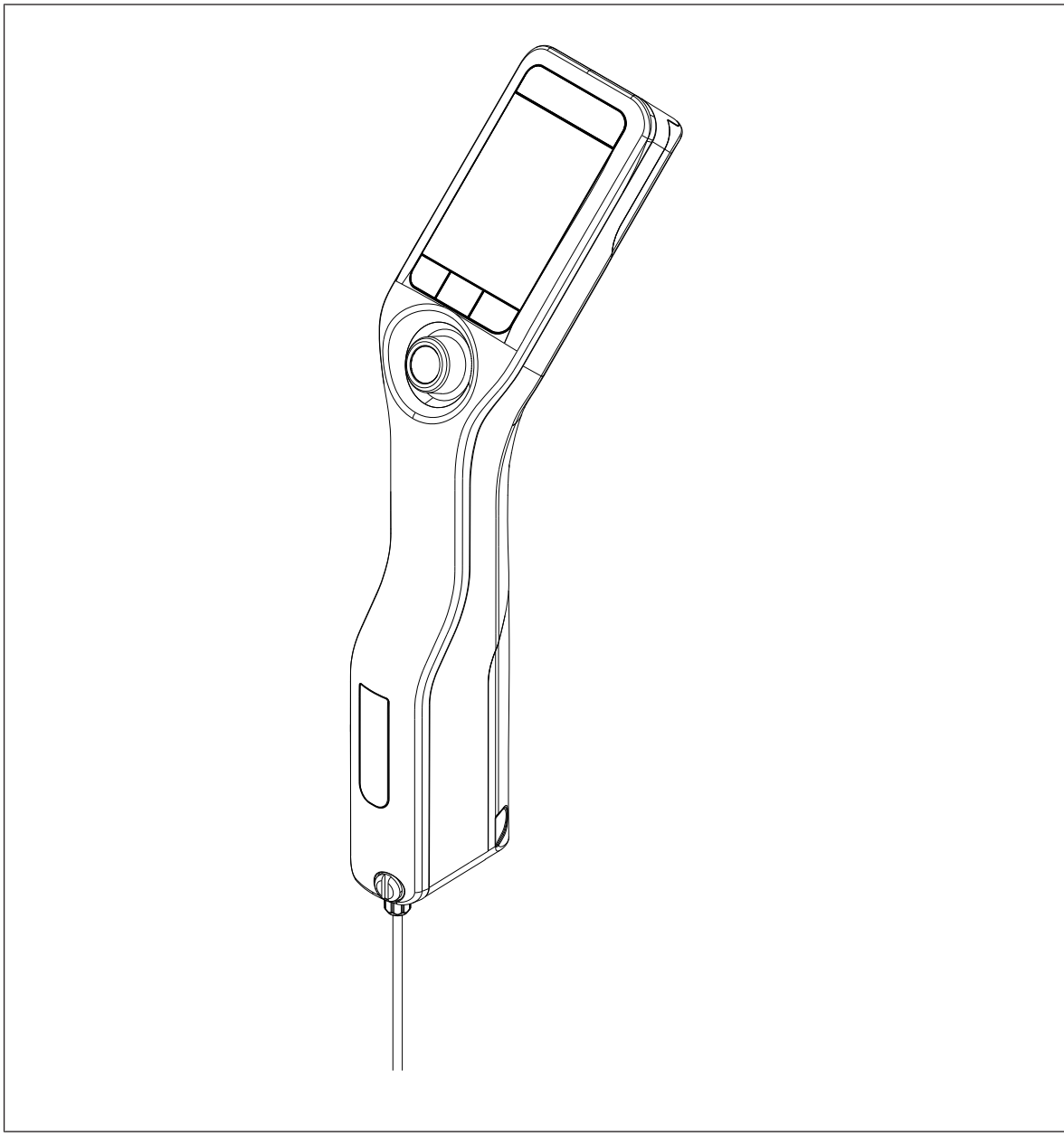
Reference Manual

Handheld Density Meter

Densito/DensitoPro



METTLER TOLEDO

Table of Contents

1 Introduction

Thank you for choosing a METTLER TOLEDO density meter. The handheld density meters Densito and DensitoPro are handheld measuring instruments used to determine the density of liquids.

The instructions in this document refer to the handheld density meters Densito and DensitoPro running firmware version V1.1.0 or higher.

See also

View the firmware version and other system information ▸ Page 69

1.1 Further information

For applications notes, see the following links:

▶ www.mt.com/analytical-application-library

▶ www.mt.com/library

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

See also

Download the Reference Manual ▸ Page 12

1.2 Explanation of conventions and symbols

Note For useful information about the product.

Refers to an external document.

Elements of instructions

Instructions always contain action steps and can contain prerequisites, intermediate results and results. If an instruction contains more than one action step, the action steps are numbered.

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

1 Action step 1

⇨ Intermediate result

2 Action step 2

⇨ Result

1.3 Compliance information

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

▶ http://www.mt.com/ComplianceSearch

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

▶ www.mt.com/dere-norms

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

▶ www.mt.com/contact

European Union

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

SVHC candidate substances according to Article 33 of the EU regulation no. 1907/2006 (REACH)

Material	CAS No.
1,3-Propanesultone	1120-71-4
PZT (Lead Zirconate Titanate)	12626-81-2

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.

The following section only applies to DensitoPro density meters.

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

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

Canada

The following section only applies to DensitoPro density meters.

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

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

2 Safety information

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

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

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

User Manual and Reference Manual are available online. See [Download the Reference Manual ▸ Page 12].

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

Warning symbols

General hazard: read the User Manual or the Reference Manual for information about the hazards and the resulting measures.

2.2 Product specific safety notes

Intended use

The density meter is designed to be used by trained staff and is intended for measuring the density of liquid samples. The samples must be compatible with the materials they come into contact with.

The density meter is designed for indoor and outdoor operation in dry conditions. The following site requirements apply:

- Ambient conditions within the limits specified in the technical data
- No corrosive gas atmosphere
- No explosive atmosphere
- No powerful electric or magnetic fields

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

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 AC/DC adapter designed for your instrument.
2 Keep all electrical cables and connections away from liquids and moisture.
3 Check the cables and the plugs for damage and replace damaged cables and plugs.

⚠ CAUTION

Injury or damage due to incorrect handling of the battery

The battery can explode or ignite if it is not handled correctly.

1 Do not store or use the battery at temperatures below -20 °C or above 60 °C.
2 Do not subject the battery to mechanical stresses like pressure, bending or impacts.

NOTICE

Damage to the measuring cell due to solidifying samples

Hot samples cool down during the measurement. If the samples solidify in the measuring cell, you can no longer empty the measuring cell.

– Only measure samples with a viscosity below 1000 mPa*s at ambient temperature.

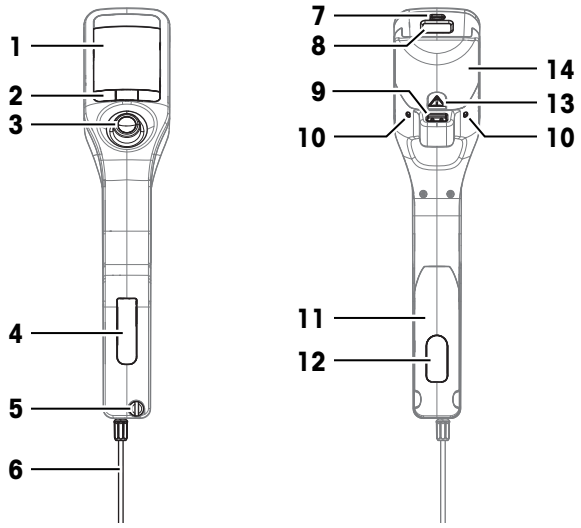
NOTICE

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

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

3 Design and function

3.1 Instrument overview



No.	Name	Function
1	Screen	To display settings and results.
2	Keys	To start up the density meter, select menu items and to navigate.
3	Navigation joystick	To navigate through the menus.
4	Measuring cell window	To view the measuring cell and to check if the measuring cell is filled or empty.
5	Filling opening with locking screw	To fill and drain the measuring cell using a syringe. The locking screw closes off the filling opening.
6	Filling tube	To fill and drain the measuring cell.
7	USB-C socket	To connect the density meter with the AC adapter or a computer.
8	RFID reader and barcode reader (DensitoPro only)	To scan a linear barcode or read and write information to Smart Tags.
9	USB-A socket	To connect a USB flash drive, a USB printer or a bluetooth dongle for a bluetooth printer.
10	Charging contacts	Contacts to charge the density meter with the optional charging stand.
11	Sample pump cover	To access the sample pump.
12	Sample pump window	To view the sample pump and to check if the sample pump is filled or empty.
13	Safety sign	Warns that incorrect handling of the battery can cause injury or damage the density meter.
14	Battery cover	To access the battery.

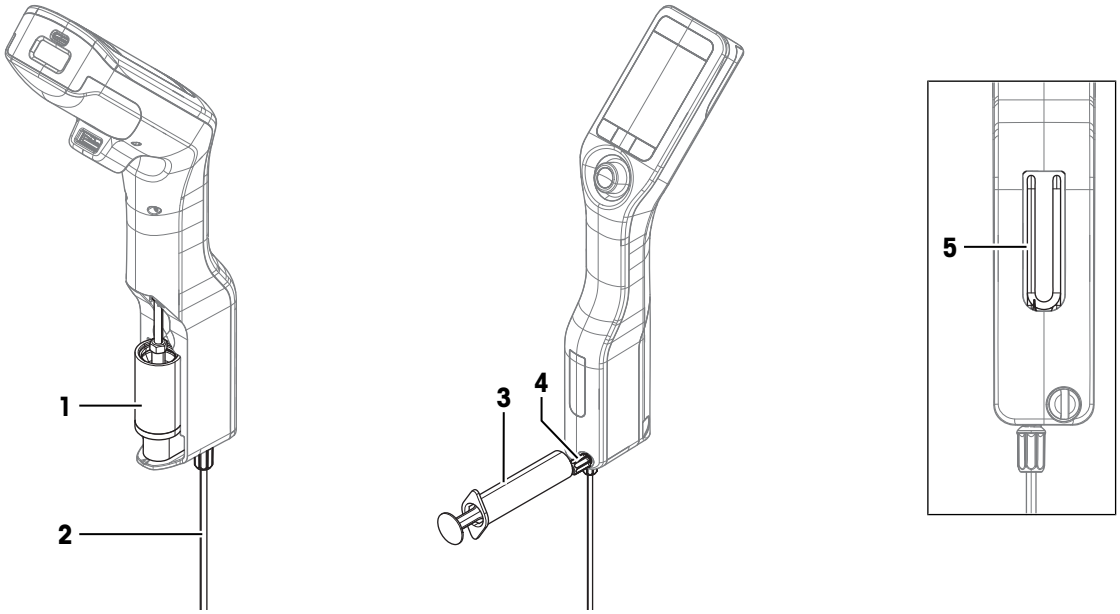
See also

Accessories ▶ Page 74

3.2 Overview of functions

The density meter uses the oscillating body method as measurement technology. The density meter has no active temperature control.

If you measure samples with low viscosity, you can use the sample pump (1) and the filling tube (2) to fill the measuring cell (5). For samples with high viscosity you can use a syringe (3) and the connector for the syringe (4) to fill the measuring cell (5). The user can observe the filling through the window of the measuring cell.



For repeated measurements, you can define and save workflows as methods. Two workflow types are available:

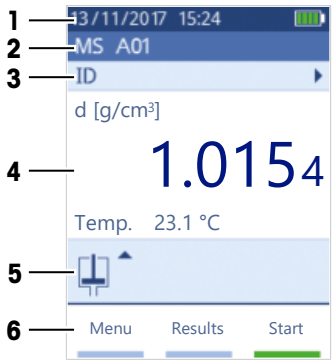
- Customizable guided workflow: guides the user step by step through the density determination.
- Unguided workflow: the user decides which steps are needed.

The results are automatically converted into one of the following predefined units or a unit that the user defines.

- Density
- Specific gravity
- Alcohol concentration
- American Petroleum Institute (API density, API specific gravity, API degree)
- Baumé scale
- Sulfuric acid concentration
- Sucrose concentration

3.3 User interface

3.3.1 Home screen



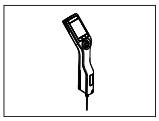
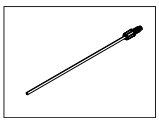
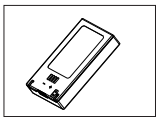
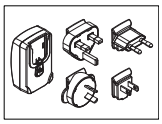
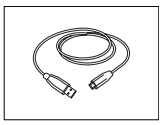
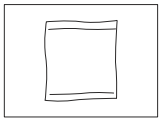
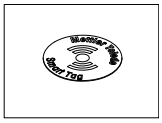
No.	Name	Explanation
1	Status ribbon	Displays the current date, time, battery charge status and connection to accessories like EasyDirect Density & Refractometry.
2	Method ribbon	Displays the type of density determination and the method identifier or the selected standard. • **MS**: measurement using a method • **TE**: test • **ADJ**: adjustment
3	Sample ID ribbon	Displays the sample ID.
4	Measuring ribbon	Displays the unit, the measured value or result and the temperature of the measuring cell.
5	Sampling ribbon	Displays the current status of the sample pump or syringe.
6	Key functions ribbon	Displays the function of the keys.

3.3.2 Icons on the screen

Icon	Location	Explanation
	Status ribbon	Barcode reader is scanning.
	Status ribbon	RFID reader is reading or writing.
	Status ribbon	EasyDirect Density & Refractometry is connected.
	Status ribbon	Density meter is sending data to the printer.
	Status ribbon	Shows the charge of the battery.
	Status ribbon	Battery is charging.
	Sampling ribbon	Syringe mode activated. The sample pump is deactivated.
	Sampling ribbon	Sample pump activated and piston in the lowermost position.
	Sampling ribbon	Sample pump activated and piston in the uppermost position.

4 Installation and commissioning

4.1 Scope of delivery

Part		Order number	Densito	DensitoPro
	Handheld density meter	–	•	•
	Filling Tube 190 mm • Tube • Connector syringe/filling tube • Washer	30330847	•	•
	Battery Li-Ion 2400 mAh	30330855	•	•
	Power Supply and Worldwide Adapters	30449255	•	•
	USB-C Cable	30449253	•	•
	Density standards (3 pcs) 6 mL	–	•	•
	Tag SmartSample (10 pcs)	30449268	–	•
	User Manual	–	•	•
	Declaration of conformity	–	•	•
	Test report	–	•	•

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 of your density meter 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 density meter.
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

View the firmware version and other system information ▶ Page 69

4.3 Unpack the density meter

1 Unpack the density meter.
2 Store the protective packaging for later transport over long distances.
3 Check that you have 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.

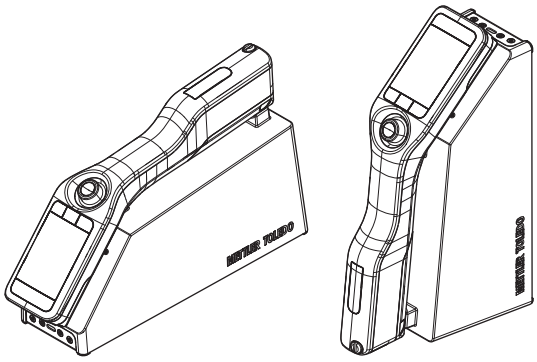
▶ www.mt.com/contact

4.4 Charge the density meter

You can either charge the density meter using the supplied AC/DC adapter, a computer or the optional charging stand. Recharging an empty battery takes approximately three hours.

Charging stand

The charging stand can be used on a level surface or mounted on a wall.



4.4.1 Charge with the AC/DC adapter

⚠ 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 AC/DC adapter designed for your instrument.
2 Keep all electrical cables and connections away from liquids and moisture.
3 Check the cables and the plugs for damage and replace damaged cables and plugs.

NOTICE

Damage to the AC/DC adapter due to overheating

An AC/DC adapter that does not have adequate air circulation around it, cannot cool sufficiently and overheats.

