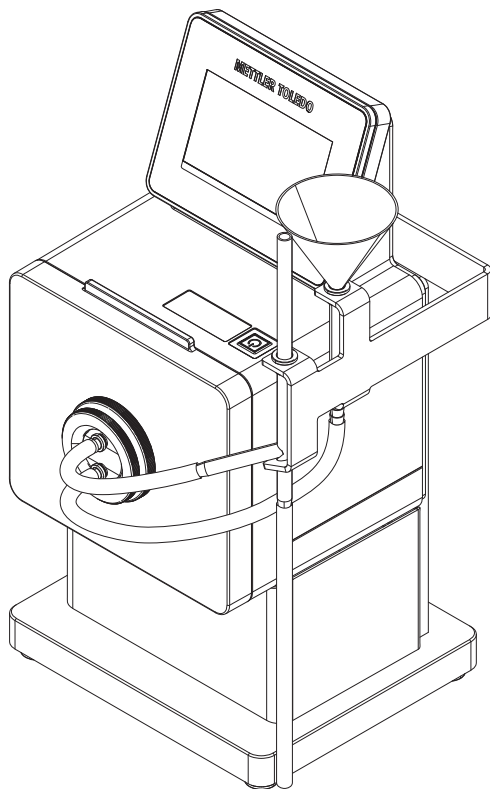




METTLER TOLEDO

Table of Contents

1	Introduction	3
2	Safety information	3
2.1	Definitions of signal words and warning symbols	4
2.2	Product specific safety notes	4
3	Design and function	6
3.1	Overview refractometer	6
3.2	Overview of the tubing	7
3.3	Overview of the magnetic lid and the flow cell	8
3.4	Rear panel	8
3.5	Overview of functions	9
3.6	Menu structure	9
4	Installation and commissioning	10
4.1	Scope of delivery	10
4.2	Download the Reference Manual	11
4.3	Unpack the refractometer	11
4.4	Position the refractometer	11
4.5	Connect the refractometer to the power supply	12
4.6	Disconnect the refractometer from the power supply	13
4.7	Install the exhaust pipe	13
4.8	Install the funnel	14
4.9	Adjust the alignment of the magnetic lid and the flow cell	14
4.10	Install the tubes	14
4.10.1	Install the filling tube	14
4.10.2	Install the draining tube	15
4.10.3	Install the waste container and the waste tube	15
4.11	Change the language	15
4.12	Configure the refractometer	15
5	Operation	16
5.1	Start up the refractometer	16
5.2	Shut down the refractometer	16
5.3	View parameter descriptions	16
5.4	Typical phases of a refractive-index determination	17
5.5	Example: Brix determination of apple juice	17
5.5.1	Configure the Measure method	17
5.5.2	Perform the Brix determination	18
6	Maintenance	20
6.1	Maintenance schedule	20
6.2	Clean the measuring cell	21
6.2.1	Typical phases of cleaning the measuring cell	21
6.2.2	Example: clean using deionized water	21
6.2.2.1	Configure a Measure method for cleaning	21
6.2.2.2	Rinse the measuring cell and the tubes	22
6.2.2.3	Empty the tubes and the measuring cell	23
6.2.2.4	Clean and dry the measuring cell	24
6.2.2.5	Reassemble the system	24
6.3	Check the measurement accuracy	24
6.3.1	Typical phases of checking the measurement accuracy	24
6.3.2	Example: test with a SimpleCheck™ water-standard	25
6.3.2.1	Clean the measuring cell	25

6.3.2.2	Configure the Test method	25
6.3.2.3	Fill the measuring cell and measure the refractive index	25
6.3.2.4	Rinse the measuring cell and the tubes	27
6.3.3	Measures if the test fails	28
6.4	Clean the refractometer	28
6.4.1	Clean the housing	28
6.4.2	Clean the magnetic lid and the flow cell	28
6.4.2.1	Clean the magnetic lid	28
6.4.2.2	Clean the flow cell	29
6.4.3	Clean the funnel and the exhaust pipe	29
6.5	Replace the magnetic lid with the flow cell	29
6.5.1	Remove the magnetic lid	29
6.5.2	Install the magnetic lid	30
6.6	Replace the tubing	31
6.7	Replace the funnel	31
6.8	Replace the exhaust pipe	31
6.9	Replace the flow-cell insert	32
6.9.1	Assemble the new flow-cell insert	32
6.9.2	Remove the alignment ring and the flow-cell insert	32
6.9.3	Install the flow-cell insert and the alignment ring	33
6.10	Replace the O-ring of the flow-cell insert	33
6.10.1	Remove the O-ring	33
6.10.2	Install the O-ring	34
6.11	View the firmware version and other system information	34
6.12	Prepare the refractometer for storage	34
6.13	Transport the refractometer	35
6.14	Dispose of the refractometer	35
7	Technical data	35
7.1	Refractometer	35
7.2	Measurement	36
7.3	Compliance information	36

1 Introduction

Thank you for choosing a METTLER TOLEDO refractometer. The refractometer Easy Bev is an easy-to-operate instruments for measuring refractive indexes and related values.

About this document

This document provides you with the information you need to get started with your METTLER TOLEDO refractometer.

The instructions in this document refer to the refractometer Easy Bev running firmware version 2.0 or higher.



For a full description of the refractometer and its functions, refer to the Reference Manual supplied online.

► www.mt.com/library

The firmware license is subject to the End User License Agreement EULA version 3.0. See the following link for the license text:

► www.mt.com/EULA

For third party licenses and open source attribution files, see the following link:

► www.mt.com/licenses

If you have any additional questions, contact your authorized METTLER TOLEDO service representative or dealer.

► www.mt.com/contact

Conventions and symbols



Refers to an external document.

Elements of instructions

- Prerequisites
- 1 Steps
- 2 Steps
 - ⇒ Intermediate results
- 3 Steps
- ⇒ Results

See also

-  View the firmware version and other system information ► Page 34

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.



User Manual and Reference Manual are available online.

See also

Download the Reference Manual ► Page 11

2.1 Definitions of signal words and warning 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

WARNING A hazardous situation with medium risk, possibly resulting in death or severe 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: read the User Manual or the Reference Manual for information about the hazards and the resulting measures.



Hot surface



Notice

2.2 Product specific safety notes

Intended use

The refractometer Easy Bev is designed to be used by trained staff. The refractometer is intended for measuring the refractive index and related values.

The following types of samples are suited for Easy Bev:

- Fruit and vegetable juices
- Carbonated beverages and non-carbonated beverages
- Dilute aqueous samples if they are compatible with the material with which they come in contact.

The following types of samples are not suited for Easy Bev:

- Syrups and similarly viscous samples
- Liquids with a high fat content, for example milk or cream: the residues that fats leave in the tubes and the measuring cell are not easy to clean.
- Oils: oils coat the surface of the measuring cell. Flushing the measuring cell with the next sample does not remove this coating.
- Substances that are not compatible with the material with which they come in contact.

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.

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 assumes that the instrument owner trains users to safely use the instrument in their workplace and deal with potential hazards. METTLER TOLEDO assumes that the instrument owner provides the necessary protective gear.

Safety notes



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 supply cable and AC adapter 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 damaged cables and power plugs.



NOTICE

Damage to the instrument due to the use of unsuitable parts

Using unsuitable parts with the instrument can damage the instrument or cause it to malfunction.

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



NOTICE

Damage to the touch screen due to pointed or sharp objects

Pressing on the touch screen with pointed or sharp objects may damage it.

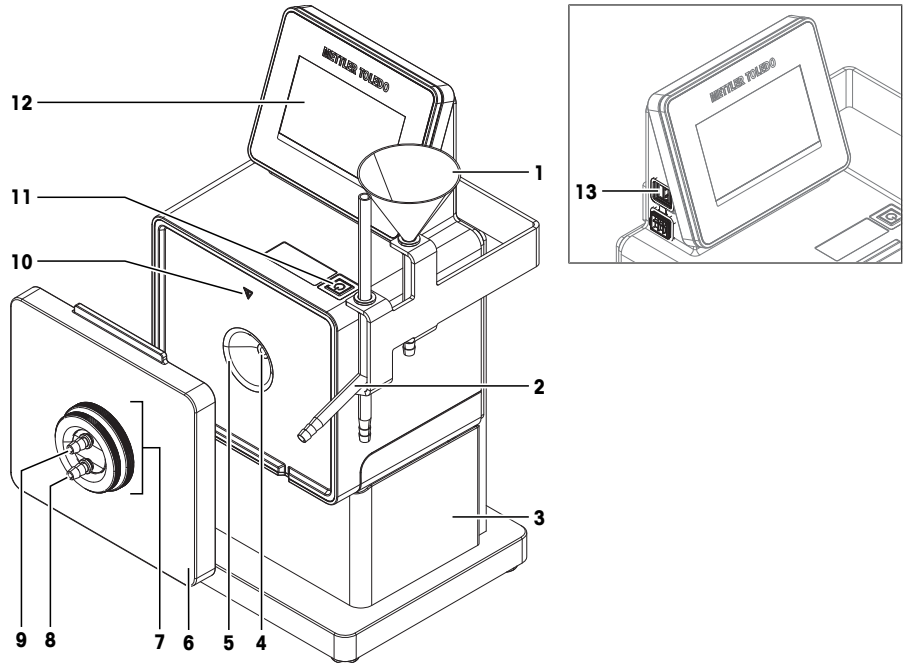
- Operate the touch screen by applying gentle pressure with the pad of your finger.

