user guidance which prompts you by flashing to execute the next operating step.

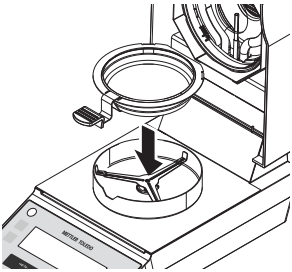
- The instrument is connected to the mains and switched on.
- The instrument is warmed-up.

2 Open the heating module.
   ⇨ The user guidance prompts you to load the empty sample pan.



3 Position the empty sample pan in the sample pan handler.

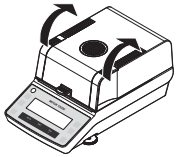
4 Place the sample pan handler in the draft shield. Ensure that the tongue of the sample pan handler lies exactly in the slot of the draft shield. The pan must lie flat in the pan holder.
Note
We advise you to work with the sample pan handler at all times. The pan handler is ergonomic, safe and provides protection against burns due to the hot sample pan.



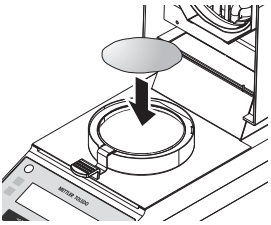
5 Close the heating module.

6 Press [→0/T←].
   ⇨ The balance is set to zero.
   ⇨ The user guidance prompts you to add the sample to the sample pan.

7 Open the heating module.



8 Place the provided specimen sample (absorbent glass fibre filter) in the sample pan.

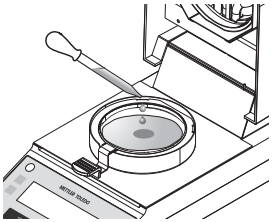


9 Wet the specimen sample with a few drops of water, so that the displayed weight is at least 0.5 grams (required minimum weight of sample)

Note

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

⇨ The user guidance indicates that you can close the heating module.



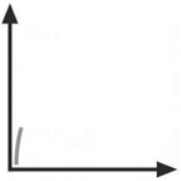
10 Close the heating module.

11 Press [**Start**] to start the drying and measuring process.

⇨ You can follow the measurement progress on the display:
– 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.

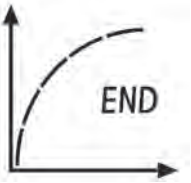
⇨ **Note**

If the heating module is opened during measurement process, the heating will stop and the program will abort.



- The measurement process is completed.

12 Read the final result on the display. If a printer is connected, press [🖶] to print the result (if auto printing is not activated).



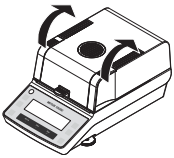
Remove sample

⚠ CAUTION

Danger of burns

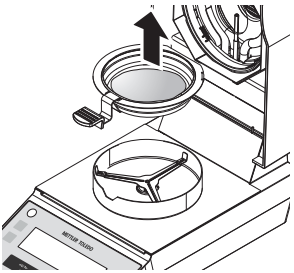
Sample, sample pan and other parts inside the sample chamber may still be hot.

1 Open the heating module.



2 Carefully remove the sample 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, you can simply tilt the handler until the pan slides out.



5 Maintenance

⚠ WARNING

Risk of electric shock

– The instrument must be disconnected from the power supply, before cleaning or other maintenance work to be performed.

– Use only the power cord from METTLER TOLEDO, if it needs replacing.

Note

- The thermal overload protection can not be reset by the user.
- The halogen lamp can not be replaced by the user.

In such cases, contact your METTLER TOLEDO representative.

For weight and temperature adjustments, **see** Adjustments.

5.1 Cleaning

⚠ CAUTION

Danger of burns

The interior parts of the heating module as well as the parts in the sample chamber could be very hot.

– Wait until the heating module has cooled down completely.

To obtain precise measurement results, we recommend you to **clean the temperature sensor** and **the protective glass** of the halogen lamp regularly. The **air inlet** of the fan is located at the rear of the instrument and its exterior should be cleaned from time to time to free it from any dust deposits. The **draft shield** and **sample pan holder** can be removed for cleaning. See Overview Heating Module for the location of the parts. Please note the following directions for cleaning your instrument.

General

Your Moisture Analyzer is made from high quality, resistant materials and can therefore be cleaned with a commercially available, mild cleaning agent e.g. isopropanol.

Attention

- Use a lint-free cloth for cleaning.

- Do not use wet, but only damp cloth for cleaning.
- Ensure that no liquids enters the interior of the instrument.
- Clean the exterior of the heating module with a mild cleaning agent although the housing is extremely rugged and resistant to solvents.
- On no account use cleaning agents, which contain solvents or abrasive ingredients, as this can result in damage to the operation panel overlay.
- Never open the housing of the instrument – it contains no components, which can be cleaned, repaired or replaced by the user.