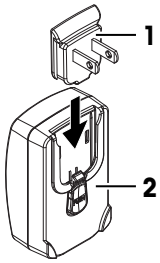
– Do not cover the AC/DC adapter.

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

4.4.1.1 Assemble the AC/DC adapter

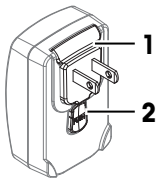
Install the prongs

1 Slide the desired set of prongs (1) into the AC/DC adapter (2).
2 Insert the USB-A plug of the USB-A-C cable in the USB-A socket of the AC/DC adapter.



Change the prongs

1 Pull the plug of the AC/DC adapter out of the power outlet.
2 Push the button (2) and slide the set of prongs (1) out.
3 Slide the desired set of prongs into the A/DC adapter.



4.4.1.2 Connect the power supply

1 Insert the USB-C plug of the USB-A-C cable into the USB-C socket on the density meter.
2 Install the cables in such a way that they cannot be damaged or interfere with operation.
3 Insert the plug of the AC/DC adapter into a power outlet that is easily accessible.
⇨ The density meter starts charging and the icon is displayed.

4.4.2 Charge with a computer

- A running computer with USB-A sockets (USB 2.0 or higher) is available.

1 Insert the USB-C plug of the USB-A-C cable into the USB-C socket on the density meter.
2 Install the cables in such a way that they cannot be damaged or interfere with operation.
3 Insert the USB-A plug in the USB-A socket of the computer.
⇨ The density meter starts charging and the icon is displayed.

4.4.3 Charge with a charging stand

Place the density meter on a level charging stand

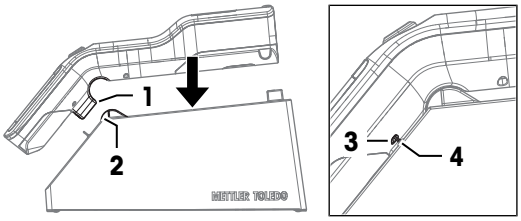
- The charging stand is installed on a level surface.

1 Align the rear of the USB-A socket (1) of the density meter with the knob (2) on the charging stand.

2 Lower the density meter onto the charging stand.

3 Make sure that the charging pins (4) touch the charging contacts (3).

⇨ The density meter starts charging and the icon is displayed.



⇨ If the density meter is shutdown, it beeps when it starts charging.

Place the density meter on a wall-mounted charging stand

- The charging stand is mounted on a wall.

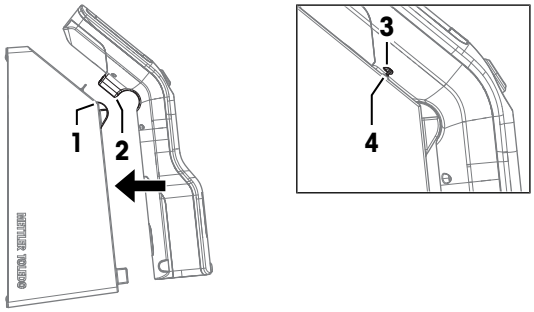
1 Align the rear of the USB-A socket (1) of the density meter with the knob (2) on the charging stand.

2 Push the density meter onto the charging stand.

3 Make sure that the charging pins (4) touch the charging contacts (3).

⇨ The density meter starts charging and the icon is displayed.

⇨ If the density meter is shutdown, it beeps when it starts charging.



See also

Install the charging stand ▸ Page 18

4.5 Setup for working with the sample pump

4.5.1 Activate the sample pump mode

1 Press the **Menu** key.

2 Navigate to **Settings** > **Measurement** > **Sampling**.

⇨ The **Sampling** window opens.

3 Navigate to **Sample pump**.

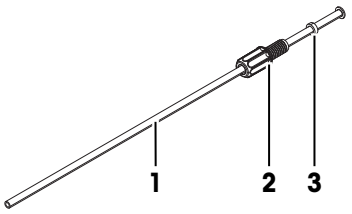
4 Press the **OK** key.

5 Navigate back to the home screen.

⇨ The icon is displayed in the sampling ribbon.

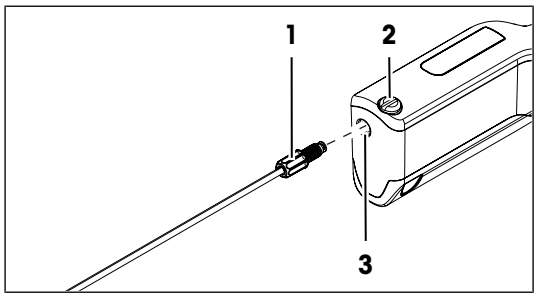
4.5.2 Install the filling tube

- The filling tube (tube (1), connector (2) and washer (3)) is assembled.



- The locking screw (2) is installed and tight.

– Screw the connector (1) of the filling tube into the opening (3) and tighten it.



4.6 Activate and deactivate the RFID reader (DensitoPro only)

1 Press the **Menu** key.
2 Navigate to **Settings** > **RFID / Barcode** > **Type**.
⇨ The **Type** window opens.
3 To activate the RFID reader, navigate to **RFID**.
4 To deactivate the RFID reader, navigate to **None**.
5 Press the **OK** key.

See also

Read and write information with the RFID reader (DensitoPro only) ▸ Page 51

4.7 Activate and deactivate the barcode reader (DensitoPro only)

1 Press the **Menu** key.
2 Navigate to **Settings** > **RFID / Barcode** > **Type**.
⇨ The **Type** window opens.
3 To activate the barcode reader, navigate to **Barcode**.
4 To deactivate the barcode reader, navigate to **None**.
5 Press the **OK** key.

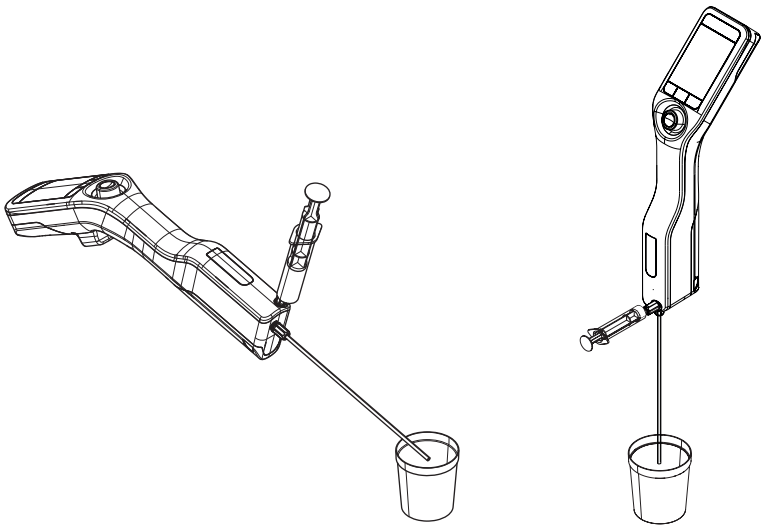
See also

Read information with the barcode reader (DensitoPro only) ▸ Page 52

4.8 Install accessories

4.8.1 Setup for working with a syringe

When you work with a syringe you can place the density meter either on the bench or hold it upright.



4.8.1.1 Activate the syringe mode

- The piston is in the lowermost position.

1 Press the **Menu** key.
2 Navigate to **Settings** > **Measurement** > **Sampling**.
   ⇨ The **Sampling** window opens.
3 Navigate to **Syringe**.
4 Press the **OK** key.
5 Navigate back to the home screen.
   ⇨ The icon is displayed in the sampling ribbon.
6 If you want place the density meter on the bench, activate the auto rotation of the screen.

See also

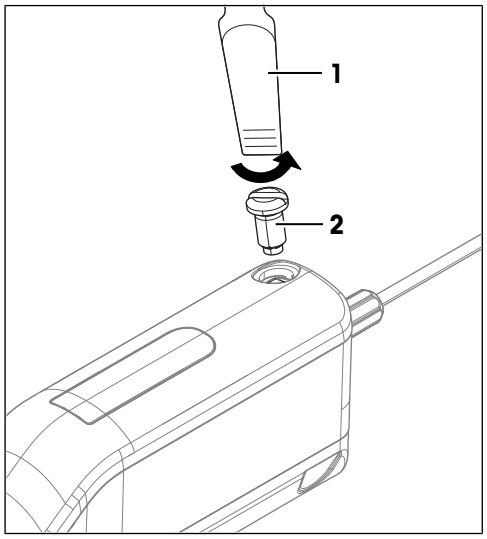
Activate and deactivate the auto rotation of the screen ▸ Page 26

4.8.1.2 Install the connector for the syringe

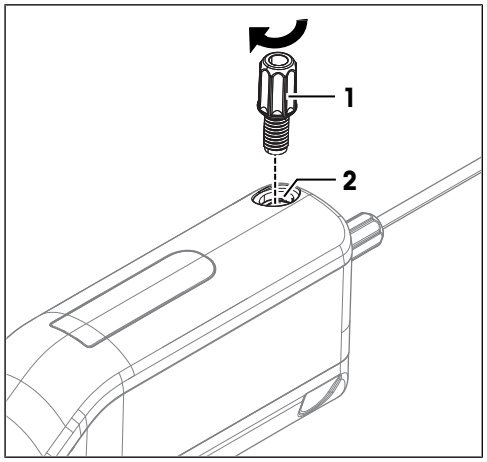
- The connector for the syringe is available.
- The filling tube is installed.

1 Unscrew the locking screw (2) counterclockwise with a flat screwdriver (1).

2 Remove the locking screw.



3 Screw the connector (1) clockwise into the filling opening (2) and tighten it with your fingers.



See also

- Accessories ▸ Page 74
- Install the filling tube ▸ Page 16

4.8.2 Install the charging stand

⚠ 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 AC/DC adapter designed for your instrument.

2 Keep all electrical cables and connections away from liquids and moisture.

3 Check the cables and the plugs for damage and replace damaged cables and plugs.

NOTICE

Damage to the AC/DC adapter due to overheating

An AC/DC adapter that does not have adequate air circulation around it, cannot cool sufficiently and overheats.

– Do not cover the AC/DC adapter.

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

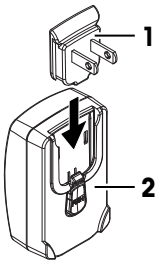
See also

Charge with a charging stand ▶ Page 15

4.8.2.1 Assemble the AC/DC adapter

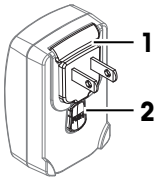
Install the prongs

1 Slide the desired set of prongs (1) into the AC/DC adapter (2).
2 Insert the USB-A plug of the USB-A-C cable in the USB-A socket of the AC/DC adapter.



Change the prongs

1 Pull the plug of the AC/DC adapter out of the power outlet.
2 Push the button (2) and slide the set of prongs (1) out.
3 Slide the desired set of prongs into the A/DC adapter.



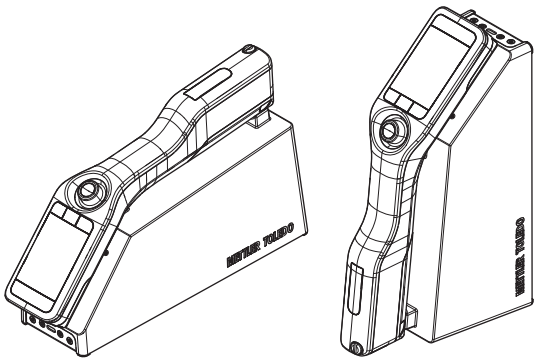
4.8.2.2 Position the charging stand

The charging stand has been developed for indoor operation.

The following site requirements apply:

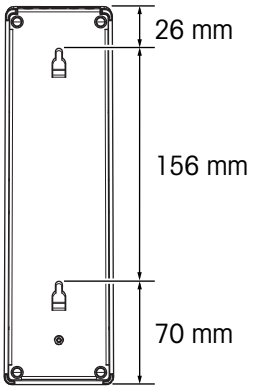
- Ambient conditions within the limits specified in the technical data
- No powerful vibrations
- No direct sunlight
- No corrosive gas atmosphere
- No explosive atmosphere
- No powerful electric or magnetic fields

The charging stand can be placed on a level surface or mounted on a wall.

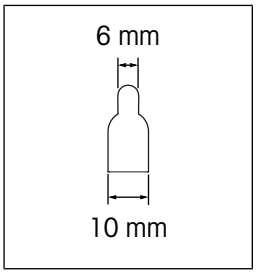


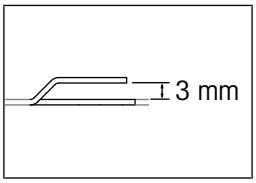
Mount the charging stand on a wall

- The wall and the screws can hold the weight of the charging stand and the density meter.
- There is enough space above the charging stand to connect the USB-A-C cable.

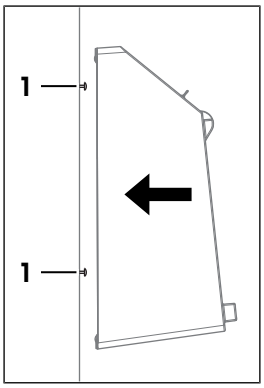


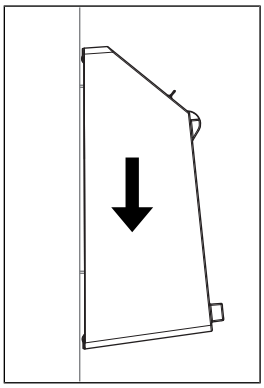
- The screws fit into the mounting holes on the charging stand.
- The screws are mounted on the wall.





1 Position the wider part of the mounting holes over the screws (1) and push the charging stand toward the wall.
2 Slide the charging stand downwards.

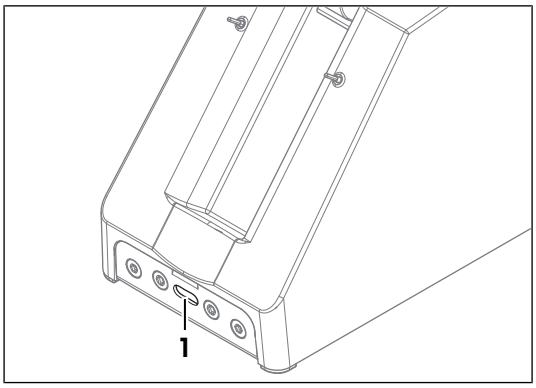




4.8.2.3 Connect the power supply

- The charging stand is installed on a level surface or mounted on a wall.
- The AC/DC adapter is assembled.

1 Insert the USB-C plug of the USB-A-C cable into the USB-C socket (1) on the charging stand.
2 Install the cables in such a way that they cannot be damaged or interfere with operation.
3 Insert the plug of the AC/DC adapter into a power outlet that is easily accessible.



See also

- Position the charging stand ▸ Page 19
- Assemble the AC/DC adapter ▸ Page 19

4.8.3 Install and remove the protective cover

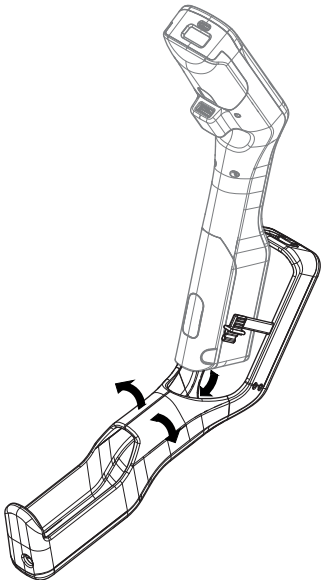
The protective cover provides a better grip and protects the density meter against the following:

- Dust
- Dirt
- Moisture
- Bumps
- Scratches

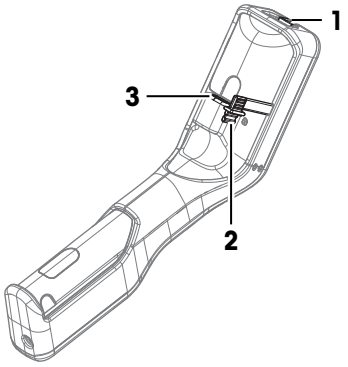
4.8.3.1 Install the protective cover

- The density meter is shut down.