See also

-  Technical data ► Page 35
-  Compliance information ► Page 36

3 Design and function

3.1 Overview refractometer

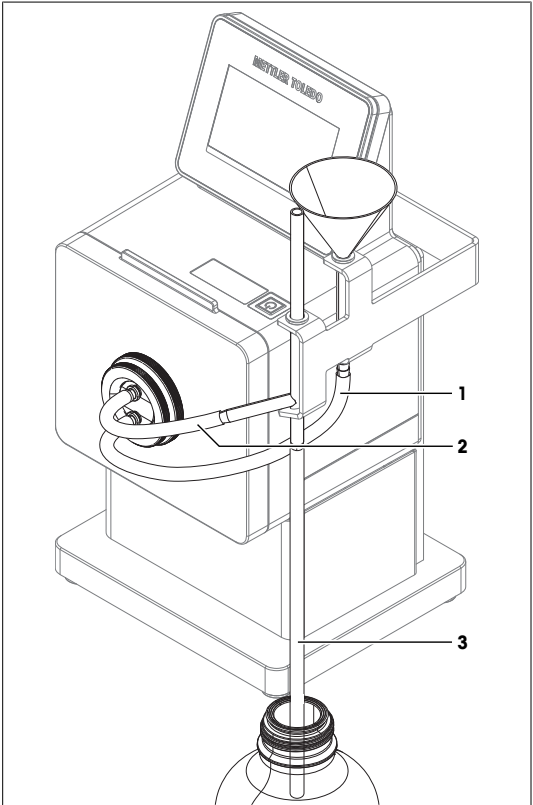


No.	Name	Function
1	Funnel	Guides the sample into the filling tube
2	Exhaust pipe	Transports air and liquid out of the measuring cell
3	Stand	Supports the refractometer
4	Prism	Refracts the light at its surface
5	Measuring cell	Holds the sample
6	Magnetic lid	Holds the flow cell in place
7	Flow cell	Closes off the measuring cell
8	Inlet of the flow cell	Used to fill the measuring cell
9	Outlet of the flow cell	Used to drain the measuring cell
10	Safety label	Warns that the measuring cell can be hot and cause slight burns if you touch it without protective gloves.
11	Power button	The power button has the following functions: • Start up the refractometer. • Shut down the refractometer.
12	Touch screen	Displays information and is used to enter information
13	USB-A socket	The USB-A socket has the following functions: • Connection for USB devices, for example printers or barcode readers • Transfer of data to and from a USB flash drive

See also

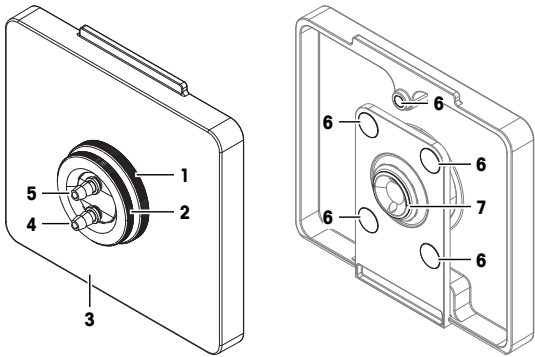
 Overview of the magnetic lid and the flow cell ► Page 8

3.2 Overview of the tubing



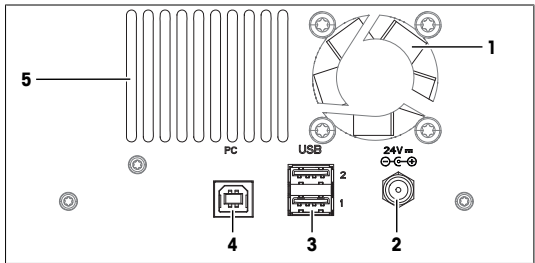
No.	Name	Length	Material	From	To
1	Filling tube	220 mm	PVC (polyvinyl chloride)	Funnel	Flow cell
2	Draining tube	110 mm	PVC (polyvinyl chloride)	Flow cell	Exhaust tube
3	Waste tube	1500 mm	PVC (polyvinyl chloride)	Exhaust tube	Waste container

3.3 Overview of the magnetic lid and the flow cell



No.	Name	Function
1	Mounting ring	Holds the alignment ring in place
2	Alignment ring	Used to adjust the alignment between the flow-cell insert and the measuring cell
3	Magnetic lid	Holds the flow cell in place
4	Inlet of the flow cell	Used to fill the measuring cell
5	Outlet of the flow cell	Used to drain the measuring cell
6	Magnets	Attach the magnetic lid to the protective plate
7	O-ring	Seals the gap between the flow-cell insert and the measuring cell

3.4 Rear panel

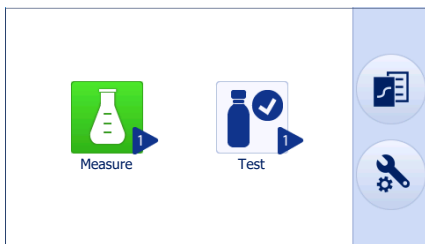


No.	Name	Function
1	Fan	Moves air over the heat sink of the Peltier element
2	24V	DC Socket to connect the AC adapter
3	USB1/USB2	The USB-A socket has the following functions: • Connection for USB devices, for example printers or barcode readers • Transfer of data to and from a USB flash drive
4	PC	USB-B socket to connect a computer
5	Ventilation openings	Intake of air to cool the heat sink of the Peltier element

See also

Technical data ► Page 35

3.5 Overview of functions



Icon	Name	Description
	Measure	Configure and start a Measure method to measure the refractive index or related values of a sample. Six Measure methods are available.
	Test	Configure and start a Test method to check the measurement accuracy with a standard substance. Two Test methods are available.
	Results	Access and manage the results of the last 20 measurements, tests and adjustments.
	Setup & Tools	Access the following functions: • Settings: change instrument settings. • Language: change the language of the user interface. • Adjustment: configure and start an Adjustment method to adjust the measurement accuracy. • Diagnostics: run diagnostics. • Toolbox: Update the firmware, restore factory settings and factory adjustment and access service information.
–	LongClick™	Tap and hold the icon of one of the following apps to start it directly from the home screen. ► shows which method is started. • Measure • Test

3.6 Menu structure

	Measure
	Test
	Results

 Setup & Tools

 Settings

 Language

 Adjustment

 Diagnostics

 Toolbox

 Peripheral check

 Printer check

 Factory reset

 FW Update

 Adj. reset

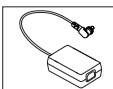
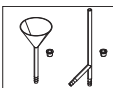
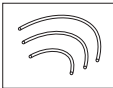
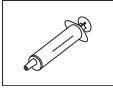
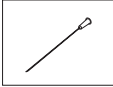
 MT-Service

 Service history

 Settings

4 Installation and commissioning

4.1 Scope of delivery

Part	Order number
 Refractometer with stand and funnel holder	—
 AC adapter with power cable	30472916
 Funnel and exhaust pipe • Funnel • Exhaust pipe • Sleeves (2 pcs)	30480715
 Tube set Easy Bev • Filling tube • Draining tube • Waste tube	30480714
 SimpleCheck nD Water Standard 1.333	30467245
 Syringe 10 mL	—
 Injection needle	—

Part	Order number
	User Manual —
	Test report —
	Declaration of conformity —
	Declaration of compliance with Chinese directive of restriction of hazardous substances —

4.2 Download the Reference Manual

- 1 Go to the website www.mt.com/library.
- 2 Select the **Technical Documentation** tab.
- 3 Enter the product type in the search field and start the search.
- 4 Select the Reference Manual from the result list.
- 5 Select the link.
 - ⇒ The Reference Manual is either opened or downloaded depending on the browser settings.
- 6 Check which firmware version is installed on your refractometer.
- 7 If the Reference Manual is not written for the installed firmware version, contact your authorized METTLER TOLEDO service representative or dealer.