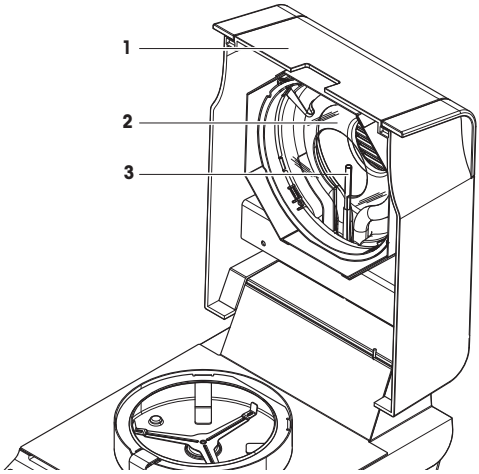
Cleaning temperature sensor and protective glass

1 Open the heating module (1).

2 Check the protective glass (2) and the temperature sensor (3) if they need to be cleaned.

3 If the protective glass (2) appears dirty, clean the surface using a commercial glass cleaner.

4 If the temperature sensor (3) is dirty, clean using a mild cleaning agent.



Removing glass for cleaning inside

If cleaning behind the glass or the backside of the glass is needed, the reflector ring (glass holder) with the protective glass must be removed.

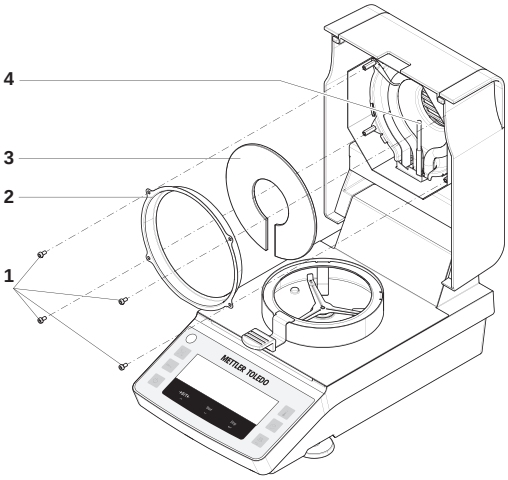
1 Remove carefully the four screws (1) as shown.

2 Remove the reflector ring (2) (glass holder) with the protective glass (3).

3 Put the glass (3) on a flat surface and clean with a commercial glass cleaner on both sides.

4 Clean the temperature sensor (4) with a mild cleaning agent.

5 Reassemble after cleaning.
Note
Make sure that the glass opening is face down.



NOTICE
Do not touch the lamp with your fingers. If it happened, clean the lamp carefully with e.g. isopropanol.

Note

After the temperature sensor or the protective glass have been cleaned, we recommend to adjust the heating module using the temperature adjustment kit, **see** Temperature Adjustment.

5.2 Replacing power line fuse

⚠ CAUTION

Safety risk or damage of the instrument

Do not use a fuse of a different type or rated value, or short out (bridge) the fuse, because this can put your safety at risk and damage the instrument!

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 drying unit. To change this fuse, proceed as follows:

1 Pull out the power cord.

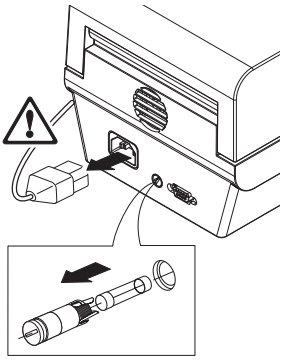
2 Unlock the fuse holder by turning counterclockwise using a suitable tool e.g. screwdriver.

3 Pull it out.

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:
for 115 V: 5 x 20 mm, F6.3AL250V (6.3 A , fast-acting, low-breaking capacity)
for 230 V: 5 x 20 mm, F2.5AL250V (2.5 A, fast-acting, low-breaking capacity)

6 Insert the fuse holder and lock it by turning clockwise.



5.3 Disposal

In conformance with the European Directive 2002/96/EC 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 (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

6 Technical Data

6.1 General data

Power Supply

115 V AC Version	100 V–120 V AC, 50/60 Hz, 4 A
230 V AC Version	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	up to 4000 m
Ambient temperature range	Operation: +10 °C to 30 °C (operability guaranteed 5 °C to 40 °C)
	Storage: -20 °C to +60 °C
Relative air humidity	Operation: 10% to 80% up to 31 °C, linearly decreasing to 50 % at 40 °C, noncondensing
	Storage: 20% to 80%
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	Plastic, PBT, Crastin SO653-GB20
Inspection window grill	Plastic, PPS A504X90 (UL94-V0)
Protective glass	Glass ceramics
Halogen lamp	Quartz glass
Reflector	Stainless steel, X2CrNiMo17-2 (1.4404)
Reflector bracket	Plastic, PPS A504X90 (UL94-V0)
Draft shield, interior bottom plate	Stainless steel, X2CrNiMo17-2 (1.4404)

GWP®

Good Weighing Practice™

GWP® is the global weighing standard, ensuring consistent accuracy of weighing processes, applicable to all equipment from any manufacturer It helps to:

- Choose the appropriate balance or scale
- Calibrate and operate your weighing equipment with security
- Comply with quality and compliance standards in laboratory and manufacturing

www.mt.com/GWP

www.mt.com/moisture

For more information

Mettler-Toledo GmbH
Im Langacher 44
8606 Greifensee, Switzerland
www.mt.com/contact

30315602B en

* 3 0 3 1 5 6 0 2 *