1 Remove the filling tube.
2 Remove the connector for the syringe if it is installed.
3 Pull the flaps in the middle apart and slide the density meter into the cover.



4 Insert the USB-C seal (1) into the USB-C socket.
5 Insert the USB-A seal (2) into the USB-A (3) socket.
6 Install the filling tube.
7 If needed, install the connector for the syringe.



See also

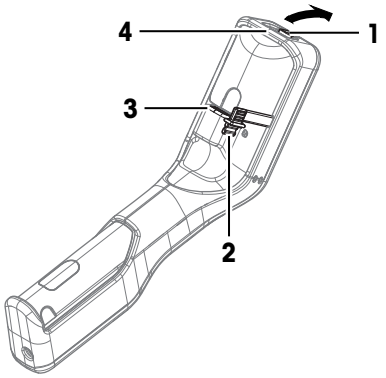
- Replace the filling tube ▸ Page 63
- Install the connector for the syringe ▸ Page 18

4.8.3.2 Remove the protective cover

- The density meter is shut down.

1 Remove the filling tube.
2 Remove the connector for the syringe if it is installed.

3 Pull the USB-C seal (1) out of the USB-C socket.
4 Pull the USB-A seal (2) out of the USB-A socket (3) .
5 Push the top of the protective cover (4) off the density meter and slide the density meter out of the protective cover.
6 Install the filling tube.
7 If needed, install the connector for the syringe.



See also

- Replace the filling tube ▸ Page 63
- Install the connector for the syringe ▸ Page 18

4.8.4 Connect a printer

In order to print the results right after the measuring procedure, the density meter has to be connected to a USB or bluetooth printer. Alternatively the results can be printed at a later time from the **Results** menu.

The following printer types are compatible with the density meter:

Connection type	Printer
Bluetooth	Godex MX20
USB	P25

Note

The bluetooth function is only available in selected countries with the necessary approvals. For more information, contact an authorized METTLER TOLEDO service representative or dealer.

▶ www.mt.com/contact

Read the user documentation of the USB printer for more information on how to set up and operate the USB printer.

See also

- Accessories ▸ Page 74

4.8.4.1 Connect a USB printer

1 Press the **Menu** key.
2 Navigate to **Settings** > **Printer** > **Printer type**.
⇨ The **Printer type** window opens.
3 Navigate to **USB**.
4 Press the **OK** key.
5 Insert the USB-B plug of USB-A-B cable into the USB-B socket of the printer.
6 Insert the USB-A plug into the USB-A socket of the density meter.
7 Switch on the printer.
⇨ The connection is established.

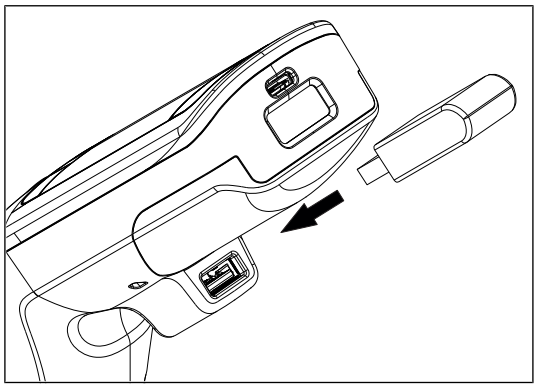
See also

- Configure the automatic printing of results ▸ Page 38
- Print results ▸ Page 54

4.8.4.2 Connect a bluetooth printer

- The bluetooth printer is set up and running.

1 Insert the bluetooth dongle into the USB-A socket of the density meter.
2 Press the **Menu** key.
3 Navigate to **Settings** > **Printer** > **Printer type**.
   ⇨ The **Printer type** window opens.
4 Navigate to **Bluetooth**.
5 Press the **OK** key.
6 Navigate to **Printer selection**.
   ⇨ The density meter searches for bluetooth printers.
   ⇨ A list of available bluetooth printers is displayed.
7 Navigate to the bluetooth printer you want to connect.
8 Press the **OK** key.



See also

- Configure the automatic printing of results ▸ Page 38
- Print results ▸ Page 54

4.8.4.3 Print a test page

- The printer is connected and running.

1 Press the **Menu** key.
2 Navigate to **Settings** > **Printer** > **Test printer**.
   ⇨ If there is no connection yet, the notification **Connecting to printer** is displayed.
   ⇨ When the connection is established, a test page is printed.

See also

- Connect a printer ▸ Page 22

4.8.5 Connect to EasyDirect Density & Refractometry

The EasyDirect Density & Refractometry computer software is a data management software to manage a database of measurement results. The data can be directly exported to the computer software if a computer is connected, on which the EasyDirect Density & Refractometry computer software is installed.

Read the electronic help of the EasyDirect Density & Refractometry software for more information on how to operate the computer software.

Procedure

- EasyDirect Density & Refractometry is installed on the computer.
- A USB-A-C cable is available.

1 Insert the USB-C plug of the USB-A-C cable into the USB-C socket on the density meter.
2 Insert the USB-A plug into a USB-A socket on the computer.
3 Add the density meter to the list of instruments on EasyDirect Density & Refractometry.
⇨ The icon is displayed in the status ribbon.

See also

- Export results to EasyDirect Density & Refractometry ▸ Page 53

4.9 Configure the density meter

4.9.1 Change the date and time format

The following date formats are available:

- **dd/mm/yyyy**: day/month/year, e.g. 30/11/2020
- **mm/dd/yyyy**: month/day/year, e.g. 11/30/2020
- **yyyy/mm/dd**: year/month/day, e.g. 2020/11/30
- **dd.mm.yyyy**: day.month.year, e.g. 30.11.2020

The following two time formats are available.

- **24 h**: 24-hour clock, e.g. 6:30 and 18:30
- **am/pm**: 12-hour clock, e.g. 6:30 am and 6:30 pm

Procedure

1 Press the **Menu** key.
2 Navigate to **Settings** > **Date / Time**.
⇨ The **Date / Time** window opens.
3 Navigate to **Date** or **Time**.
4 To change the date or time, move the navigation joystick up to raise or down to lower the number.
5 To switch between day, month and year or hours and minutes, move the navigation joystick to the left or right.
6 Press the **OK** key.
7 Navigate to **Date format** or **Time format**.
8 Navigate to the format you want to use.
9 Press the **OK** key.

4.9.2 Change the temperature unit

Two temperature units are available.

- **°C**
- **°F**

When you change the temperature unit, temperatures are displayed in the selected unit. The temperature unit of results that were determined before you changed the unit remain unchanged.

Procedure

1 Press the **Menu** key.
2 Navigate to **Settings** > **Global units** > **Temperature unit**.
⇨ The **Temperature unit** window opens.
3 Navigate to the desired **Temperature unit**.
4 Press the **OK** key.
⇨ The temperatures are displayed in the selected unit.

4.9.3 Change the density unit

Three density units are available.

- **g/cm³**
- **kg/m³**
- **lb/gal (US)**

When you change the density unit, density values are displayed in the selected unit. There are two exceptions.

- The densities of results that were determined before you changed the unit remain unchanged.

- If you select the unit [lb/gal], the unit [g/cm^3] is still used for adjustments and tests.

Procedure

1 Press the **Menu** key.
2 Navigate to **Settings** > **Global units** > **Density unit**.
   ⇨ The **Density unit** window opens.
3 Navigate to the desired **Density unit**.
4 Press the **OK** key.

⇨ The densities are displayed in the selected unit

4.9.4 Change energy saver settings

The settings of the parameters **Brightness**, **Energy saver** and **Auto shutdown** influence the power consumption and thus the battery life.

Parameter	Description	Values
Brightness	Defines the brightness of the screen.	10...100 %
Energy saver	Defines if the screen is dimmed when no action has been performed for a given time.	Off I 30 I 60 I 90 I 120 seconds
Auto shutdown	Defines if the density meter is shut down when no action has been performed for a given time.	Off I 2 I 5 I 10 minutes

Procedure

1 Press the **Menu** key.
2 Navigate to **Settings** > **Screen**.
   ⇨ The **Screen** window opens.
3 Navigate to the desired parameter and change the settings.

4.9.5 Protect actions with a password

With the parameter **Password** you can prevent users from performing certain actions without a password. The following table shows which actions are password-protected.

Action	Password protected
Start methods.	No
Start tests.	No
Start adjustments.	Yes
View the configuration of methods, tests and adjustments.	No
Change the configuration of methods, tests and adjustments.	Yes
Create and delete methods.	Yes
View, print and export results.	No
Delete all results.	Yes
View the settings of the density meter.	No
Change the settings of the density meter.	Yes
Update the firmware.	Yes
Restore factory adjustment.	Yes
Restore factory settings.	Yes

The password has to be entered once before a user performs a password-protected action and does not have to be reentered until the density meter is restarted.

If the user forgets the password, the universal password 8606 unlocks all actions and settings.

4.9.5.1 Enable the password protection

1 Press the **Menu** key.
2 Navigate to **Settings** > **Password** > **Password protection**.
⇨ The **Password protection** window opens.
3 Navigate to **Yes**.
4 Press the **OK** key.
⇨ The **Password** window opens.
5 Enter a password with the navigation joystick.
6 Press the **OK** key.
7 Reenter the password.
8 Press the **OK** key.
⇨ The password has to be entered before the user can perform a protected action.

4.9.5.2 Disable the password protection

1 Press the **Menu** key.
2 Navigate to **Settings** > **Password** > **Password protection**.
⇨ The **Password protection** window opens.
3 Navigate to **No**.
4 Press the **OK** key.
⇨ The **Password** window opens.
5 Enter the password with the navigation joystick.
6 Press the **OK** key.
⇨ Users can perform all actions.

4.9.5.3 Change the password

1 Disable the password protection.
2 Enable the password protection and enter the new password.

4.9.6 Activate and deactivate the auto rotation of the screen

The **Auto rotate** parameter defines whether the screen rotates by 180° when the density meter is placed on a bench.

1 Press the **Menu** key.
2 Navigate to **Settings** > **Screen** > **Auto rotate**.
⇨ The **Auto rotate** window opens.
3 Navigate to **Yes** to switch on or **No** to switch off the **Auto rotate** mode.
4 Press the **OK** key.
⇨ The screen rotates when the density meter is placed on a bench.

4.9.7 Activate and deactivate the audio signal

The parameter **Audio signal** defines whether an audio signal is played when a key or the navigation joystick is pressed and when measurements are finished.

1 Press the **Menu** key.
2 Navigate to **Settings** > **Audio signal**.
⇨ The **Audio signal** window opens.
3 Navigate to **Yes** to switch on or **No** to switch off the **Audio signal**.

4 Press the **OK** key.

4.9.8 Change the keyboard layout

1 Press the **Menu** key.
2 Navigate to **Settings** > **Language / Keyboard** > **Keyboard layout**.
⇨ The **Keyboard layout** window opens.
3 Navigate to the desired keyboard layout.
4 Press the **OK** key.

4.9.9 Change the language

The system language defines the language of the user interface and printouts.

1 Press the **Menu** key.
2 Navigate to **Settings** > **Language / Keyboard** > **Language**.
⇨ The **Language** window opens.
3 Navigate to the desired language.
4 Press the **OK** key.
⇨ The user interface is changed to the selected language.

4.9.10 Activate and deactivate a cleaning reminder

Because the measuring cell always contains residue from the last sample, there is a risk that the measuring cell can be damaged by the sample. To prevent such damages, METTLER TOLEDO recommends that you clean the measuring cell at the end of each sample series.

To remind users to clean the measuring cell, you can activate a reminder. This reminder is displayed before manual shutdown of the instrument, and users have to confirm or cancel the reminder before shutting down the density meter.

Action of the system	Cleaning reminder	Auto shutdown
When users shut down the density meter, a reminder is displayed.	**Yes**	**No**
If the density meter automatically shuts down, no reminder is displayed.	**Yes**	**Yes**
No reminder is displayed when the density meter shuts down.	**No**	**Yes/No**

Procedure

1 Press the **Menu** key.
2 Navigate to **Settings** > **Measurement** > **Cleaning reminder**.
⇨ The **Cleaning reminder** window opens.
3 Navigate to **Yes** to activate or **No** to deactivate the **Cleaning reminder**.
4 Press the **OK** key.

See also

Change energy saver settings ▸ Page 25

5 Configuration of density determinations

Three different types of density determinations are available.

- **Methods**: determine the density of a sample.
- **Test**: determine the density of a standard to check that the measurement cell is clean and measuring accurately.
- **Adjustment**: determine the density of a standard and adjust the density meter based on the results.

5.1 Create, change or delete a method

5.1.1 Create a method

The new method is listed in the **Methods** window with the name you enter in the parameter **Method ID**. If you do not change the parameter **Method ID**, it is set by default to (A{X}{X}), e.g. A03.

- Less than 30 methods are saved.
- The home screen is open.

1 Move the navigation joystick to the left.
   ⇨ The **Methods** window opens.
2 Press the **New** key.
   ⇨ The **Method settings** window opens.
3 Navigate to **Method ID** and enter a name with up to 25 characters.
4 Press the **OK** key.
   ⇨ The method is listed in the **Methods** window.
5 Change the parameters as needed.

See also

- Configure the user guidance ▸ Page 29
- Configure the measurement reliability ▸ Page 31
- Configure the result conversion ▸ Page 31
- Configure the automatic documentation of results ▸ Page 37
- Configure result limits ▸ Page 38

5.1.2 Change a method

- The home screen is open.

1 Move the navigation joystick to the left.
   ⇨ The **Methods** window opens.
2 Navigate to the method you want to edit.
   ⇨ The **Method settings** window opens.
3 Change the parameters as needed.

See also

- Configure the user guidance ▸ Page 29
- Configure the measurement reliability ▸ Page 31
- Configure the result conversion ▸ Page 31
- Configure the automatic documentation of results ▸ Page 37
- Configure result limits ▸ Page 38

5.1.3 Delete a method

- More than one method is created.
- The method you want to delete is not active. The active method is marked by a square.
- The home screen is open.

1 Move the navigation joystick to the left.
   ⇨ The **Methods** window opens.
2 Navigate to the method you want to delete.
   ⇨ The **Method settings** window opens.
3 Press the **Delete** key.
   ⇨ The message **Do you want to delete the method?** is displayed.
4 Navigate to **Yes**.
5 Press the **OK** key.

⇨ The method is no longer listed in the **Methods** window.

5.2 Change a test

1 Press the **Menu** key.
2 Navigate to **Test**.
   ⇨ The **Test** window opens.
3 Change the parameters as needed.

See also

- Configure the user guidance ▸ Page 29
- Configure the automatic documentation of results ▸ Page 37
- Configure a standard ▸ Page 39
- Configure the tolerance for a test ▸ Page 39

5.3 Change an adjustment

1 Press the **Menu** key.
2 Navigate to **Adjustment**.
   ⇨ The **Adjustment** window opens.
3 Change the parameters as needed.

See also

- Configure the user guidance ▸ Page 29
- Configure the automatic documentation of results ▸ Page 37
- Configure a standard ▸ Page 39

5.4 Configure the user guidance

The parameters that are available to configure the user guidance are described in the following chapters.

5.4.1 Define the level of user guidance

The **Workflow** parameter defines the level of user guidance during the density determination. Two options are available.

- **Manual**: users decide how and when to fill the measuring cell, start the measurement and drain or clean the measuring cell.
- **Guided**: the density meter prompts the user to fill, drain or clean the measuring cell.

5.4.2 Define the pump speed

The parameter **Fill speed** defines the speed of the pump for filling the measuring cell. The sample viscosity places limits on the fill speed.

Speed level	% of maximum pump speed	Fill time for water	Viscosity
High	80 %	Approx. 4 s	Up to 40 mPa*s
Medium	40 %	Approx. 8 s	Up to 75 mPa*s
Low	10 %	Approx. 30 s	Up to 100 mPa*s

5.4.3 Define the fill cycle (only guided workflow)

The parameter **Fill cycle** defines, how many times the measuring cell is filled and emptied before the density is measured. The sample that is in the measuring cell after the last filling is used for the measurement.

Recommendation:

- Density determination with the sample pump: set **Fill cycle** to 3.
- Density determination with a syringe: set **Fill cycle** to 2.