► www.mt.com/contact

See also

- 📖 Introduction ► Page 3
- 📖 View the firmware version and other system information ► Page 34

4.3 Unpack the refractometer

- 1 Remove the refractometer from the protective packaging.
- 2 Store the packing material for later transport over long distances.
- 3 Check if you received all parts listed in the scope of delivery.
- 4 Inspect the parts visually for flaws or damage.
- 5 If parts are missing or damaged, report it to your authorized METTLER TOLEDO service representative or dealer.

► www.mt.com/contact

4.4 Position the refractometer

The refractometer has been developed for indoor operation in a room with stable temperature and ventilation as needed by the chemicals that are used.

The following site requirements apply:

- Dew point below the measurement temperature
- Ambient conditions within the limits specified in the technical data
- No powerful vibrations
- No direct sunlight

- No corrosive gas atmosphere
- No explosive atmosphere
- No powerful electric or magnetic fields

Procedure

- 1 Place the refractometer on a level surface.
- 2 Make sure that there are at least 15 cm clearance behind the refractometer.
- 3 Make sure that nothing blocks the ventilation openings at the back of the refractometer.
- 4 Make sure nothing blocks the opening at the back of the stand.

See also

 Technical data ► Page 35

4.5 Connect the refractometer to the power supply

The AC adapter is suitable for all supply line voltages ranging from 100...240 V AC and 50/60 Hz.



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 supply cable and AC adapter 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 damaged cables and power plugs.



NOTICE

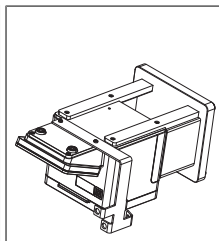
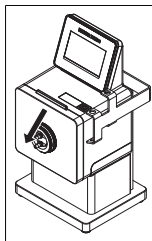
Damage to the AC adapter due to overheating

If the AC adapter is covered or in a container, it is not sufficiently cooled and overheats.

- 1 Do not cover the AC adapter.
- 2 Do not put the AC adapter in a container.

Procedure

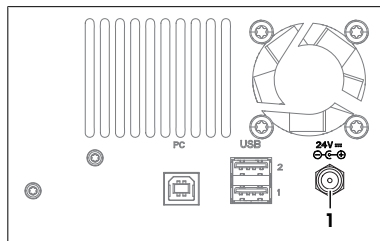
- The measuring cell and the tubes are empty and clean.
 - The filling tube and the draining tube are disconnected from the flow cell.
 - The waste tube is removed from the waste container.
- 1 Tilt the refractometer and gently lower it onto its front.
 - 2 Install the cables in such a way that they cannot be damaged or interfere with operation.
 - 3 Insert the plug of the power cable in the socket of the AC adapter.



- 4 Insert the plug of the AC adapter into the **24V** (1) socket on the rear panel.
- 5 Tighten the knurled nut to secure the plug.
- 6 Return the refractometer to its upright position.
- 7 Insert the plug of the power cable into a grounded power outlet that is easily accessible.

See also

- 📖 Start up the refractometer ► Page 16
- 📖 Clean the measuring cell ► Page 21



4.6 Disconnect the refractometer from the power supply

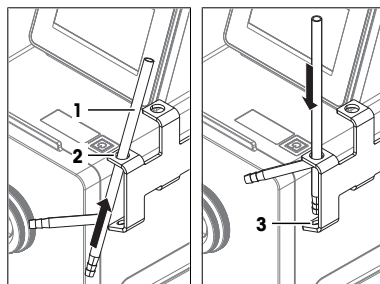
- The refractometer is shut down.
- 1 Pull the plug of the power cable out of the power outlet.
 - 2 Unscrew the knurled nut from the **24V** socket on the rear panel.
 - 3 Pull the plug of the AC adapter out of the **24V** socket on the rear panel.

See also

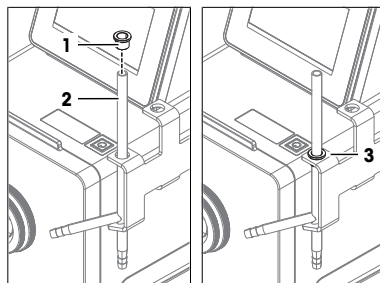
- 📖 Shut down the refractometer ► Page 16

4.7 Install the exhaust pipe

- 1 Insert the exhaust pipe (1) from below into the upper opening (2).
- 2 Bring the exhaust pipe to an upright position.
- 3 Insert the lower end of the exhaust pipe into the lower opening (3).

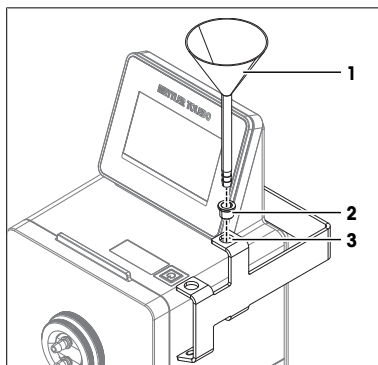


- 4 Slide one of the sleeves (1) onto the exhaust pipe (2).
- 5 Slide the sleeve down and into the gap between the exhaust pipe and the funnel holder (3).



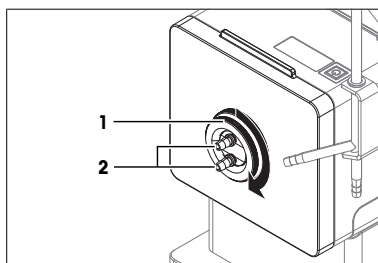
4.8 Install the funnel

- 1 Insert the other sleeve (2) into the opening (3).
- 2 Insert the funnel (1) into the sleeve.



4.9 Adjust the alignment of the magnetic lid and the flow cell

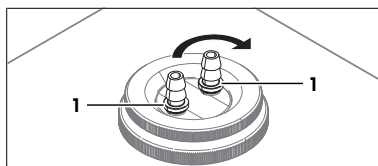
- 1 If you can turn the flow-cell insert easily with the nozzles (2), turn the alignment ring (1) clockwise until you feel resistance.
- 2 Turn the alignment ring clockwise by another 90°.
- 3 Check that you can no longer turn the flow-cell insert without using force.
- 4 Check that the lower part of the magnetic lid is still flush with the refractometer.



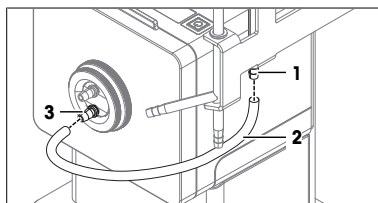
4.10 Install the tubes

4.10.1 Install the filling tube

- 1 Check that the nozzles (1) are screwed tightly into the flow-cell insert and if needed tighten the nozzles clockwise.

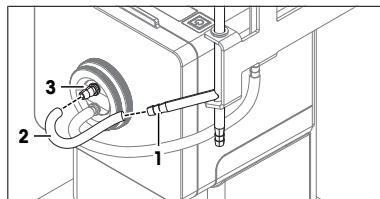
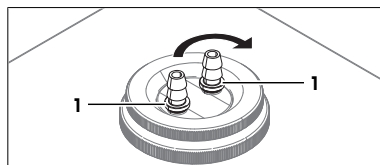


- 2 Select the filling tube (length 220 mm) from the tube set.
- 3 Push one end of the filling tube (2) over the barbed end of the funnel (1).
- 4 Push the other end of the filling tube over the inlet (3) of the flow cell.



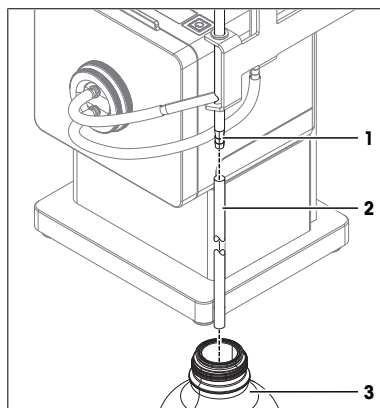
4.10.2 Install the draining tube

- 1 Check that the nozzles (1) are screwed tightly into the flow-cell insert and if needed tighten the nozzles clockwise.
- 2 Select the draining tube (length 110 mm) from the tube set.
- 3 Push one end of the draining tube (2) over the barbed end of the exhaust pipe (1).
- 4 Push the other end of the draining tube over the outlet (3) of the flow cell.



4.10.3 Install the waste container and the waste tube

- 1 Place a suitable waste container (3) below the exhaust pipe.
- 2 Select the waste tube (length 1500 mm) from the tube set.
- 3 Push one end of the waste tube (2) over the barbed end of the exhaust pipe (1).
- 4 Shorten the waste tube as needed.
- 5 Place the other end of the waste tube into the waste container (3).
- 6 Make sure that the end of the waste tube does not touch the waste.



4.11 Change the language

- 1 Go to  >  > .
- 2 Tap **Language** and select the language from the list.
⇒ The selected language is used on the touch screen and printouts.
- 3 To return to **Setup & Tools**, tap .