5.4.4 Define the cleaning type (only guided workflow)

Two types of cleaning methods are available, **Drain** and **Rinse**.

Drain

The user is prompted to drain the measuring cell after the measurement.

This setting is useful if the samples that are measured dissolve in each other.

Rinse

The user is prompted to fill and drain the measuring cell with a cleaning solution after the measurement. The parameter **Rinse cycle** defines how many times the user is prompted to fiil and drain the measuring cell.

This setting is only useful if the samples that are measured do not dissolve in each other.

See also

Typical phases of density determinations ▸ Page 42

5.4.5 Activate and deactivate the confirmation of results

After the measurement reliability is achieved, the results are frozen. The parameter **Confirmation of results** defines whether users have to confirm the results before they are replaced by the current density value. Regardless of the setting, all results are stored.

The setting is not method specific but valid for all density determinations.

Action of the system	Confirmation of results	Workflow
The screen is frozen and the sample pump is locked until users confirm the result.	**Yes**	**Guided**
The screen is frozen until users confirm the result but the sample pump is not locked.	**Yes**	**Manual**
Users are prompted to place the filling tube into the waste beaker. As soon as users press **OK**, the result is replaced by the current density value.	**No**	**Guided**
As soon as the user starts draining the cell, the result is replaced by the current density value.	**No**	**Manual**

Procedure

1 Press the **Menu** key.

2 Navigate to **Settings** > **Measurement** > **Confirmation of results**.
   ⇨ The **Confirmation of results** window opens.
3 Navigate to **Yes** to activate or **No** to deactivate the **Confirmation of results**.
4 Press the **OK** key.

See also

Define the level of user guidance ▸ Page 29

5.5 Configure the measurement reliability

Measurement reliability is only available for methods.

The parameter **Measurement reliability** defines how the stability of a measured value is evaluated. Once a measured value is determined to be stable, it is saved as a result.

- **Medium**: The result is saved as soon as the measured temperature value stays within 0.4 °C (0.72 °F) for 10 s. Results are delivered faster, but with less accuracy compared to the **High** mode.
- **High**: The result is saved as soon as the measured temperature value stays within 0.2 °C (0.36 °F) for 10 s. Results are very accurate, but may take a longer time compared to the **Medium** mode in cases where the sample temperature differs from the ambient temperature.
- **Manual** (only for unguided density determinations): users decide when the result is stable and save it.

See also

Define the level of user guidance ▸ Page 29

5.6 Configure the result conversion

The density meter converts the measured oscillation to the unit you define. The conversions are grouped in the following categories.

- **Density**: Density and specific gravity
- **Alcohol**: Alcohol concentration
- **API**: American Petroleum Institute (API density, API specific gravity, API degree)
- **Baumé**: Baumé scale
- **H2SO4**: Sulfuric acid concentration
- **Sugar**: Sucrose concentration
- **User-defined**: Conversion as defined by the user

Select the category and the conversion type

1 Press the **Menu** key.
2 Navigate to **Methods** > **Method settings** > **Calculation** > **Category**
3 Navigate to the desired category.
4 Press the **OK** key.
   ⇨ The **Calculation** window opens.
5 Navigate to the conversion type you want to use.
6 Press the **OK** key.

⇨ The parameters that you need to configure for the selected conversion type are displayed.

You can find more information about the conversion types and the parameters in the following chapters.

5.6.1 Density and specific gravity

Available conversions:

- **d**: density at the measurement temperature
- **d comp.**: temperature compensated density

- **SG**: temperature compensated specific gravity
- **SG (t/t)**: specific gravity at the measurement temperature

Density at the measurement temperature

Unit: [g/cm³], [kg/m³] or [lb/gal (US)] as defined in **Settings** > **Global units**.

The calculation is based on a reference for the density of water.

▶ www.mt.com/dere-norms

Temperature compensated density

Unit: [g/cm³], [kg/m³] or [lb/gal (US)] as defined in **Settings** > **Global units**.

The measured density is converted to the value it would have at a compensation temperature. The following formula is used to compensate the temperature influence.

$$d_{comp}=d_{meas}*(1+\alpha*(T_{meas}-T_{comp}))$$

- d_{comp}: temperature compensated density
- d_{meas}: density at the measurement temperature
- α: temperature coefficient as defined in **Alpha*1000** > **Alpha entry**, see [Define the temperature-compensation coefficient α ▶ Page 35]
- T_{meas}: measurement temperature, temperature of the measuring cell during the measurement
- T_{comp}: compensation temperature as defined in **Compensation temp.**

Temperature compensated specific gravity

$$SG=\frac{d_{comp}(Sample)}{d_{comp}(H_2O)}$$

- SG: specific gravity
- d_{comp}(Sample): density of the sample compensated to the temperature defined in **Compensation temp. 1**. The temperature influence is compensated by the temperature coefficient α as defined in **Alpha*1000** > **Alpha entry**. See [Define the temperature-compensation coefficient α ▶ Page 35]
- $d_{comp}(H_2O)$: density of water compensated to the temperature defined in **Compensation temp. 2**

Specific gravity at the measurement temperature

$$SG(t/t)=\frac{d(Sample)}{d(H_2O)}$$

- SG(t/t): specific gravity
- d(Sample): density of the sample at the measurement temperature.
- $d(H_2O)$: density of water compensated to the measurement temperature.

See also

- Define the temperature-compensation coefficient α ▶ Page 35
- Configure the result conversion ▶ Page 31
- Density of pure water (0…40 °C) ▶ Page 77
- Change the density unit ▶ Page 24

5.6.2 Alcohol concentration

Available calculations:

- **Alcohol [% w/w]**: mass percent [%w/w]
- **Alcohol 60°F [% v/v]**: volume percent [%v/v], compensated to 60 °F
- **Alcohol 20°C [% v/v]**: volume percent [%v/v], compensated to 20 °C
- **Proof US 60°F [Proof]**: Proof degree with US unit [Proof], compensated to 60 °F

- **Proof IP 60°F [Proof]**: Proof degree with IP unit [Proof], compensated to 60 °F

See also

Configure the result conversion ▸ Page 31

5.6.3 American Petroleum Institute (API)

The conversion of the measured value to the selected unit is based on the tables published by the American Petroleum institute (API).

The following tables are available.

- **Crude oil (A)**
- **Refined products (B)**
- **Lubricants (D)**

The **Compensation temp.** parameter defines the compensation temperature.

The **Output format** defines to which of the following units the result is converted:

- **d**: API density
- **SG**: API specific gravity
- **°API**: API degree

See also

Configure the result conversion ▸ Page 31

5.6.4 Baumé scale

Unit: [°Bé]

Available conversions:

- **H. Bé 15°C [°Bé]**: for densities > 1 g/cm^3, compensated to 15 °C
- **L. Bé 15°C [°Bé]**: for densities < 1 g/cm^3, compensated to 15 °C
- **H. Bé 60°F [°Bé]**: for densities > 1 g/cm^3, compensated to 60 °F
- **L. Bé 60°F [°Bé]**: for densities < 1 g/cm^3, compensated to 60 °F

The temperature influence is compensated by the temperature coefficient α as defined in **Alpha*1000** > **Alpha entry**.

See also

Define the temperature-compensation coefficient α ▸ Page 35
Configure the result conversion ▸ Page 31

5.6.5 Sulfuric acid concentration

Available conversions:

- **H2SO4 [% w/w]**: mass percent [%w/w]
- **H2SO4 20°C [% v/v]**: volume percent [%v/v], compensated to 20 °C

See also

Configure the result conversion ▸ Page 31

5.6.6 Sugar concentration

Available conversions:

- **Brix [% w/w]**: mass percent [w/w %], compensated to 20 °C
- **Plato [°P]**: degree Plato [°P], compensated to 20 °C

See also

Configure the result conversion ▸ Page 31

5.6.7 User defined concentration

You can define a function to convert a density or specific gravity to a concentration. The following steps are involved:

1. Define the conversion of the measured value to a density or specific gravity.
2. Define the function to convert the density or specific gravity to a concentration.
3. Define the unit and the number of decimal places of the concentration.

See also

Define the density or specific gravity ▸ Page 34
Define the function ▸ Page 35
Define the format of the result ▸ Page 35
Configure the result conversion ▸ Page 31

5.6.7.1 Define the density or specific gravity

The conversions are either based on temperature compensated densities (**d comp.**) or specific gravities (**SG**).

Define a temperature-compensated density

The following formula is used to calculate the temperature-compensated density.

$$d_{comp}=d_{meas}*(1+\alpha*(T_{meas}-T_{comp}))$$

- d_{comp}: temperature compensated density
- d_{meas}: density at the measurement temperature
- α: temperature coefficient as defined in **Alpha*1000** > **Alpha entry**, see [Define the temperature-compensation coefficient α ▸ Page 35]
- T_{meas}: measurement temperature, temperature of the measuring cell during the measurement
- T_{comp}: compensation temperature as defined in **Compensation temp.**

Steps to define a temperature-compensated density:

- The conversion category is set to **User-defined**.

1 Navigate to **X** and select one of the following options: **d comp.**, **d comp. - 1** or **(1/d comp.) - 1**.
2 Navigate to **Compensation temp.** and define the compensation temperature.
3 Navigate to **Alpha*1000** > **Alpha entry** and define α. See [Define the temperature-compensation coefficient α ▸ Page 35]

Define a temperature-compensated specific gravity

The following formula is used to calculate the temperature-compensated specific gravity.

$$SG=\frac{d_{comp}(Sample)}{d_{comp}(H_2O)}$$

- SG: specific gravity
- d_{comp}(Sample): density of the sample compensated to the temperature defined in **Compensation temp. 1**. The temperature influence is compensated by the temperature coefficient α as defined in **Alpha*1000** > **Alpha entry**. See [Define the temperature-compensation coefficient α ▸ Page 35]
- $d_{comp}(H_2O)$: density of water compensated to the temperature defined in **Compensation temp. 2**

Steps to define the temperature-compensated specific gravity:

- The conversion category is set to **User-defined**.

1 Navigate to **X** and select one of the following options: **SG**, **SG-1** or **(1/SG)-1**.
2 Navigate to **Compensation temp. 1** and define the compensation temperature for the sample.

3 Navigate to **Compensation temp. 2** and define the compensation temperature for water.

4 Navigate to **Alpha*1000** > **Alpha entry** and define α. See [Define the temperature-compensation coefficient α ▸ Page 35]

See also

Define the function ▸ Page 35

5.6.7.2 Define the function

You can either use a linear function (**Linear (Ax+B)**) or a second order polynomial function (**2nd order pol. (Ax²+Bx+C)**. The functions are based on a graph with the density or specific gravity on the x-axis and the concentration on the y-axis.

The following formulae are used.

- Linear function: Ax + B
- Second order polynomial function: $Ax^2 + Bx + C$

Procedure

- The coefficients A and B are known for a linear function.
- The coefficients A, B and C are known for a second order polynomial function.

1 Navigate to **Fit type** and select **Linear (Ax+B)** or **2nd order pol. (Ax²+Bx+C)**.

2 Press the **OK** key.

3 Enter the values for the coefficients.

Calculate the coefficients A, B and C

1 If you want to use a second order polynomial function, prepare at least 4 solutions with different concentrations.

2 If you want to use a linear function, prepare at least 2 solutions with different concentrations.

3 Determine the density or specific gravity you want to use for each concentration.

4 Plot the concentration (y-axis) against the density or specific gravity (x-axis).

5 Fit a line or second order polynomial to the curve.

See also

Define the density or specific gravity ▸ Page 34

5.6.7.3 Define the format of the result

Using the parameters **Unit** and **Decimal places**, you can define the unit and the number of decimal places for the display of the current value and the result.

5.6.8 Define the temperature-compensation coefficient α

The temperature-compensation coefficient α is used to convert a measured value to a reference temperature. You have three options to define α.

- **Manual**: users enter the value for α that they calculated or read from a table.
- **Calculated**: the density meter calculates α based on a linear equation and densities and temperatures that users enter.
- **2nd order pol. (ax²+bx+c)**: the density meter calculates α based on a second order polynomial using coefficients that users enter.

See also

Density and specific gravity ▸ Page 31

Baumé scale ▸ Page 33

Define the density or specific gravity ▸ Page 34

5.6.8.1 Enter a known value for α

- The result of α*1000 is known.

1 Navigate to **Alpha*1000** > **Alpha entry** and select **Manual**.
2 Press the **OK** key.
3 Navigate to **Alpha*1000**.
4 Enter the value for α*1000.
5 Press the **OK** key.

Calculate α

1 Measure the density (d_1) at a temperature (T_1) above the normal measuring temperature.
2 Measure the density (d_2) at a temperature (T_2) below the normal measuring temperature.
3 Use the measured densities and the temperatures in [°C] to calculate α according to the following formula.

$$\alpha=(\frac{d_2}{d_1}-1) / (T_1-T_2)$$

4 Calculate the result of α*1000.

Example

Density at 26 °C (T_1) = 0.7844 g/cm³
Density at 15 °C (T_2) = 0.7937 g/cm³

$$\alpha = (\frac{0.7937}{0.7844} - 1) / (26 - 15)$$

α = ((1.011856 – 1)/11) = 0.011856/11 = 0.001078

α * 1000 = 1.078

See also

Temperature-compensation coefficients α ▸ Page 77

5.6.8.2 The density meter calculates a fixed value for α

- The density (d_1) at a temperature (T_1) above the normal measuring temperature is known.
- The density (d_2) at a temperature (T_2) below the normal measuring temperature is known.

1 Navigate to **Alpha*1000** > **Alpha entry** and select **Calculated**.
2 Navigate to **Density 1** and enter the value for d_1.
3 Navigate to **Temperature 1** and enter the value for T_1.
4 Navigate to **Density 2** and enter the value for d_2.
5 Navigate to **Temperature 2** and enter the value for T_2.
⇨ The density meter calculates the value for **Alpha*1000** and displays it.

See also

List of errors and problems ▸ Page 65

5.6.8.3 Define the second order polynomial used to calculate α

The density meter can use the following second order polynomial to calculate α.

$$\alpha=(a*d_{meas}^{2}+b*d_{meas}+c)$$

Procedure

- The three coefficients a, b and c are known.

1 Navigate to **Alpha*1000** > **Alpha entry** and select **2nd order pol. (ax²+bx+c)**.
2 Press the **OK** key.
3 Enter the values for the coefficients a, b and c.

Calculate the coefficients a, b and c

1 Prepare at least 4 solutions with different concentrations.
2 Define two temperatures, one above und one below the normal measurement temperature.
3 Measure the density of each solution at both temperatures.
4 Calculate the temperature-compensation coefficient α for each solution.
5 Plot the values for α (y-axis) against the densities (x-axis) measured at one of the temperatures.
6 Fit a second order polynomial to the curve.

See also

List of errors and problems ▸ Page 65

5.7 Configure the automatic documentation of results

NOTICE

Loss of data

A maximum of 1100 results is saved in the density meter. When the result list contains 1100 results and a new results is saved, the oldest result is overwritten.

– Print or export the results before the maximum number of results is reached.

See also

Change a method ▸ Page 28
Change a test ▸ Page 29
Change an adjustment ▸ Page 29

5.7.1 Configure the sample or standard identifier

You can define what kind of identifier is assigned to a sample or to a standard.

Automatic numbering is only available for methods.

Action of the system	Sample ID entry Standard ID entry	Sample ID Standard ID
No identifier is assigned to the sample or the standard.	**None**	Not available
• The identifier you define in the **Sample ID** parameter is assigned to all samples measured with the same method. • The identifier you define in the **Standard ID** parameter is assigned to all standards measured with the same test.	**Fixed**	0…25 characters
Users enter the identifier before the density measurement starts. • Guided density determination: users are prompted to enter the identifier when the method starts. The density determination continues when the user has entered a valid identifier. • Unguided density determination: Users have to enter the identifier before the measurement starts but are not prompted to do so. If they do not enter an identifier, the identifier of the previous sample is used.	**Variable**	Not available

Action of the system	Sample ID entry Standard ID entry	Sample ID Standard ID
An automatically generated identifier is assigned to the sample. The identifier automatically increases by 1, when a new measurement is started with the same method.	**Automatic numbering**	Not available

5.7.2 Configure the automatic printing of results

The **Printout** parameter defines whether a result is automatically printed when it is saved and which information is printed.