4.12 Configure the refractometer

This chapter shows you how to access and change the following settings:

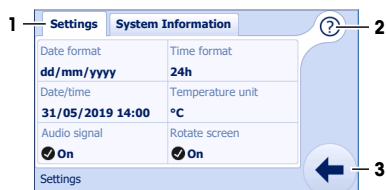
- Date and time
- Temperature unit
- Audio signal
- Orientation of the screen

Procedure

- 1 Go to > > > **Settings** (1).
- 2 Change the parameters as needed.
- 3 To view parameter descriptions, tap (2).
- 4 To return to **Setup & Tools**, tap (3).

See also

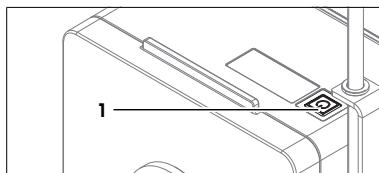
View parameter descriptions ► Page 16



5 Operation

5.1 Start up the refractometer

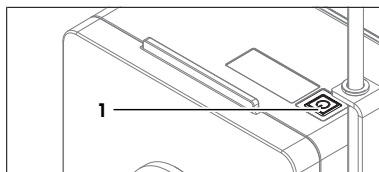
- The refractometer is connected to the power supply.
- 1 Press the power button (1) until the refractometer plays a beep.
 - ⇒ The welcome screen opens.
 - ⇒ The refractometer plays a beep and the home screen opens.
 - 2 Wait 15 minutes before you perform a measurement, if the instrument was stored or transported at temperatures that are significantly different from the ambient temperature at the place of installation.



5.2 Shut down the refractometer

Because the Peltier element is designed to keep the temperature of the measuring cell stable, the measuring cell takes time to adapt to a new temperature. METTLER TOLEDO recommends to only shut down the refractometer if it is not used for several days.

- No task is running.
 - The measuring cell is clean and dry.
- Press the power button (1).
 - ⇒ The refractometer shows the good-bye screen and ends running tasks.
 - ⇒ The refractometer plays three beeps and shuts down.
 - ⇒ The control circuit for the power button is energized. The rest of the refractometer is no longer energized.



Shut down the refractometer in emergency situations

- Pull the plug of the power cable out of the power outlet.

See also

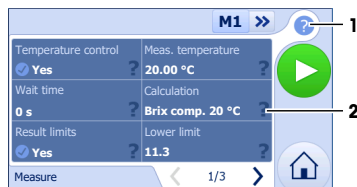
Clean the measuring cell ► Page 21

5.3 View parameter descriptions

- A window with parameters is open.
- 1 Tap (1).



- 2 Tap the parameter (2) that interests you.
⇒ A window with the parameter description opens.
- 3 Close the window.
- 4 Tap ? (1) to close the help.



5.4 Typical phases of a refractive-index determination

Refractive-index determinations usually include two phases.

- Rinse the measuring cell and the tubes.
- Fill the measuring cell and measure the refractive index.

Rinse the measuring cell and the tubes

Because the measuring cell and the tubes are usually filled with the previous sample, it is important that you flush the system using the new sample. This is only possible if the previous sample is soluble in the new sample.

- If you measure samples with similar ingredients and concentrations, fill the funnel once to flush out the previous sample.
- If you measure samples with different ingredients and concentrations, fill the funnel twice or three times to flush out the previous sample.

5.5 Example: Brix determination of apple juice

The following chapters show you how to configure a **Measure** method and determine the Brix value of apple juice at 20 °C. The example is suitable for consecutive measurements of apple juice or beverages with similar ingredients and sugar concentrations.

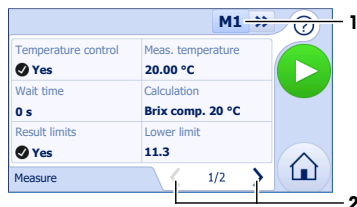


You can find more information about the configuration of methods in the Reference Manual. **See** [Download the Reference Manual ► Page 11].

You can find parameter descriptions in the help embedded on the instrument. **See** [View parameter descriptions ► Page 16].

5.5.1 Configure the Measure method

- 1 Go to > .
⇒ The parameter window of the last used **Measure** method (1) opens.
- 2 Change the parameter settings to the values shown in the following table.
- 3 Use the arrows (2) to move between windows.



Parameter	Setting	Explanation
Temperature control	Yes	The refractometer keeps the temperature of the measuring cell at the temperature defined in Meas. temperature .
Meas. temperature	20.00 °C	The refractometer keeps the temperature of the measuring cell at 20 °C.
Wait time	0 s	The refractometer starts to evaluate the stability of the measured value as soon as users press .

Parameter	Setting	Explanation
Calculation	Brix comp. 20 °C	A Brix value [% w/w] that is compensated to 20 °C is calculated.
Result limits	Yes	The refractometer evaluates if the result is within a defined range. - Results within limits: green writing - Results outside limits: red writing
Lower limit	11.3	The lower limit of the range is set to 11.3 % w/w.
Upper limit	11.7	The upper limit of the range is set to 11.7 % w/w.
Prompt for sample	Yes	The refractometer prompts users to add the sample.
Sample ID	Variable	The refractometer prompts users to enter the sample ID as soon as they have added the sample.
Clean	No	The refractometer does not prompt users to clean the measuring cell.
Printout	None	The result is not printed.
Export to USB	No	The result is not exported.

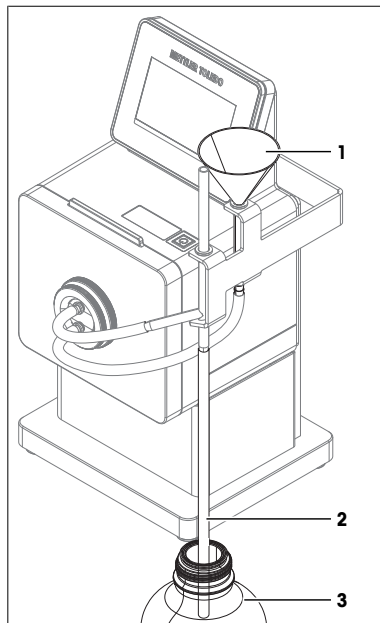
5.5.2 Perform the Brix determination

Material

- Apple juice

Procedure

- The measuring cell is filled with apple juice.
- 1 Make sure that the waste tube (2) is not immersed in the waste and that the waste container (3) is not full.
- 2 Fill the funnel (1) with apple juice.
 - ⇒ The apple juice flushes out the previous sample.
- 3 Wait until the apple juice stops flowing out of the waste tube (2).

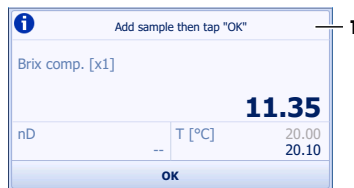


- 4 Tap  (1).

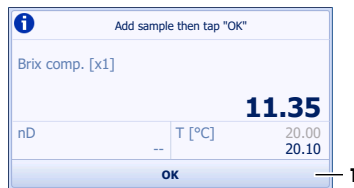


⇒ You are prompted to add the sample (1).

- 5 Fill the funnel with apple juice.



- 6 Tap **OK** (1).



- 7 Enter the sample identification, using the **abc** key (1) to cycle between capital letters, small letters and numbers.
- 8 Tap .



- ⇒ The revolving circle (1) shows that the measurement is in process.
- ⇒ The temperature of the measuring cell (4) is brought to the temperature defined in the method (3).
- ⇒ The calculated Brix value (2) is displayed.
- ⇒ When the measured value is stable, the result is saved.



- 9 To restart the method, tap  (1).
- 10 To open the home screen, tap  (2).



6 Maintenance

In this chapter you find descriptions of the maintenance tasks you should perform on your refractometer. Any other maintenance tasks need to be performed by a service technician that has been qualified by METTLER TOLEDO.

If you experience problems with your refractometer, contact your authorized METTLER TOLEDO service representative or dealer.

METTLER TOLEDO recommends that your authorized METTLER TOLEDO service representative or dealer performs a preventive maintenance and calibration certification at least once a year.

► www.mt.com/contact

6.1 Maintenance schedule

If the standard operating procedures of your company require other maintenance intervals, use the intervals listed in the standard operating procedures.

Frequency	Task	Link
After a measurement series	Rinse the measuring cell and the tubes with deionized water and check the measured value for water.	[Rinse the measuring cell and the tubes ► Page 22]
Daily	Check if the tubes are dirty, cloudy or leaking. If needed, replace them.	[Replace the tubing ► Page 31]
	Rinse the measuring cell and the tubes with deionized water and check the measured value for water at the end of the work day.	[Rinse the measuring cell and the tubes ► Page 22]
Monthly	Check the measurement accuracy using a Test method and a standard substance.	[Check the measurement accuracy ► Page 24]

6.2 Clean the measuring cell

6.2.1 Typical phases of cleaning the measuring cell

Cleaning the measuring cell usually includes four phases:

- Rinse the measuring cell and the tubes.
- Empty the tubes and the measuring cell.
- Clean and dry the measuring cell.
- Reassemble the system.

Rinse the measuring cell and the tubes

Because the measuring cell and the tubes are usually filled with the previous sample, it is important that you flush the system using the new sample. This is only possible if the previous sample is soluble in the new sample.

- If you measure samples with similar ingredients and concentrations, fill the funnel once to flush out the previous sample.
- If you measure samples with different ingredients and concentrations, fill the funnel twice or three times to flush out the previous sample.

6.2.2 Example: clean using deionized water

The following chapters show you how to clean the measuring cell with deionized water after measuring Brix values of apple juice.



You can find more information about the configuration of methods in the Reference Manual. **See** [Download the Reference Manual ► Page 11].

You can find parameter descriptions in the help embedded on the instrument. **See** [View parameter descriptions ► Page 16].

6.2.2.1 Configure a Measure method for cleaning

- 1 Go to > .
⇒ The parameter window of the last used **Measure** method opens.
- 2 Tap (1) to switch to the next method.
- 3 Change the parameter settings to the values shown in the following table.
- 4 Use the arrows (2) to move between windows.



Parameter	Setting	Explanation
Temperature control	Yes	The refractometer keeps the temperature of the measuring cell at the temperature defined in Meas. temperature .
Meas. temperature	20.00 °C	The refractometer keeps the temperature of the measuring cell at 20 °C.
Wait time	0 s	The refractometer starts to evaluate the stability of the measured value as soon as users press .
Calculation	Brix comp. 20 °C	A Brix value [% w/w] that is compensated to 20 °C is calculated.

Parameter	Setting	Explanation
Result limits	Yes	The refractometer evaluates if the result is within a defined range. - Results within limits: green writing - Results outside limits: red writing
Lower limit	-0.2	The lower limit of the range is set to -0.2 % w/w.
Upper limit	0.2	The upper limit of the range is set to 0.2 % w/w.
Prompt for sample	No	The refractometer does not prompt users to add the sample.
Sample ID	None	The refractometer does not assign any identification to the sample.
Clean	No	The refractometer does not prompt users to clean the measuring cell.
Printout	None	The result is not printed.
Export to USB	No	The result is not exported.

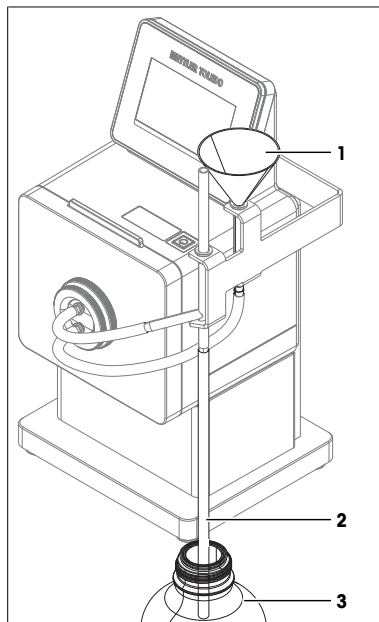
6.2.2.2 Rinse the measuring cell and the tubes

Material

- Deionized water

Procedure

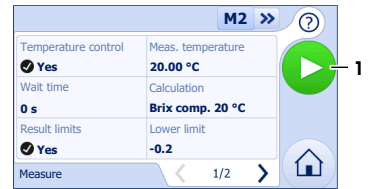
- The measuring cell is filled with apple juice.
- 1 Make sure that the waste tube (2) is not immersed in the waste and that the waste container (3) is not full.
 - 2 Fill the funnel (1) with deionized water.
 - ⇒ The deionized water flushes out the apple juice.
 - 3 Wait until the deionized water stops flowing out of the waste tube (2).
 - 4 Repeat the previous steps.



- 5 Tap  (1).
- 6 Fill the funnel with deionized water.

- ⇒ The revolving circle (1) shows that the measurement is in process.
- ⇒ The temperature of the measuring cell (4) is brought to the temperature defined in the method (3).
- ⇒ The calculated Brix value (2) is displayed.
- ⇒ When the measured value is stable, the result is saved.

- 7 If the result is outside the limits, repeat the previous steps.
- 8 If the result is within the limits, empty the tubes and the measuring cell.



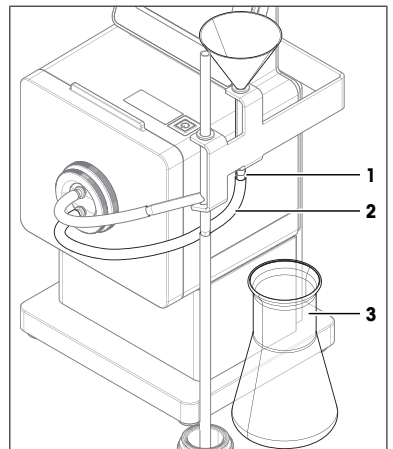
6.2.2.3 Empty the tubes and the measuring cell

Material

- Small waste container
- Lint-free tissues

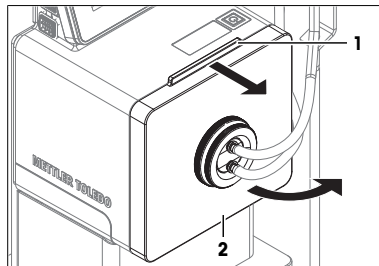
Procedure

- 1 Place the small waste container (3) below the funnel.
- 2 Pull the filling tube (2) carefully from the funnel and empty it into the small waste container.
- 3 Wipe the barbed end of the funnel (1) and the end of the filling tube with a clean tissue.
- 4 Clean up any spills.
- 5 Push the filling tube over the barbed end of the funnel.

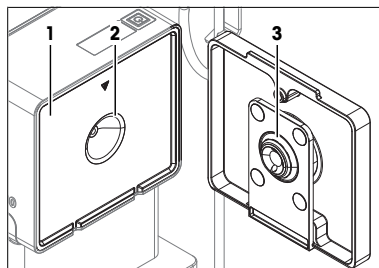


6.2.2.4 Clean and dry the measuring cell

- 1 Stabilize the lower part of the magnetic lid (2) with one hand.
- 2 To detach the magnetic lid, pull the handle (1) away from the refractometer.
- 3 Rotate the magnetic lid away from the refractometer and hold it in place.

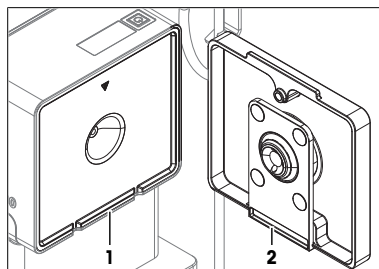


- 4 Wipe the measuring cell (2) and the protective plate (1) with a clean and lint-free tissue.
- 5 Wipe the inside of the magnetic lid (3) with a clean and lint-free tissue.
- 6 Clean up any spills.



6.2.2.5 Reassemble the system

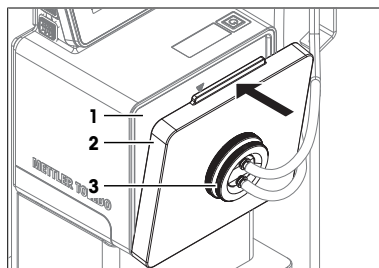
- 1 Align the rectangular opening (2) on the holding plate with the ridge (1).



- 2 Tilt the top (2) of the magnetic lid towards the refractometer until the magnets attach themselves to the protective plate (1).
- 3 Check that you cannot turn the flow-cell insert (3) easily.

See also

- Adjust the alignment of the magnetic lid and the flow cell ► Page 14



6.3 Check the measurement accuracy

6.3.1 Typical phases of checking the measurement accuracy

Checking the measurement accuracy usually includes three phases:

- Clean the measuring cell.
- Fill the measuring cell and measure the refractive index.

- Rinse the measuring cell and the tubes.

6.3.2 Example: test with a SimpleCheck™ water-standard

The following chapters show you how to configure a **Test** method and determine the refractive index of a SimpleCheck water-standard at 20 °C.



You can find more information about the configuration of methods in the Reference Manual. **See** [Download the Reference Manual ▶ Page 11].

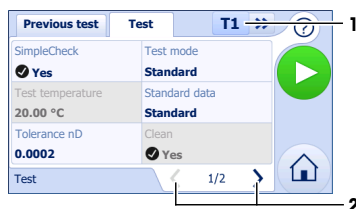
You can find parameter descriptions in the help embedded on the instrument. **See** [View parameter descriptions ▶ Page 16].

6.3.2.1 Clean the measuring cell

- Clean the measuring cell. **See** [Example: clean using deionized water ▶ Page 21].