- **None**: No report is printed.
- **Short**: A short report is printed.
- **Long**: A long report is printed

Information	Methods	Test	Adjustment
Date / Time	**Short/Long**	**Short/Long**	**Short/Long**
Method ID	**Short/Long**	–	–
Sample ID	**Short/Long**	–	–
Application name with standard	–	**Short/Long**	**Short/Long**
Standard ID	–	**Short/Long**	**Short/Long**
Status	**Short/Long**	**Short/Long**	–
Calculation	**Short/Long**	–	–
Density	**Short/Long**	**Short/Long**	**Short/Long**
Dev. d	–	**Short/Long**	**Short/Long**
Temp.	**Short/Long**	**Short/Long**	**Short/Long**
d nominal	–	**Short/Long**	**Short/Long**
SNR	**Long**	**Long**	**Long**
Additional settings like the compensation temperature and the temperature-compensation coefficient α	**Long**	**Long**	**Long**

See also

Connect a printer ▸ Page 22

5.7.3 Configure the automatic export of results

Results are automatically exported to EasyDirect Density & Refractometry if the density meter is connected to a computer with the software installed.

See also

Connect to EasyDirect Density & Refractometry ▸ Page 23

5.8 Configure result limits

Result limits are only available for methods.

The **Result limits** parameter defines whether the density meter evaluates if a result lies within a defined range. The parameters **Lower limit** and **Upper limit** define the range.

- Result within the limits: the background of the measuring ribbon turns green.

- Result outside the limits: the background of the measuring ribbon turns red and the text **Out of limits** is displayed in the sampling ribbon

Procedure

1 Press the **Menu** key.
2 Navigate to **Methods** > **Method settings** > **Calculation** > **Result limits**.
3 To deactivate **Result limits**, navigate to **No**.
4 To activate **Result limits**, navigate to **Yes**.
5 Press the **OK** key.
⇨ **Lower limit** and **Upper limit** are displayed.
6 Set the **Lower limit** and **Upper limit**.

5.9 Configure a standard

Use water as standard

- The **Test** window or the **Adjustment** window are open.

1 Navigate to **Standard type** and select **Water**.
2 Press the **OK** key.
⇨ The density meter uses predefined values for the **Test** or the **Adjustment**.

Use another substance as standard

- The **Test** window or the **Adjustment** window are open.

1 Navigate to **Standard type** and select **Other standard**.
2 Press the **OK** key.
3 Navigate to **Compensation temp.** and enter the compensation temperature.
4 Navigate to **d nominal** and enter the nominal density of the standard at the temperature you entered as compensation temperature.
5 Navigate to **Alpha*1000** and define the temperature-compensation coefficient α.

See also

Define the temperature-compensation coefficient α ▸ Page 35

5.10 Configure the tolerance for a test

The **Tolerance d** parameter is used to evaluate the measured density and decide if the test passed or failed.

Recommendations for defining the value for **Tolerance d**:

- Deionized water: 2*(instrument resolution + operator repeatability)
- Certified organic standards with a high temperature-compensation coefficient: uncertainty of the standard + limit of error of instrument + temperature error + 2*operator repeatability

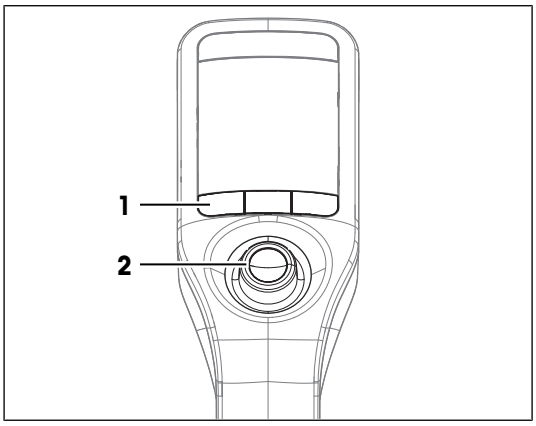
The operator repeatability is the standard deviation of ten density determinations performed by the operator.

6 Operation

6.1 Start up the density meter

– Press one of the keys (1) or the navigation joystick (2).
  ⇨ A short beep is played.
  ⇨ A welcome message is displayed.

⇨ The home screen opens. The density meter is ready to use.



6.2 Shut down the density meter

– Press and hold any of the keys or the navigation joystick for more than 3 s.
  ⇨ A beep is played and the screen goes dark.

⇨ The control circuits for the keys and the navigation joystick are energized. The rest of the density meter is no longer energized.

Shut down using the Menu

- The home screen is open.

1 Press the **Menu** key.
2 Navigate to **Shut down**.
  ⇨ The dialog **Do you want to shut down the instrument?** opens.
3 Press the **Yes** key.
  ⇨ A beep is played and the screen goes dark.

⇨ The control circuits for the keys and the navigation joystick are energized. The rest of the density meter is no longer energized.

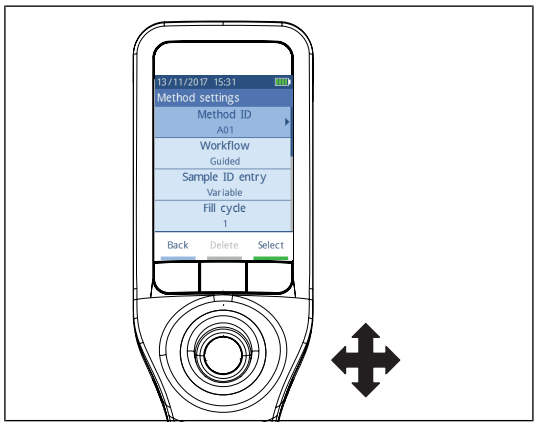
See also

Activate and deactivate a cleaning reminder ▸ Page 27

6.3 Navigate and enter information

6.3.1 Navigate through menus and confirm settings

1 Press the **Menu** key.
2 To navigate to a desired menu, move the navigation joystick up or down.
3 To navigate to a submenu of the selected menu, move the navigation joystick to the right.
4 To go back, move the navigation joystick to the left.



Confirm settings

In every menu, where the function of key 3 is marked with a green bar, you can press the navigation joystick to confirm the selection.

Shortcut to the method list

- The home screen is open.

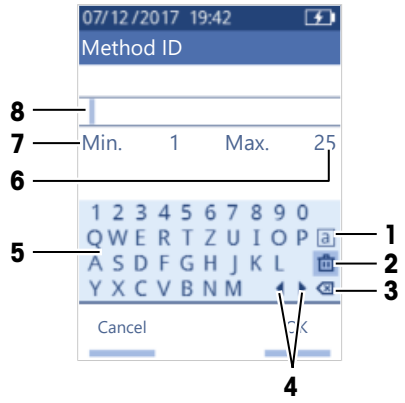
– Move the navigation joystick to the left.
  ⇨ The **Methods** window opens.

6.3.2 Enter text and numbers

- The keyboard window is open.

1 Navigate to the character, number, symbol or icon.
2 Press the navigation joystick to confirm the selection of the character, number, symbol or icon.
3 To confirm the entered information and leave the keyboard window, press the **OK** key.

Keyboard overview



No.	Icon	Function
1	a A #	Cycles between the screens with small, capital or special characters.
2		Deletes all entered characters.
3		Deletes the character to the left of the cursor.

No.	Icon	Function
4	◀ ▶	Moves the cursor.
5	–	Displays available characters, numbers and symbols.
6	–	Maximum number of characters you can enter.
7	–	Minimum number of characters you need to enter.
8	–	Displays the entered characters.

See also

Change the keyboard layout ▶ Page 27

6.4 Typical phases of density determinations

Density determinations include the following two phases.

- Fill the measuring cell with sample and perform the measurement.
- Prepare the measuring cell for the next sample.

6.4.1 Fill the measuring cell and measure the density

Because the measuring cell always contains residue from the previous sample or the cleaning solution, it is important that you remove the residue using the new sample. Make sure that the residue is soluble in the new sample. To remove any residue from the previous sample, fill and empty the measuring cell three times with the new sample.

To achieve good results, make sure that the measuring cell contains only the sample you want to measure and that there are no bubbles in the measuring cell.

You can use the sample pump or syringes to fill, drain and rinse the measuring cell. The sample pump is used for samples with a viscosity up to 100 mPa*s. Syringes are typically used if the viscosity of the samples is above 100 mPa*s.

See also

Example: Density determination using the sample pump ▶ Page 42
Example: Density determination using a syringe ▶ Page 45
Example: Density determination of cold or hot samples ▶ Page 48

6.4.2 Prepare the measuring cell for the next sample

At the end of this phase, the residue in the measuring cell must be soluble in the next sample. The solubility of the sample defines if you can just drain the measuring cell or if you need to rinse it as well.

- The next sample dissolves the sample you just measured: you can just drain the measuring cell.
- The next sample does not dissolve the sample you just measured: you have to drain the measuring cell and rinse it with a cleaning solution. The cleaning solution must dissolve the sample that you just measured and the next sample. When you rinse the measuring cell, the cleaning solution removes the residue from the original sample.

See also

Clean the measuring cell ▶ Page 56

6.5 Example: Density determination using the sample pump

The following chapters show you how to configure and perform a density determination of deionized water at room temperature (23 °C or 73.4 °F).

Summary of the configuration

- Guided density determination
- Filling and draining with the sample pump

- Evaluation if result lies within specified limits

For additional information about the configuration of a method, read the chapter [Configuration of density determinations ▸ Page 28].

6.5.1 Configure the method

- The density unit is set to [g/cm³].
- **Confirmation of results** in **Settings** is activated.
- The home screen is open.

1 Move the navigation joystick to the left.
   ⇨ The **Methods** window opens.
2 Press the **New** key.
   ⇨ The **Method settings** window opens.
3 Navigate to **Method ID** and enter a name with up to 25 characters.
4 Press the **OK** key.
   ⇨ The method is listed in the **Methods** window.
5 Change the parameter settings to the values shown in the following table.

Parameter	Setting	Explanation
Workflow	**Guided**	The density meter prompts users to fill and drain the measuring cell.
Sample ID entry	**Variable**	The density meter prompts users to enter the identifier before the density is measured.
Fill cycle	3	The density meter prompts users to fill and drain the measuring cell twice and then fill the measuring cell for the measurement.
Fill speed	**High**	The pump fills the measuring cell with 80 % of the maximum pump speed.
Measurement reliability	**Medium**	The result is saved as soon as the measured temperature value stays within 0.4 °C (0.72 °F) for 10 s.
Calculation > **Category**	**Density**	A density is calculated.
Calculation > **Calculation**	**d**	The density is not compensated to a certain temperature.
Calculation > **Result limits**	**Yes**	The density meter evaluates if the result is within a defined range.
Lower limit	0.9972 g/cm³	Defines the lower limit of the range.
Upper limit	0.9977 g/cm³	Defines the upper limit of the range.
Clean	**Drain**	Users are prompted to drain the measuring cell.
Printout	**None**	The result is not printed.

See also

- Change the density unit ▸ Page 24
- Activate and deactivate the confirmation of results ▸ Page 30
- Configuration of density determinations ▸ Page 28

6.5.2 Perform the density determination

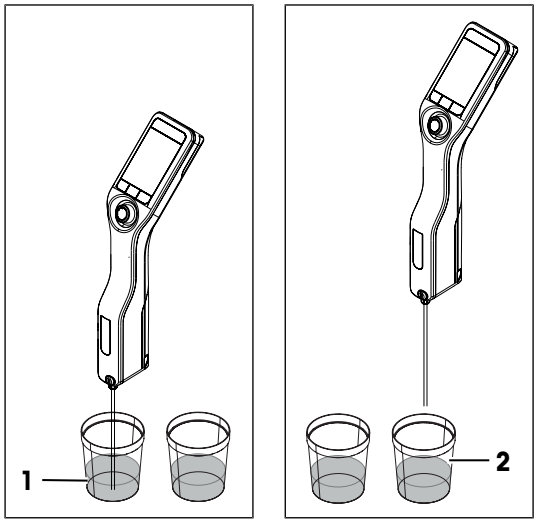
Start the method

- The density meter is set up to work with the sample pump.
- The piston is in the lowermost position.
- The home screen is open.

1 Move the navigation joystick to the left.
2 Navigate to the method you want to use and press the **Start** key.
   ⇨ The home screen opens.
3 Press the **Start** key.
   ⇨ The **Sample ID** window opens.
4 Enter the identifier.
5 Press the **OK** key.

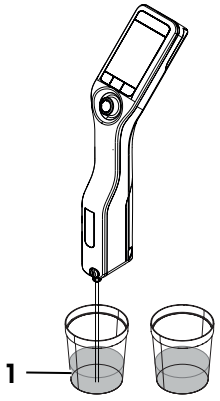
Rinse the measuring cell

1 Immerse the filling tube into the sample (1).
2 Press the **OK** key.
   ⇨ The sample pump moves the piston to its uppermost position.
3 Hold the filling tube over the waste beaker (2).
4 Press the **OK** key.
   ⇨ The sample pump moves the piston to its lowermost position.
5 Clean the end of the filling tube with a clean tissue.
6 Repeat the steps once.



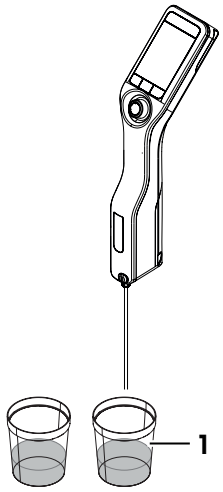
Fill the measuring cell and measure the density

1 Immerse the filling tube into the sample (1).
2 Press the **OK** key.
   ⇨ The sample pump moves the piston to its uppermost position.
3 Make sure there are no bubbles in the measuring cell.
   ⇨ The measurement starts.
   ⇨ When the background of the measuring ribbon changes color, the measurement is finished.
   ⇨ The measured value is saved in the results.
4 Press the **OK** key.



Drain the measuring cell

1 Hold the filling tube over the waste beaker (1).
2 Press the **OK** key.
   ⇨ The sample pump moves the piston to its lowermost position.
3 Clean the end of the filling tube with a clean tissue.



6.6 Example: Density determination using a syringe

The following chapters show you how to configure and perform a density determination of a viscous sample such as 40 % w/w sugar solution at room temperature (23 °C or 73.4 °F).

Summary of the configuration

- Guided density determination
- Filling and draining with a syringe

For additional information about the configuration of a method, read the chapter [Configuration of density determinations ▸ Page 28].

6.6.1 Configure the method

- **Confirmation of results** in **Settings** is activated.
- The home screen is open.

1 Move the navigation joystick to the left.
   ⇨ The **Methods** window opens.
2 Press the **New** key.
   ⇨ The **Method settings** window opens.
3 Navigate to **Method ID** and enter a name with up to 25 characters.
4 Press the **OK** key.
   ⇨ The method is listed in the **Methods** window.
5 Change the parameter settings to the values shown in the following table.

Parameter	Setting	Explanation
Workflow	**Guided**	The density meter prompts users to fill and drain the measuring cell.
Sample ID entry	**Variable**	The density meter prompts users to enter the identifier before the density is measured.
Fill cycle	2	The density meter prompts users to rinse the measuring cell and then fill the measuring cell for the measurement.
Fill speed	**High**	Has no effect because the syringe mode is activated.
Measurement reliability	**Medium**	The result is saved as soon as the measured temperature value stays within 0.4 °C (0.72 °F) for 10 s.

Parameter	Setting	Explanation
Calculation > **Category**	**Sugar**	A sugar concentration is calculated.
Calculation > **Calculation**	**Brix**	A Brix value is calculated.
Calculation > **Result limits**	**None**	The density meter does not evaluate if the result is within a defined range.
Clean	**Drain**	Users are prompted to drain the measuring cell.
Printout	**None**	The result is not printed.