6.3.2.2 Configure the Test method

- Go to > .
⇒ The parameter window for the last used **Test** method (1) opens.
- Change the parameter settings to the values shown in the following table.
- Use the arrows (2) to move between windows.



Parameter	Setting	Explanation
SimpleCheck	Yes	The workflow for self verification with SimpleCheck™ standard-substances is used.
Test mode	Standard	The refractometer determines a refractive index.
Test temperature	20.00 °C (read only)	The refractometer keeps the temperature of the measuring cell at 20 °C.
Standard data	–	Opens a window to enter standard data. Users are prompted to enter or scan the standard data when they start the test method.
Tolerance nD	0.0002	The result is marked as passed if it falls within the following range: nD nominal ± 0.0002
Clean	Yes (read only)	The refractometer prompts users to clean the measuring cell.
Printout	None	The result is not printed.

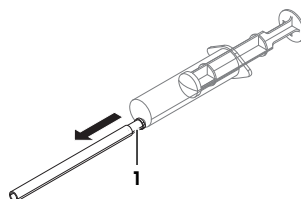
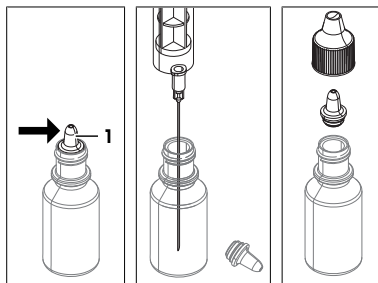
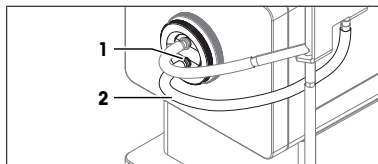
6.3.2.3 Fill the measuring cell and measure the refractive index

Material

- SimpleCheck water-standard
- 3-component syringe with O-ring
- Injection needle
- Lint-free tissues

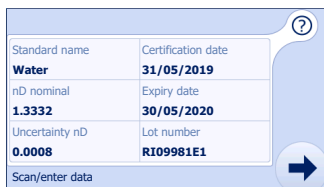
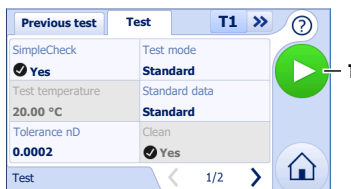
Prepare the measurement

- The measuring cell and the tubes are empty.
- 1 Pull the filling tube (2) from the barbed connector (1) on the flow cell.
- 2 Wipe the barbed connector and the end of the filling tube with a clean tissue.
- 3 Clean up any spills.
- 4 Unscrew the cover from the bottle with the SimpleCheck water-standard.
- 5 Push the nozzle (1) out of the bottle and place it on a clean work surface.
- 6 Place the bottle on a level work surface.
- 7 Fill the syringe with 5 mL of the SimpleCheck water-standard.
- 8 Push the nozzle back into the bottle.
- 9 Screw the cover onto the bottle.
- 10 Place the cap on the injection needle and remove the capped injection needle (1) from the syringe.
- 11 Make sure that there are no bubbles in the syringe.



Start the method and configure the standard data

- 1 Tap  (1).
 - ⇒ The message **Make sure the cell is clean and dry. Do you want to continue?** opens.
- 2 Tap **Yes**.
 - ⇒ The window with the standard data opens.
- 3 Enter the values declared on the certificate of the SimpleCheck water-standard manually or scan them with a barcode reader.



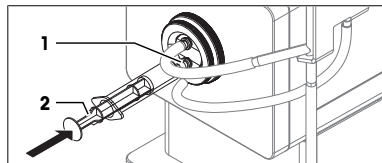
4 Tap .

⇒ You are prompted to add the SimpleCheck water-standard (1).



Fill the measuring cell and measure the refractive index

- 1 Insert the syringe into the connector (1).
- 2 Press the plunger (2) slowly and continuously into the syringe until you have pushed 4 mL of the SimpleCheck water-standard into the measuring cell.
 - ⇒ The first centimeter of the draining tube is filled with SimpleCheck water-standard.
- 3 Leave the syringe in the connector.
- 4 Tap **OK** (1).



- ⇒ The revolving circle (1) shows that the measurement is in process.
- ⇒ The temperature of the measuring cell (4) is brought to the temperature defined in the method (3).
- ⇒ The refractive index (2) is displayed.

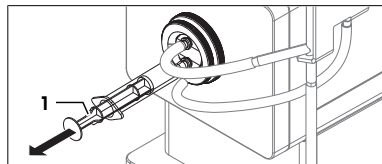


- ⇒ The result is saved and you are prompted to clean the measuring cell (1).



6.3.2.4 Rinse the measuring cell and the tubes

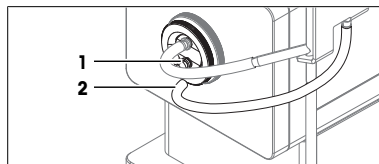
- 1 Pull the plunger continuously out of the syringe.
 - ⇒ The sample is pulled back into the syringe and the measuring cell fills with air.
- 2 Remove the syringe from the connector and empty its content into a suitable waste container.



- 3 Wipe the barbed connector (1) with a clean tissue.
- 4 Push the filling tube (2) over the barbed connector (1).
- 5 Rinse the measuring cell and the tubes with deionized water.

See also

📖 Rinse the measuring cell and the tubes ► Page 22



6.3.3 Measures if the test fails

- 1 Check that you have used the correct standard substance, and if needed repeat the test with the correct standard substance.
- 2 If the test continues to fail, clean the measuring cell with a cleaning solution that dissolves your samples and dissolves in the standard substance.
- 3 Repeat the test.
- 4 If the test continues to fail, repeat the test twice and compare all three results.
- 5 If the results are not the same, clean the measuring cell and perform tests until the test passes or the results of three consecutive tests are the same.
- 6 If the test continues to fail and the results of three consecutive tests are the same, restore the factory adjustment data and repeat the test.
- 7 If the test continues to fail, perform an adjustment.

6.4 Clean the refractometer



NOTICE

Damage to the refractometer due to inappropriate cleaning methods

Inappropriate cleaning agents can damage the housing or other parts of the refractometer. If liquids enter the housing they can damage the refractometer.

- 1 Make sure the cleaning agent is compatible with the material of the part you want to clean.
- 2 Make sure that no liquid enters the interior of the refractometer.

If you have questions about the compatibility of cleaning agents, contact your authorized METTLER TOLEDO service representative or dealer.

► www.mt.com/contact

6.4.1 Clean the housing

METTLER TOLEDO recommends the following cleaning agents:

- Water
- Water with a mild detergent
- Ethanol

Procedure

- Wipe the housing, the stand and the funnel holder with a cloth moistened with the cleaning agent.

6.4.2 Clean the magnetic lid and the flow cell

6.4.2.1 Clean the magnetic lid

METTLER TOLEDO recommends the following cleaning agents:

- Water
- Water with a mild detergent
- Ethanol

Procedure

- 1 Rinse the measuring cell and the tubes. **See** [Rinse the measuring cell and the tubes ► Page 22].

- 2 Empty the tubes and the measuring cell. **See** [Empty the tubes and the measuring cell ► Page 23].
- 3 Remove the magnetic lid. **See** [Remove the magnetic lid ► Page 29].
- 4 Wipe the inside and the outside of the magnetic lid with a soft cloth moistened with the cleaning agent.

See also

-  Rinse the measuring cell and the tubes ► Page 22
-  Empty the tubes and the measuring cell ► Page 23
-  Remove the magnetic lid ► Page 29

6.4.2.2 Clean the flow cell



NOTICE

Damage to the flow cell due to abrasive cleaning methods

The flow cell is made of PTFE (polytetrafluorethylene) and gets scratched if you use abrasive cleaning methods.

- Use an ultrasonic cleaner or soft materials to clean the flow cell.

METTLER TOLEDO recommends the following cleaning agents:

- Water
- Water with a mild detergent
- Ethanol

Procedure

- 1 Remove the alignment ring and the flow-cell insert. **See** [Remove the alignment ring and the flow-cell insert ► Page 32].
- 2 Clean the alignment ring and the flow-cell insert using an ultrasonic cleaner.
- 3 Install the flow-cell insert and the alignment ring. **See** [Install the flow-cell insert and the alignment ring ► Page 33].
- 4 Install the magnetic lid. **See** [Install the magnetic lid ► Page 30].