See also

Activate and deactivate the confirmation of results ▸ Page 30

6.6.2 Perform the density determination

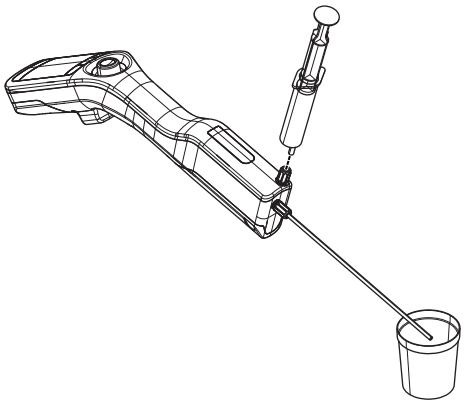
Start the method

- The density meter is set up to work with a syringe.
- The measuring cell is drained.
- The home screen is open.

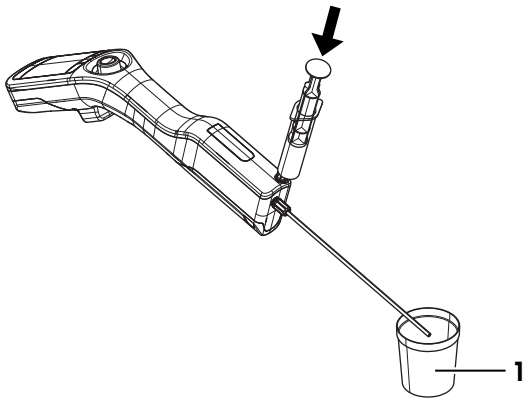
1 Move the navigation joystick to the left.
2 Navigate to the method you want to use and press the **Start** key.
   ⇨ The home screen opens.
3 Press the **Start** key.
   ⇨ The **Sample ID** window opens.
4 Enter the identifier.
5 Press the **OK** key.

Rinse the measuring cell

1 Fill a new syringe with sample.
2 Insert the syringe into the connector for the syringe.

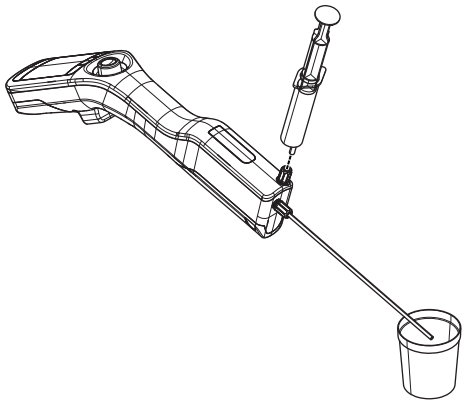


3 Hold the filling tube over the waste beaker (1).
4 Press the syringe plunger continuously into the syringe.
   ⇨ The sample flows through the measuring cell and removes the residue from the previous sample.
5 Pull the plunger continuously out of the syringe.
   ⇨ The sample is pulled back into the syringe and the measuring cell fills with air.
6 Remove the syringe and empty it into a suitable waste beaker.

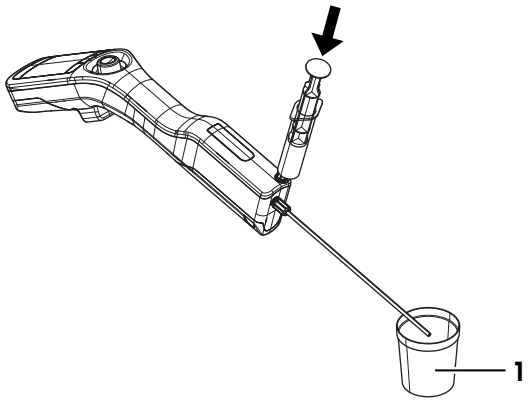


Fill the measuring cell and measure the density

1 Fill a new syringe with sample.
2 Insert the syringe into the connector for the syringe.

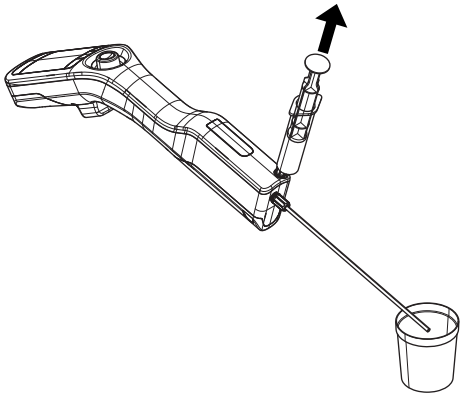


3 Hold the filling tube over the waste beaker (1).
4 Press the syringe plunger slowly (5…10 cm/s) and continuously into the syringe until only a small amount of sample is left in the syringe.
   ⇨ The sample flows with a laminar flow into the measuring cell.
5 Leave the syringe in the connector.
6 Make sure there are no bubbles in the measuring cell.
7 Press the **OK** key.
   ⇨ The measurement starts.
   ⇨ When the background of the measuring ribbon changes color, the measurement is finished.
   ⇨ The measured value is saved in the results.
8 Press the **OK** key.



Drain the measuring cell

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 and empty it into a suitable waste beaker.



6.7 Example: Density determination of cold or hot samples

To achieve good results, the measuring cell and the sample must have the same temperature. If you fill the measuring cell with a sample that is more than 5 °C (9 °F) above or below the temperature displayed on the home screen, this condition is not met. Because the density meter has no active temperature control, you must wait until the temperature of the measuring cell and the temperature of the sample are the same, before you make the measurement.

The following chapters show you how to configure and perform a density determination of deionized water that is more than 5 °C (9 °F) above or below the temperature displayed on the home screen.

Summary of the configuration

- Unguided density determination
- Filling and draining with the sample pump

For additional information about the configuration of a method, read the chapter [Configuration of density determinations ▸ Page 28].

6.7.1 Configure the method

- The density unit is set to [g/cm³].
- **Confirmation of results** in **Settings** is activated.
- The home screen is open.

1 Move the navigation joystick to the left.
   ⇨ The **Methods** window opens.
2 Press the **New** key.
   ⇨ The **Method settings** window opens.
3 Navigate to **Method ID** and enter a name with up to 25 characters.
4 Press the **OK** key.
   ⇨ The method is listed in the **Methods** window.
5 Change the parameter settings to the values shown in the following table.

Parameter	Setting	Explanation
Workflow	**Manual**	Users define their individual measuring workflows.
Sample ID entry	**Variable**	Users need to enter the identifier before they start the measurement.
Fill speed	**High**	The pump fills the measuring cell with 80 % of the maximum pump speed.
Measurement reliability	**Medium**	The result is saved as soon as the measured temperature value stays within 0.4 °C (0.72 °F) for 10 s.

Parameter	Setting	Explanation
Calculation > **Category**	**Density**	A density is calculated.
Calculation > **Calculation**	**d**	The density is not compensated to a certain temperature.
Calculation > **Result limits**	**None**	The density meter does not evaluate if the result is within a defined range.
Clean	**Drain**	Users are prompted to drain the measuring cell.
Printout	**None**	The result is not printed.

See also

Activate and deactivate the confirmation of results ▶ Page 30

6.7.2 Perform the density determination

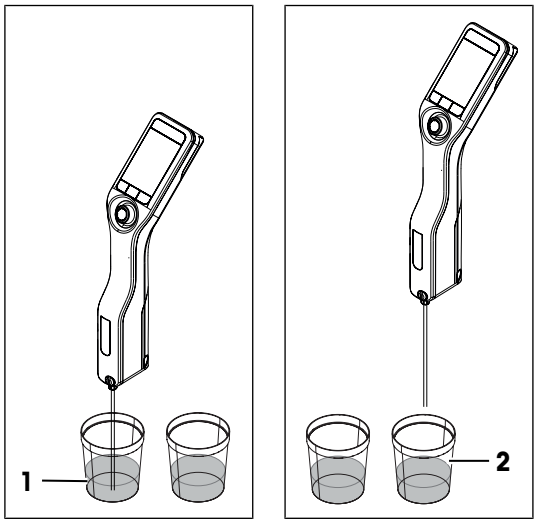
Start the method

- The density meter is set up to work with the sample pump.
- The piston is in the lowermost position.
- The home screen is open.

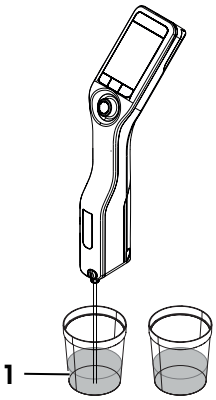
1 Move the navigation joystick to the left.
2 Navigate to the method you want to use and press the **Start** key.
⇨ The home screen opens.
3 To enter a **Sample ID**, move the navigation joystick to the right.
⇨ The **Sample ID** window opens.
4 Enter the identifier.
5 Press the **OK** key.

Rinse the measuring cell

1 Immerse the filling tube into the sample (1).
2 Move the navigation joystick upwards and let go.
⇨ The sample pump moves the piston to its uppermost position.
3 Hold the filling tube over the waste beaker (2).
4 Move the navigation joystick downwards and let go.
⇨ The sample pump moves the piston to its lowermost position.
5 Clean the end of the filling tube with a clean tissue.
6 Repeat the steps once.

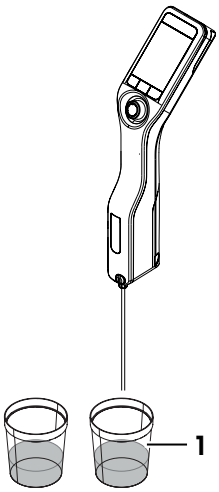


Fill the measuring cell and measure the density



1 Immerse the filling tube into the sample (1).
2 Move the navigation joystick upwards and let go.
   ⇨ The sample pump moves the piston to its uppermost position.
3 Make sure there are no bubbles in the measuring cell.
4 Press the **Start** key.
   ⇨ The measurement starts.
   ⇨ When the background of the measuring ribbon changes color, the measurement is finished.
   ⇨ The measured value is saved in the results.
5 Press the **OK** key.
6 Wait for about 20 seconds and press the **Start** key again.
   ⇨ The sample that is still in the measuring cell is measured again.
7 Tap **Results** and compare the last two results.
8 Tap **Back**.
9 If the results are not the same, continue to measure the same sample until the temperatures and the results of two measurements in a row are the same.

Drain the measuring cell



1 Hold the filling tube over the waste beaker (1).
2 Move the navigation joystick downwards and let go.
   ⇨ The sample pump moves the piston to its lowermost position.
3 Clean the end of the filling tube with a clean tissue.

6.8 Stop a method

Stop a method when working with the sample pump

1 Press the **Stop** key.
2 If you stopped the method before you started to fill the measuring cell, you do not need to do anything else.
3 If you have started to fill the measuring cell before you stopped the method, drain the measuring cell. See [Drain the measuring cell ▸ Page 66]
4 Clean the measuring cell. See [Clean using the sample pump ▸ Page 57]

Stop a method when working with a syringe

1 Press the **Stop** key.
2 If you stopped the method before you started to fill the measuring cell, you do not need to do anything else.
3 If you have started to fill the measuring cell before you stopped the method, drain the measuring cell. See [Drain the measuring cell ▸ Page 66]
4 Clean the measuring cell. See [Clean using a syringe ▸ Page 57]

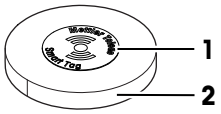
6.9 Read and write information with the RFID reader (DensitoPro only)

With the RFID reader, you can read or write identifiers for samples or standards to Smart Tags.

The RFID reader only recognizes the following characters.

- A-Z
- a-z
- 0-9

Metal containers interfere with reading and writing to Smart Tags. For this reason you need to place the Smart Tag (1) on a SmartSample film (2).



See also

Miscellaneous accessories ▸ Page 75

6.9.1 Write information to a Smart Tag

- The RFID reader is activated.
- METTLER TOLEDO Smart Tags are available.

1 Press the **Menu** key.

2 Navigate to **Settings** > **RFID / Barcode** >**Write ID to RFID tag**.

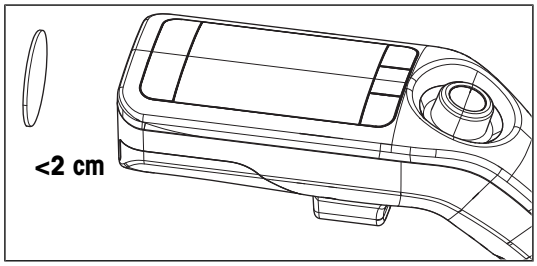
⇨ The icon is displayed in the status ribbon.

3 Enter the identifier.

4 Hold the RFID reader over a Smart Tag and press the **Write** key.

⇨ An audio signal is played and the notification **RFID tag is written** is displayed.

⇨ The identifier is saved on the Smart Tag.



See also

Activate and deactivate the RFID reader (DensitoPro only) ▸ Page 16

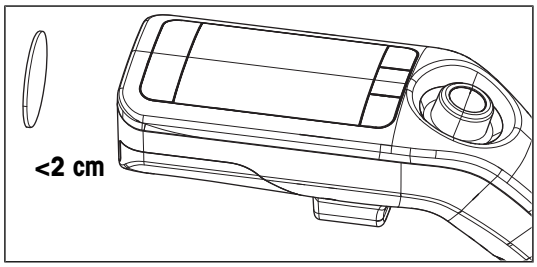
6.9.2 Read information from a Smart Tag

Enter the identifier of a sample or a standard

- The RFID reader is activated.
- The parameter **Sample ID entry** or **Standard ID entry** is set to **Variable**.

– When you are prompted to enter an identifier, press the **RFID** key and hold the RFID reader over the Smart Tag.

⇨ An audio signal is played and the identifier is saved.



Read information from a Smart Tag

- The RFID reader is activated.

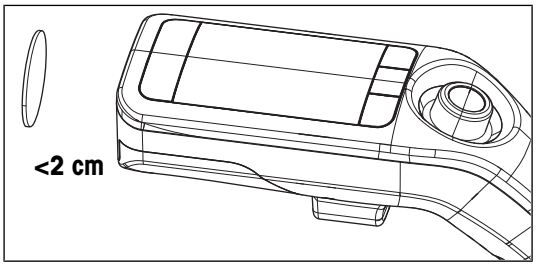
1 Press the **Menu** key.

2 Navigate to **Settings** > **RFID / Barcode** > **Scan RFID tag**.

⇨ The notification **Scan RFID tag** is displayed.

3 Hold the RFID reader over a Smart Tag and wait until an audio signal is played.

⇨ The read information is displayed.



See also

- Activate and deactivate the RFID reader (DensitoPro only) ▸ Page 16
- Configuration of density determinations ▸ Page 28

6.10 Read information with the barcode reader (DensitoPro only)

With the barcode reader, you can read identifiers for samples and standards from linear barcodes.

The barcode reader only recognizes the following characters.

- A-Z
- a-z
- 0-9

Procedure

- The barcode reader is activated.
- The parameter **Sample ID entry** or **Standard ID entry** is set to **Variable**.

– When you are prompted to enter an identifier, press the **Barcode** key and hold the barcode reader over the barcode.

⇨ An audio signal is played and the identifier is saved.

See also

- Activate and deactivate the barcode reader (DensitoPro only) ▸ Page 16
- Configuration of density determinations ▸ Page 28

6.11 View, export, print and delete results

6.11.1 View results

- The home screen is open.

1 Press the **Results** key.

⇨ A list with all results is displayed.

2 To view an individual result, navigate to the result and move the navigation joystick to the right.

6.11.2 Delete all results

You can only delete all results but not individual results or a subgroup of results.

- The home screen is open.

1 Press the **Results** key.

2 Press the **Delete** key.

⇨ The message **Do you want to delete all results?** is displayed.

3 Press the **Yes** key.

⇨ An empty list is displayed.

6.11.3 Export and print results

NOTICE

Loss of data

A maximum of 1100 results is saved in the density meter. When the result list contains 1100 results and a new results is saved, the oldest result is overwritten.

– Print or export the results before the maximum number of results is reached.

You can export or print results if you have the required accessories.

- To export results you need the EasyDirect Density & Refractometry software or a USB flash drive.
- To print results, you need a compatible USB printer or bluetooth printer.