6.4.3 Clean the funnel and the exhaust pipe

METTLER TOLEDO recommends the following cleaning agents:

- Water
- Water with a mild detergent
- Ethanol

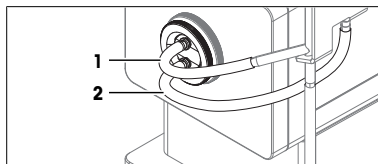
- 1 Rinse the measuring cell and the tubes. **See** [Rinse the measuring cell and the tubes ► Page 22].
- 2 Empty the tubes and the measuring cell. **See** [Empty the tubes and the measuring cell ► Page 23].
- 3 Remove the funnel. **See** [Replace the funnel ► Page 31].
- 4 Remove the exhaust pipe. **See** [Replace the exhaust pipe ► Page 31].
- 5 Clean the exhaust pipe and the funnel using an ultrasonic cleaner.
- 6 Rinse the exhaust pipe and the funnel with deionized water.
- 7 Wipe the outside of the funnel and the exhaust pipe with a cloth.
- 8 Install the exhaust pipe. **See** [Install the exhaust pipe ► Page 13].
- 9 Install the funnel. **See** [Install the funnel ► Page 14].
- 10 Install the tubes. **See** [Install the tubes ► Page 14].

6.5 Replace the magnetic lid with the flow cell

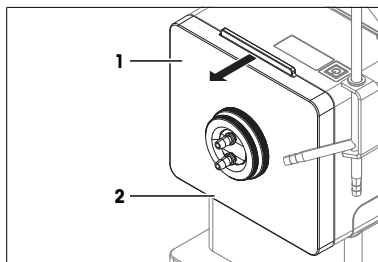
6.5.1 Remove the magnetic lid

- 1 Rinse the measuring cell and the tubes. **See** [Rinse the measuring cell and the tubes ► Page 22].
- 2 Empty the tubes and the measuring cell. **See** [Empty the tubes and the measuring cell ► Page 23].

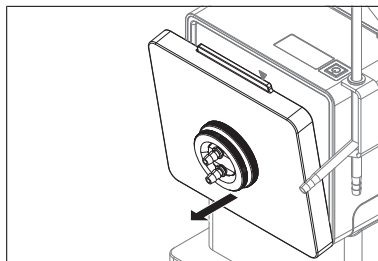
- 3 Pull the draining tube (1) from the outlet of the flow cell.
- 4 Pull the filling tube (2) from the inlet of the flow cell.



- 5 Stabilize the lower part of the magnetic lid (2) with one hand.
- 6 To detach the magnetic lid, pull the handle (1) away from the refractometer.

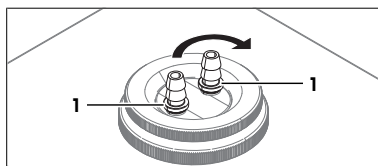


- 7 Remove the magnetic lid.
- 8 Wipe the inside of the magnetic lid with a clean and lint-free tissue.
- 9 Wipe the measuring cell and the protective plate with a clean and lint-free tissue.

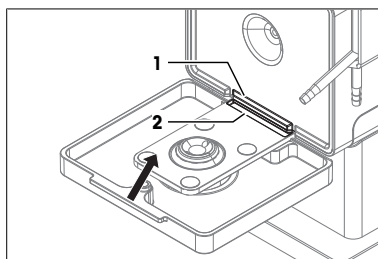


6.5.2 Install the magnetic lid

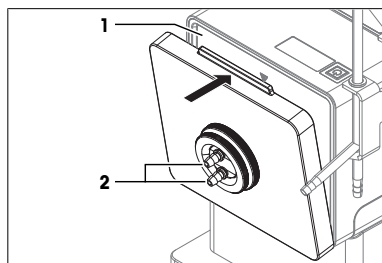
- 1 Check that the nozzles (1) are screwed tightly into the flow-cell insert and if needed tighten the nozzles clockwise.



- 2 Align the rectangular opening (2) on the holding plate with the ridge (1).
- 3 Tilt the top of the magnetic lid towards the refractometer.



- 4 Rotate the nozzles (2) until they are aligned vertically.
- 5 Tilt the top of the magnetic lid towards the refractometer until the magnets attach themselves to the protective plate (1).
- 6 Adjust the alignment of the magnetic lid and the flow cell.
See [Adjust the alignment of the magnetic lid and the flow cell ► Page 14].



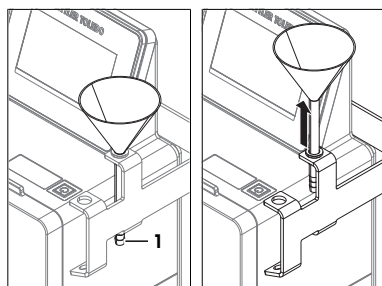
6.6 Replace the tubing

Replace any tube that is cloudy, leaks or that you can no longer clean completely.

- 1 Rinse the measuring cell and the tubes. **See** [Rinse the measuring cell and the tubes ► Page 22].
- 2 Empty the tubes and the measuring cell. **See** [Empty the tubes and the measuring cell ► Page 23].
- 3 Remove the tube you want to replace.
- 4 Install the new tube. **See** [Install the tubes ► Page 14].

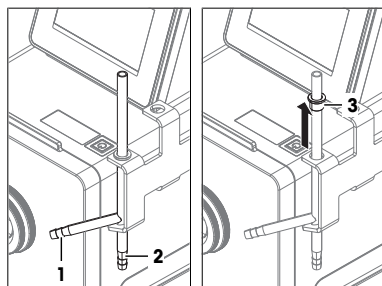
6.7 Replace the funnel

- 1 Rinse the measuring cell and the tubes. **See** [Rinse the measuring cell and the tubes ► Page 22].
- 2 Empty the tubes and the measuring cell. **See** [Empty the tubes and the measuring cell ► Page 23].
- 3 Pull the filling tube from the funnel.
- 4 Wipe the barbed end of the funnel (1) and the end of the filling tube with a clean tissue.
- 5 Pull the funnel out of the sleeve.
- 6 Install the new funnel. **See** [Install the funnel ► Page 14].
- 7 Push the filling tube over the barbed end of the funnel.

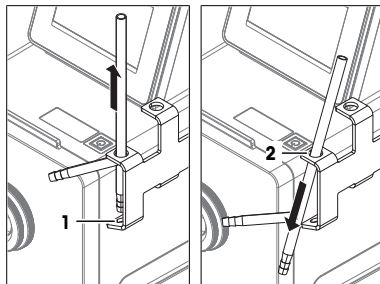


6.8 Replace the exhaust pipe

- 1 Rinse the measuring cell and the tubes. **See** [Rinse the measuring cell and the tubes ► Page 22].
- 2 Empty the tubes and the measuring cell. **See** [Empty the tubes and the measuring cell ► Page 23].
- 3 Pull the draining tube from the exhaust pipe (1).
- 4 Wipe the barbed end of the exhaust pipe (1) and the end of the draining tube with a clean tissue.
- 5 Pull the waste tube from the exhaust pipe (2).
- 6 Wipe the barbed end of the exhaust pipe (2) and the end of the waste tube with a clean tissue.
- 7 Slide the sleeve (3) off the exhaust pipe.



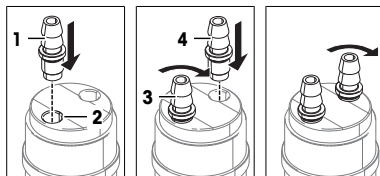
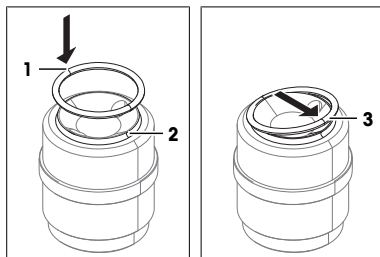
- 8 Pull the lower end of the exhaust pipe out of the lower opening (1).
- 9 Pull the exhaust pipe downwards at an angle and out of the upper opening (2).
- 10 Install the new exhaust pipe. **See** [Install the exhaust pipe ► Page 13].
- 11 Install the draining tube. **See** [Install the draining tube ► Page 15].
- 12 Install the waste tube. **See** [Install the waste container and the waste tube ► Page 15].



6.9 Replace the flow-cell insert

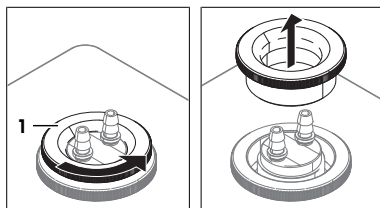
6.9.1 Assemble the new flow-cell insert

- 1 Place the flow-cell insert with its flat surface on a clean work surface.
- 2 Place one side of the O-ring (1) in the groove (2) on the flow-cell insert.
- 3 Push the other side of the O-ring (3) over the rim into the groove.
- 4 Turn the flow-cell insert upside down and place it the surface with the O-ring on a clean work surface.
- 5 Insert one of the nozzles (1) into the one of the openings (2).
- 6 Screw the nozzle (3) clockwise into the opening and tighten it.
- 7 Insert the other nozzle (4) into the other opening.
- 8 Screw the nozzle clockwise into the opening and tighten it.