See also

- Accessories ▸ Page 74
- Connect to EasyDirect Density & Refractometry ▸ Page 23
- Connect a printer ▸ Page 22

6.11.3.1 Export results to EasyDirect Density & Refractometry

Export an individual result

- EasyDirect Density & Refractometry is connected.
- An individual result is displayed.

1 Press the **Report** key.
2 Navigate to **Option** and select **EasyDirect**.
3 Press the **OK** key.
4 Press the **Start** key.
⇨ The export is completed and the result is displayed.

Export all results or a subset of results

- EasyDirect Density & Refractometry is connected.
- The result list is displayed.

1 Press the **Report** key.
2 Navigate to **Option** and select **EasyDirect**.
3 Press the **OK** key.
4 To export all results, deactivate the filter.
5 To export a subset of results, configure the filter.
6 Press the **Start** key.
⇨ The export is completed and the result list is displayed.

See also

- Configure the filter ▸ Page 55
- Connect to EasyDirect Density & Refractometry ▸ Page 23

6.11.3.2 Export results to a USB flash drive

Individual results, subsets of results or all results can be exported as CSV files to a USB flash drive. Each time an export is performed, the data is stored in a new CSV file.

Characteristics of the CSV files

- A CSV file only contains data of one method type. Example: If results from test methods and measurement methods are exported, they are saved to two separate CSV files. One file contains the results from the test methods. The other file contains the results from the measurement methods.
- File names are constructed according to the following pattern: Method type_product type_serial number_date_time.csv. Example: MeasureExport_DensitoPro_A001711238_20200519_073724.csv
- Data delimiter: tab

Export an individual result

- A USB flash drive is connected.
- An individual result is displayed.

1 Press the **Report** key.
2 Navigate to **Option** and select **USB stick**.
3 Press the **OK** key.
4 Press the **Start** key.
⇨ The result is exported.

Export all results or a subset of results

- A USB flash drive is connected.
- The result list is displayed.

1 Press the **Report** key.
2 Navigate to **Option** and select **USB stick**.
3 Press the **OK** key.
4 To export all results, deactivate the filter.
5 To export a subset of results, configure the filter.
6 Press the **Start** key.
⇨ The results are exported.

See also

Configure the filter ▸ Page 55

6.11.3.3 Print results

The **Printout** parameter defines whether a result is automatically printed when it is saved and which information is printed.

Information	Methods	Test	Adjustment
Date / Time	**Short/Long**	**Short/Long**	**Short/Long**
Method ID	**Short/Long**	–	–
Sample ID	**Short/Long**	–	–
Application name with standard	–	**Short/Long**	**Short/Long**
Standard ID	–	**Short/Long**	**Short/Long**
Status	**Short/Long**	**Short/Long**	–
Calculation	**Short/Long**	–	–
Density	**Short/Long**	**Short/Long**	**Short/Long**
Dev. d	–	**Short/Long**	**Short/Long**
Temp.	**Short/Long**	**Short/Long**	**Short/Long**
d nominal	–	**Short/Long**	**Short/Long**
SNR	**Long**	**Long**	**Long**

Information	Methods	Test	Adjustment
Additional settings like the compensation temperature and the temperature-compensation coefficient α	**Long**	**Long**	**Long**

Print an individual result

- A printer is connected.
- An individual result is displayed.

1 Press the **Report** key.
2 Navigate to **Option** and select **Print**.
3 Press the **OK** key.
4 Navigate to **Printout** and set it to **Short** or **Long** as needed.
5 Press the **OK** key.
⇨ The result is printed.

Print all results or a subset of results

- A printer is connected.
- The result list is displayed.

1 Press the **Report** key.
2 Navigate to **Option** and select **Print**.
3 Press the **OK** key.
4 Navigate to **Printout** and set it to **Short** or **Long** as needed.
5 Press the **OK** key.
6 To print all results, deactivate the filter.
7 To print a subset of results, configure the filter.
8 Press the **Start** key.
⇨ The results are printed.

See also

- Configure the filter ▸ Page 55
- Connect a printer ▸ Page 22

6.11.3.4 Configure the filter

If you activate the filter, you can print or export a subset of the results. The following filters are available.

- **Off**: Filter is deactivated and all results are printed or exported.
- **Today**: Only the results from current day are printed or exported.
- **Range**: Only the results within the set date range are printed or exported.

Procedure

1 Press the **Menu** key.
2 Navigate to **Results** > **Report** > **Filter**.
3 Select the desired **Filter** type.
4 Press the **OK** key.
5 If you selected **Range**, define the values for **Start date** and **End date**.

See also

- Export results to a USB flash drive ▸ Page 53
- Export results to EasyDirect Density & Refractometry ▸ Page 53
- Print results ▸ Page 54

7 Maintenance

In this chapter you find descriptions of the maintenance tasks you should perform on your density meter. 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 density meter, contact your authorized METTLER TOLEDO service representative or dealer.

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

▶ www.mt.com/contact

7.1 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	See
Daily	Clean the measuring cell at the end of the work day.	[Clean the measuring cell ▸ Page 56]
	Perform a test with deionized water.	[Check the measurement accuracy ▸ Page 60]

See also

Activate and deactivate a cleaning reminder ▸ Page 27

7.2 Clean the density meter

NOTICE

Damage to the density meter due to inappropriate cleaning methods

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

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 density meter.

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

▶ www.mt.com/contact

7.2.1 Clean the housing

METTLER TOLEDO recommends the following cleaning agents:

- Water
- Water with a mild detergent

Procedure

▪ The density meter is shut down.

– Wipe the housing with a cloth moistened with the cleaning agent.

7.2.2 Clean the measuring cell

Because the measuring cell always contains residue from the last sample, there is a risk that the measuring cell can be damaged by the sample. To prevent such damages, METTLER TOLEDO recommends that you clean the measuring cell at the end of each sample series.

To clean the measuring cell, you need to rinse the measuring cell with a cleaning solution. The cleaning solution must have the following properties.

- Does not chemically interact with the material of the measuring cell.
- Dissolves the sample that was just measured.
- Evaporates without leaving incrustations.

METTLER TOLEDO recommends the following cleaning solutions.

Sample	Cleaning solution
Water Water based	Deionized water
Acids, concentrated	Water (flush the measuring cell with plenty of water to remove the heat from the reaction of water and acid)
Alkaline, concentrated	0.3…0.5 % deconex solution
Samples with fats or oily compoents	0.3…0.5 % deconex solution
Petrochemical samples Edible oils and fats	Toluene, xylene or petrol ether mixtures

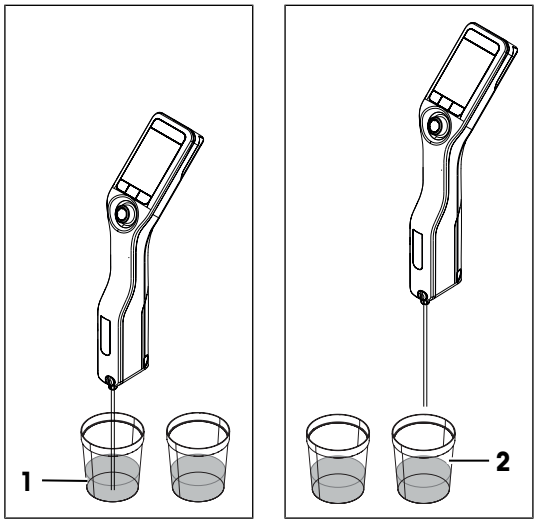
See also

Activate and deactivate a cleaning reminder ▶ Page 27

7.2.2.1 Clean using the sample pump

- The density meter is set up to work with the sample pump.
- The cleaning solution is defined and available.
- The piston is in the lowermost position.

1 Immerse the filling tube in the cleaning solution (1).
2 Move the navigation joystick upwards and let go.
   ⇨ The sample pump moves the piston to its uppermost position.
3 Lift the filling tube out of the cleaning solution and hold it over the waste beaker (2).
4 Move the navigation joystick downwards and let go.
   ⇨ The sample pump moves the piston to its lowermost position.
5 Clean the end of the filling tube with a clean tissue.
6 Repeat the steps until all residue from the sample is removed.
7 Move the navigation joystick upwards and let go.
   ⇨ The sample pump fills the measuring cell with air.
8 Move the navigation joystick downwards and let go.
   ⇨ Most of the cleaning solution is removed from the measuring cell.
9 Clean the end of the filling tube with a clean tissue.

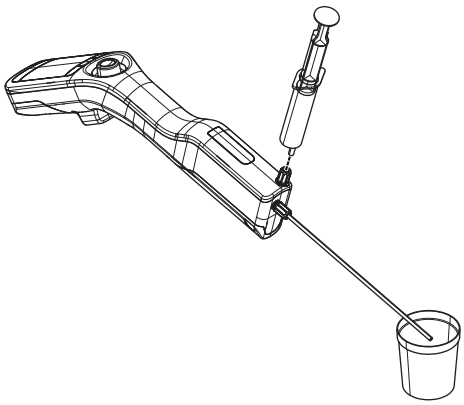


7.2.2.2 Clean using a syringe

- The density meter is set up to work with a syringe.
- The cleaning solution is defined and available.
- The measuring cell is drained.

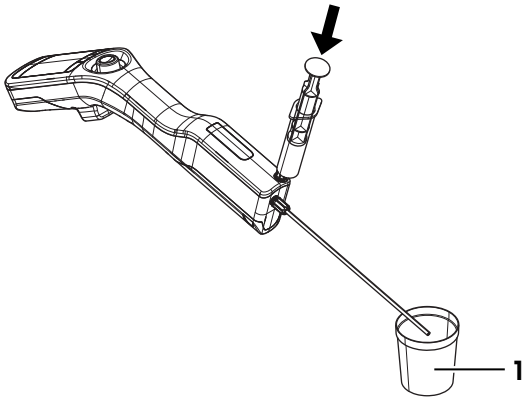
1 Fill a syringe with the cleaning solution.

2 Insert the syringe into the connector for the syringe.



3 Hold the filling tube over the waste beaker (1).

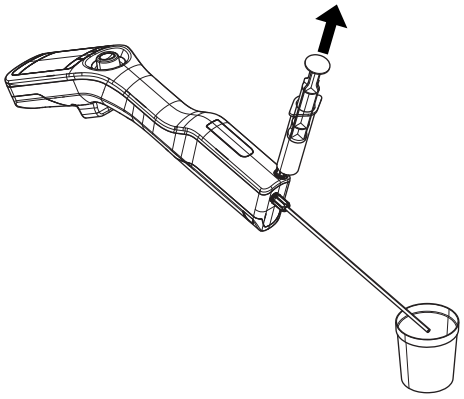
4 Press the plunger continuously into the syringe until the syringe is empty.



5 Pull the plunger continuously out of the syringe.
   ⇨ The cleaning solution is pulled back into the syringe and the measuring cell fills with air.

6 Remove the syringe and empty it into a suitable waste beaker.

7 Repeat the steps until all residue from the sample is removed.



7.2.3 Clean the cylinder and the piston of the sample pump

If rinsing is not enough to clean the cylinder and the piston, you can remove both for more thorough cleaning.

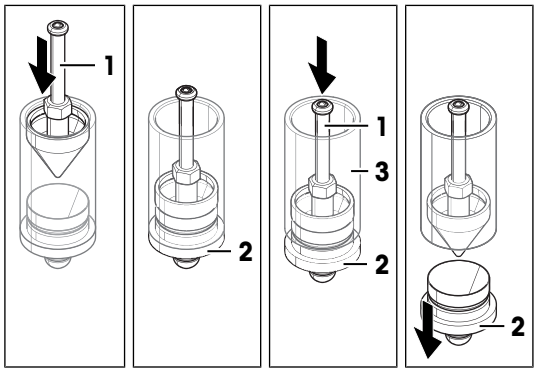
7.2.3.1 Disassemble the cylinder and remove the piston

1 Remove the cylinder and the piston from the density meter. See [Remove the cylinder and the piston ▸ Page 63].

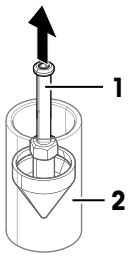
2 Push the piston (1) into the cylinder until it touches the bottom section (2) of the cylinder.

3 Carefully apply pressure to the piston (1) and push the bottom section (2) partway out of the glass section of the cylinder (3).

4 Pull the bottom section (2) out of the glass section (3).



5 Pull the piston (1) out of the glass section (2).



7.2.3.2 Clean the piston and the cylinder sections

METTLER TOLEDO recommends the following cleaning agents:

- Water
- Water with a mild detergent

Procedure

1 Wipe the piston and the cylinder sections with a cloth moistened with the cleaning agent.

2 If needed, soak the piston and the cylinder sections in the cleaning agent.

3 If needed, scrub the piston and the cylinder sections with a non-abrasive brush.

4 Rinse the piston and the cylinder sections with deionized water.

5 Dry the piston and the cylinder sections.

See also

Technical data ▸ Page 70

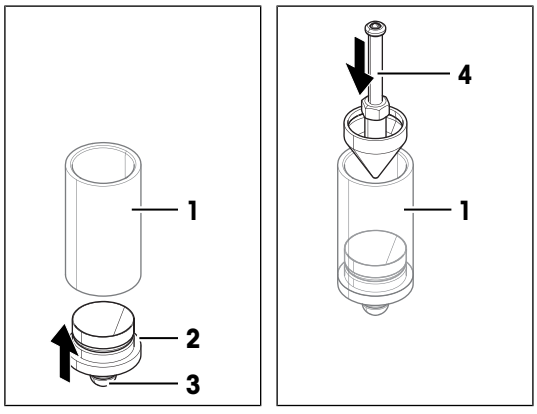
7.2.3.3 Assemble the cylinder and install the piston

1 Insert the bottom section (3) into the glass section (1).

2 Push the bottom section (3) into the glass section (1) until the ledge (2) touches the glass.

3 Insert the piston (4) into the glass section (1).

4 Install the cylinder and the piston into the density meter. See [Install the cylinder and the piston ▸ Page 64].



7.2.4 Clean the protective cover

The protective cover is made of EPDM (ethylene propylene diene monomer (M-class) rubber).

METTLER TOLEDO recommends the following cleaning agents:

- Water
- Water with a mild detergent

Procedure

- The density meter is shut down.

1 Remove the protective cover.

2 Wipe the outside and the inside of the protective cover with a cloth moistened with the cleaning agent.

See also

- Install and remove the protective cover ▸ Page 21
- Clean the housing ▸ Page 56

7.3 Check the measurement accuracy

To check the measurement accuracy of the density meter, you need to configure and perform a test.

For additional information about the configuration of a test, read the chapter [Configuration of density determinations ▸ Page 28].

7.3.1 Example: Test with water

The following chapters show you how to configure and perform a guided test with deionized water at room temperature (23 °C or 73.4 °F).

7.3.1.1 Configure the test

- The density unit is set to [g/cm^3].
- **Confirmation of results** in **Settings** is activated.

1 Press the **Menu** key.

2 Navigate to **Test**.

⇨ The **Test** window opens.

3 Change the parameter settings to the values shown in the following table.

Parameter	Setting	Explanation
Workflow	**Guided**	The density meter prompts users to fill and drain the measuring cell.
Standard type	**Water**	The density meter uses predefined values for the water measurement.
Standard ID entry	**Variable**	The density meter prompts users to enter the identifier before the density is measured.
Fill cycle	3	The density meter prompts users to fill and drain the measuring cell twice and then fill the measuring cell for the measurement.
Fill speed	**High**	The pump fills the measuring cell with 80 % of the maximum pump speed.
Tolerance d	0.0002 g/cm^3	The result is marked as passed if it falls within the following range. **d nominal ± Tolerance d**
Clean	**Drain**	Users are prompted to drain the measuring cell.
Printout	**None**	The result is not printed.

See also

- Activate and deactivate the confirmation of results ▶ Page 30
- Change the density unit ▶ Page 24

7.3.1.2 Perform the test

Start the test

- The density meter is set up to work with the sample pump.
- The measuring cell has been cleaned.
- The piston is in the lowermost position.