6.9.2 Remove the alignment ring and the flow-cell insert

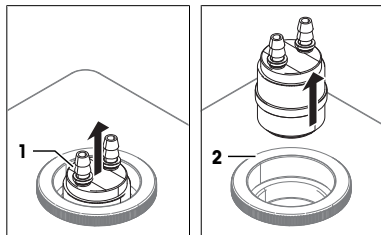
- 1 Remove the magnetic lid. **See** [Remove the magnetic lid ► Page 29].
- 2 Unscrew the alignment ring (1) counterclockwise and remove it.



- 3 Lift the flow-cell insert (1) out of the mounting ring (2).
- 4 Wipe the inside of the mounting ring with a soft, clean cloth.

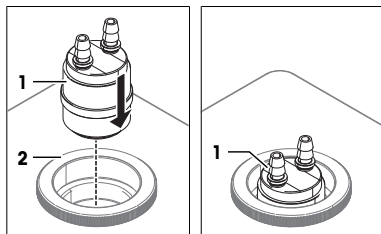
See also

-  Remove the magnetic lid ► Page 29

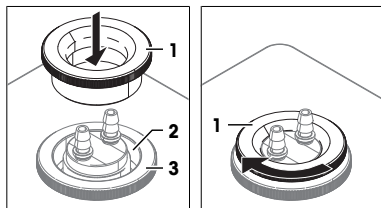


6.9.3 Install the flow-cell insert and the alignment ring

- 1 Insert the flow-cell insert (1) from above into the mounting ring (2) until it rests on the work surface.



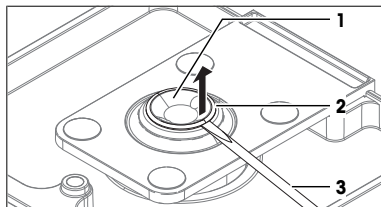
- 2 Slide the alignment ring (1) into the gap (2) until it touches the mounting ring (3).
- 3 Screw the alignment ring (1) clockwise into the magnetic lid.
- 4 Install the magnetic lid. **See** [Install the magnetic lid ► Page 30].



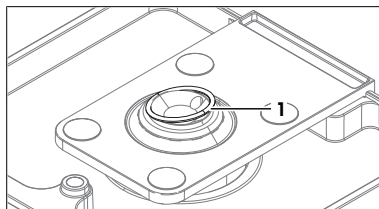
6.10 Replace the O-ring of the flow-cell insert

6.10.1 Remove the O-ring

- 1 Rinse the measuring cell and the tubes. **See** [Rinse the measuring cell and the tubes ► Page 22].
- 2 Empty the tubes and the measuring cell. **See** [Empty the tubes and the measuring cell ► Page 23].
- 3 Remove the magnetic lid. **See** [Remove the magnetic lid ► Page 29].
- 4 Place the magnetic lid on a clean work surface.
- 5 Insert the tip of a flat screwdriver (3) into the slit between the O-ring (2) and the flow-cell insert (1).



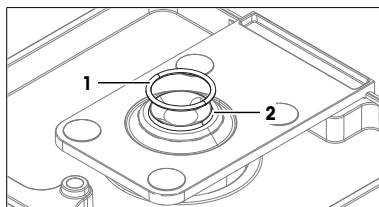
- 6 Use the screwdriver to lift the O-ring (1) over the rim of the flow-cell insert.



- 7 Lift the O-ring (1) completely out of the groove (2).

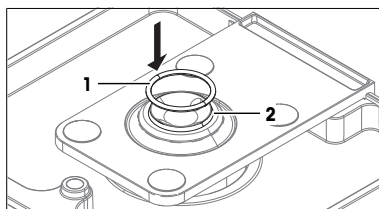
See also

- Remove the magnetic lid ▶ Page 29

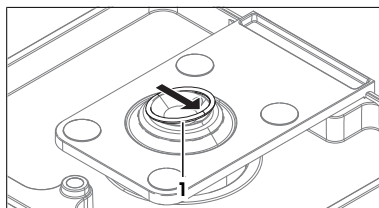


6.10.2 Install the O-ring

- 1 Place the one side of the O-ring (1) in the groove (2) on the flow-cell insert.



- 2 Push the other side of the O-ring (1) over the rim into the groove.
- 3 Install the magnetic lid. **See** [Install the magnetic lid ▶ Page 30].
- 4 Install the filling tube. **See** [Install the filling tube ▶ Page 14].
- 5 Install the draining tube. **See** [Install the draining tube ▶ Page 15].

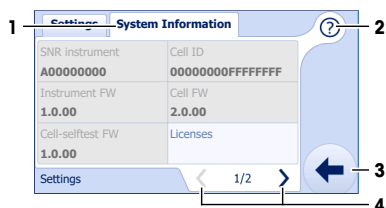


6.11 View the firmware version and other system information

- 1 Go to > > > **System Information** (1).
- 2 To view parameter descriptions, tap (2).
- 3 To move between windows, use the arrows (4).
- 4 To return to **Setup & Tools**, tap (3).

See also

- View parameter descriptions ▶ Page 16



6.12 Prepare the refractometer for storage

- 1 Rinse the measuring cell and the tubes.
- 2 Empty and remove the tubes.
- 3 Clean and dry the measuring cell.
- 4 Shut down the refractometer.
- 5 Disconnect the refractometer from the power supply.

- 6 Clean the refractometer.
- 7 Protect the refractometer from dust.
- 8 Store the refractometer in a dry and clean place.

See also

 Technical data ► Page 35

6.13 Transport the refractometer

If you have questions about transporting your refractometer, contact your authorized METTLER TOLEDO service representative or dealer.

► www.mt.com/contact

- 1 Rinse the measuring cell and the tubes.
- 2 Empty and remove the tubes.
- 3 Remove the funnel, the exhaust pipe and their sleeves.
- 4 Clean and dry the measuring cell.
- 5 Shut down the refractometer.
- 6 Disconnect the refractometer from the power supply.
- 7 Clean the refractometer.
- 8 If you transport the refractometer over long distances, use the packaging designed for the refractometer.
- 9 Move the refractometer to the new location.

6.14 Dispose of the refractometer

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.



7 Technical data



Additional technical data are listed in the Reference Manual.

► www.mt.com/library

7.1 Refractometer

Characteristic	Value	
Power rating instrument	Input values	24 V DC, 2.5 A
	Socket	DC-Jack, 2.5 mm
Power rating AC adapter	Input voltage	100...240 V AC $\pm 10\%$, 1.5 A
	Input frequency	50/60 Hz
	Output values	24 V DC, 2.5 A
Dimensions	Width	231 mm
	Depth	200 mm
	Height	379 mm
	Weight	10.4 kg

Characteristic		Value
Materials	Measuring cell	Sapphire prism, stainless steel (X2CrNiMo17-12-2 / 1.4404), PTFE (polytetrafluoroethylene)
	Flow cell	PTFE (polytetrafluoroethylene)
	Funnel	Stainless steel (X5CrNi18-10 / 1.4301)
	Filling tube	PVC (polyvinyl chloride)
	Exhaust pipe	Stainless steel (X5CrNi18-10 / 1.4301)
	Draining tube	PVC (polyvinyl chloride)
	Waste tube	PVC (polyvinyl chloride)
	Funnel holder	Stainless steel
	Housing	Baydur (polyurethane)
	Stand	Stainless steel, aluminum
	Touch screen	Polyster, Gorillaz Glass
Ambient conditions	Ambient temperature	+5 °C...+40 °C
	Relative humidity	20...80 % (not condensing)
	Altitude	≤5000 m above sea level
	Pressure	Atmospheric pressure
	Use	In interior spaces
	Overvoltage category	II
	Pollution degree	2
Storage conditions	Temperature	-20 °C...+70 °C
	Relative humidity	10...90 %

7.2 Measurement

Characteristic		Value
Refractive index	Measuring range	1.32...1.58
	Accuracy	±0.0001
	Repeatability	0.00005
	Resolution	0.0001
	Wavelength	589 nm
Measuring temperature	Range ¹⁾	15...25 °C
	Accuracy	±0.1 °C
	Resolution	0.01 °C
Min. sample volume	Using funnel	50 mL
	Using syringe	4 mL

¹⁾ Not more than 20 °C below ambient temperature

7.3 Compliance information

Application-relevant standards and norms are listed on the internet.

► www.mt.com/dere-norms

European Union

The instrument complies with the directives and standards listed on the EU Declaration of Conformity.

Material	CAS No.
1,2-dimethoxyethane	110-71-4

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.

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

To protect your product's future:

METTLER TOLEDO Service assures the quality, measuring accuracy and preservation of value of this product for years to come.

Please request full details about our attractive terms of service.

www.mt.com/EasyPlus-Refractometry

For more information

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