1 Press the **Menu** key.
2 Navigate to **Test**.
⇨ The **Test** window opens.
3 Press the **Start** key.
⇨ The home screen opens.
4 Press the **Start** key.
⇨ The **Standard ID** window opens.
5 Enter the identifier.
6 Press the **OK** key.

Rinse the measuring cell

1 Immerse the filling tube in the water.
2 Press the **OK** key.
⇨ The sample pump moves the piston to its uppermost position.
3 Hold the filling tube over the waste beaker.
4 Press the **OK** key.
⇨ The sample pump moves the piston to its lowermost position.
5 Clean the end of the filling tube with a clean tissue.
6 Repeat the steps once.

Fill the measuring cell and measure the density

1 Immerse the filling tube in the water.
2 Press the **OK** key.
⇨ The sample pump moves the piston to its uppermost position.
3 Make sure there are no bubbles in the measuring cell.
⇨ The measurement starts.
⇨ When the background of the measuring ribbon changes color, the measurement is finished.
⇨ The measured value is saved in the results.
4 Press the **OK** key.

Drain the measuring cell

1 Hold the filling tube over the waste beaker.
2 Press the **OK** key.
⇨ The sample pump moves the piston to its lowermost position.
3 Clean the end of the filling tube with a clean tissue.

7.3.2 Measures if a test fails

1 Check if the correct standard has been used, and if needed repeat the test with the correct standard.

2 If the test continues to fail, clean the measuring cell with a cleaning solution that dissolves your samples and dissolves in the standard.
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.

See also

- Clean the measuring cell ▸ Page 56
- Restore the factory-adjustment data ▸ Page 66
- Adjust the measurement accuracy ▸ Page 66

7.4 Replace the battery

⚠ CAUTION

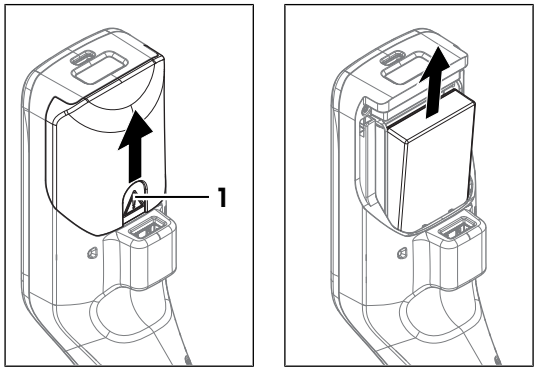
Injury or damage due to incorrect handling of the battery

The battery can explode or ignite if it is not handled correctly.

1 Do not store or use the battery at temperatures below -20 °C or above 60 °C.
2 Do not subject the battery to mechanical stresses like pressure, bending or impacts.

The density meter works with a rechargeable 2400 mAh Li-Ion battery that you can order from METTLER TOLEDO.

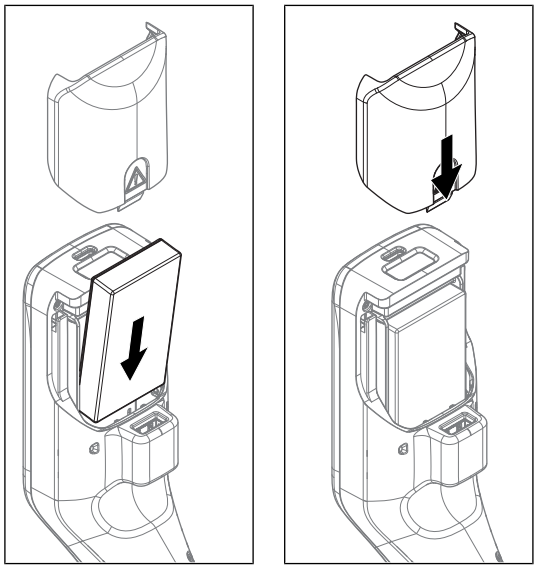
1 Press on the lower part (1) of the battery cover and push the battery cover up.
2 Pull the upper part of the battery out of the battery compartment and lift the battery out.



3 Insert the lower part of the battery at an angle into the battery compartment.
4 Push the upper part of the battery into the battery compartment.
5 Slide the battery cover from above onto the density meter.

See also

- Accessories ▸ Page 74
- Technical data ▸ Page 70

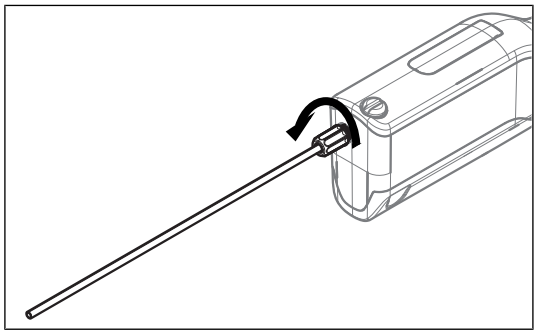


7.5 Replace the filling tube

1 Unscrew the filling tube by hand and remove it.
2 Install the new filling tube.

See also

- Accessories ▸ Page 74
- Install the filling tube ▸ Page 16

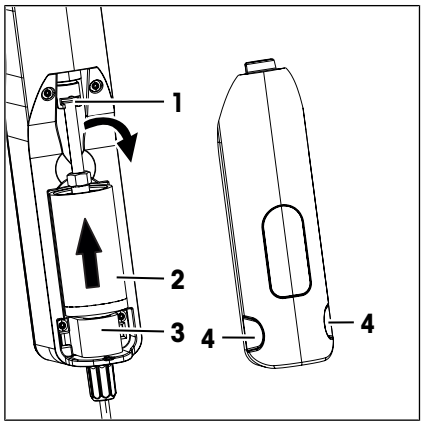


7.6 Replace the cylinder and the piston of the sample pump

7.6.1 Remove the cylinder and the piston

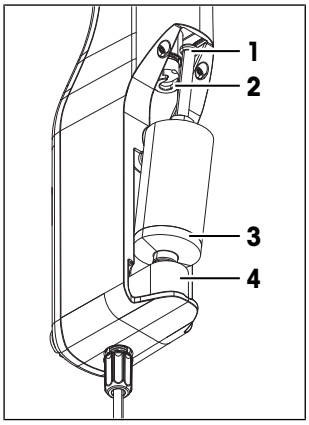
- The measuring cell is drained.

1 Move the navigation joystick upwards and let go.
⇨ The sample pump moves the piston to its uppermost position.
2 Shut down the density meter.
3 Press on the grip recesses (4) of the cover and lift the lower part of the cover out of the housing.
4 Pull the top of the cover out of the housing.
5 Lift the piston (1) out of the guide system.
6 Pull the cylinder (2) up and out of its guide system (3).



7.6.2 Install the cylinder and the piston

1 Insert the cylinder (3) of the sample pump into its guide system (4).
2 Insert the piston (1) into its guide system (2).
3 Reinstall the cover of the sample pump.
4 Start up the density meter.
5 Move the navigation joystick downwards and let go.
⇨ The sample pump moves the piston to its lowermost position.



See also

Accessories ▸ Page 74

7.7 Update the firmware

The firmware of your density meter can be updated. If you want to update the firmware of your density meter, contact your authorized METTLER TOLEDO service representative or dealer.

▶ www.mt.com/contact

7.8 Prepare the density meter for storage

The density meter can be stored at temperatures of -20…+50 °C (-4…+122 °F). But the lifespan of the battery is reduced when it is stored at high temperatures.

1 Clean the measuring cell.
2 Shut down the density meter.
3 Clean the housing.
4 Store the density meter in a dry and clean place.

See also

Clean the density meter ▸ Page 56
Technical data ▸ Page 70

7.9 Ship the density meter

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

▶ www.mt.com/contact

1 Shut down the density meter.
2 Clean the density meter.
3 Ship the density meter using the original packaging.

7.10 Dispose of the density meter

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.

8 Troubleshooting

8.1 List of errors and problems

Problem	Possible cause	Measure
The sample pump does not aspirate any liquid.	The locking screw is not installed.	– Install the locking screw.
	The locking screw is not tight.	– Tighten the locking screw.
	The O-rings of the cylinder are damaged.	– Replace the cylinder and the piston. See [Replace the cylinder and the piston of the sample pump ▸ Page 63].
Test of measurement accuracy fails.	The measuring cell is not clean.	See [Measures if a test fails ▸ Page 61].
	Mismatch between measured and configured standard	See [Measures if a test fails ▸ Page 61].
	The tolerance range is too small.	See [Configure the tolerance for a test ▸ Page 39].
	The density meter is not adjusted correctly.	See [Measures if a test fails ▸ Page 61].
The message **Drain cell over waste beaker.** is displayed when you try to start a method.	The piston is not in the lowermost position.	See [Drain the measuring cell ▸ Page 66]
There are bubbles in the measuring cell.	Fill speed is too high.	1 If you use the sample pump, lower the setting for fill speed. See [Define the pump speed ▸ Page 30]. 2 If you use a syringe, press the syringe plunger more slowly into the syringe.
	The liquid contains dissolved gases.	– Degas the sample before you fill it into the measuring cell.
	Connector for syringe or the filling tube is not tight.	1 Tighten the connector of the filling tube. 2 Tighten the locking screw or the connector for the syringe.
The message **Pump position unknown.** is displayed.	The saved pump position was lost because the battery was removed too long.	The density meter is set up to work with a syringe. – You can ignore the message and continue to work with the density meter. The density meter is set up to work with the sample pump. See [Drain the measuring cell ▸ Page 66]
"--" is displayed, instead of a value for **Alpha*1000**.	The calculated value is out of range.	– Check and correct the density values and the values for the compensation temperatures you entered.

Problem	Possible cause	Measure
"--" is displayed, instead of a measured value or a result.	The measured value or the result is out of range.	1 Check that the unit defined in the method matches the sample you want to measure. 2 If you use a user-defined conversion, check that all the settings are correct.

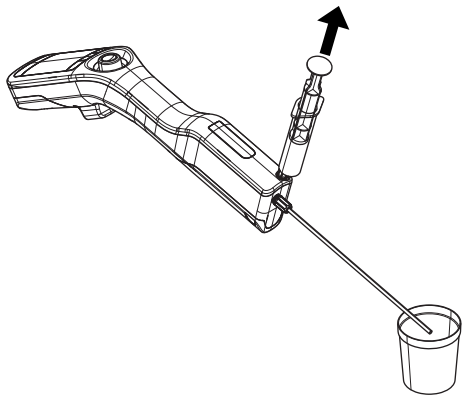
8.2 Drain the measuring cell

Drain using the sample pump

1 Hold the filling tube over the waste beaker.
2 Move the navigation joystick downwards and let go.
⇨ The sample pump moves the piston to its lowermost position.
3 Clean the end of the filling tube with a clean tissue.

Drain using a syringe

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 and empty it into a suitable waste beaker.



8.3 Restore the factory-adjustment data

You can delete the current adjustment data and restore the factory-adjustment data.

1 Press the **Menu** key.
2 Navigate to **Maintenance & Service** > **Reset to factory adjust.**.
⇨ The message **Do you want to reset to factory adjustment?** opens.
3 To overwrite the current adjustment data with the factory adjustment data, press **Yes**.
⇨ The factory adjustment data are restored.

8.4 Adjust the measurement accuracy

NOTICE

Inaccurate results due to incorrect adjustment

Adjustments that are not performed property can lead to inaccurate results.

– Only perform an adjustment if you are qualified to do it.

The following chapters show you, how to configure and perform an exemplary adjustment with water.

For additional information about the configuration of an adjustment, read the chapter [Configuration of density determinations ▸ Page 28].

See also

Measures if a test fails ▸ Page 61

8.4.1 Example: Adjustment with water

The following chapters show you how to configure and perform a guided adjustment with deionized water at room temperature (23 °C or 73.4 °F).

8.4.1.1 Configure the adjustment

- **Confirmation of results** in **Settings** is activated.

1 Press the **Menu** key.
2 Navigate to **Adjustment**.
   ⇨ The **Adjustment** window opens.
3 Change the parameter settings to the values shown in the following table.

Parameter	Setting	Explanation
Workflow	**Guided**	The density meter prompts users to fill and drain the measuring cell.
Standard type	**Water**	The density meter uses predefined values for the water measurement.
Standard ID entry	**Variable**	The density meter prompts users to enter the identifier before the density is measured.
Fill cycle	3	The density meter prompts users to fill and drain the measuring cell twice and then fill the measuring cell for the measurement.
Fill speed	**High**	The pump fills the measuring cell with 80 % of the maximum pump speed.
Clean	**Drain**	Users are prompted to drain the measuring cell.
Printout	**None**	The result is not printed.

8.4.1.2 Perform the adjustment

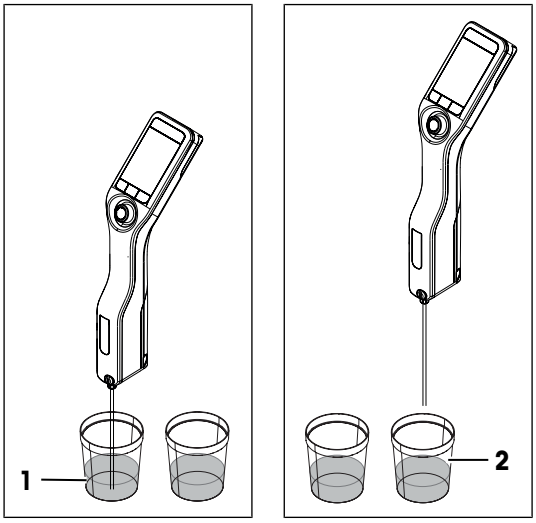
Start the adjustment

- The density meter is set up to work with the sample pump.
- The measuring cell has been cleaned.
- The piston is in the lowermost position.

1 Press the **Menu** key.
2 Navigate to **Adjustment**.
   ⇨ The **Adjustment** window opens.
3 Press the **Start** key.
   ⇨ The home screen opens.
4 Press the **Start** key.
   ⇨ The **Standard ID** window opens.
5 Enter the identifier.
6 Press the **OK** key.

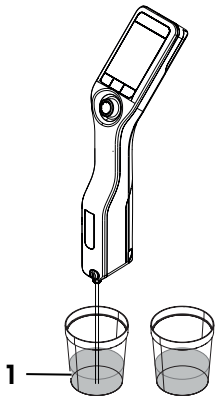
Rinse the measuring cell

1 Immerse the filling tube in the water (1).
2 Press the **OK** key.
   ⇨ The sample pump moves the piston to its uppermost position.
3 Hold the filling tube over the waste beaker (2).
4 Press the **OK** key.
   ⇨ The sample pump moves the piston to its lowermost position.
5 Clean the end of the filling tube with a clean tissue.
6 Repeat the steps once.



Fill the measuring cell and measure the density

1 Immerse the filling tube in the water (1).
2 Press the **OK** key.
   ⇨ The sample pump moves the piston to its uppermost position.
3 Make sure there are no bubbles in the measuring cell.
   ⇨ The measurement starts.
   ⇨ When the background of the measuring ribbon changes color, the measurement is finished.
   ⇨ The measured value is saved in the results.
4 Accept or reject the adjustment.

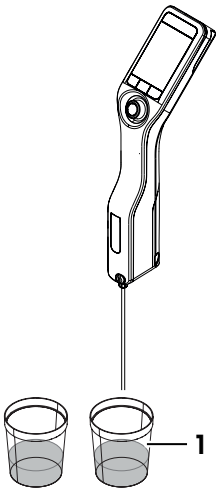


Drain the measuring cell

1 Hold the filling tube over the waste beaker (1).
2 Press the **OK** key.
   ⇨ The sample pump moves the piston to its lowermost position.
3 Clean the end of the filling tube with a clean tissue.

See also

Activate and deactivate the confirmation of results ▸ Page 30



8.5 Restore the factory settings

NOTICE

Loss of data

With a factory reset all user-specific settings are set to the default values and all saved data (e.g. sample IDs, results, Method IDs and adjustment data) are deleted.

– Document the data you need before you restore the factory settings.

1 Press the **Menu** key.

2 Navigate to **Maintenance & Service** > **Reset to factory settings**.

⇨ The dialog **Do you want to reset all values to factory settings?** opens.

3 To reset the density meter to factory settings, press the **Yes** key.

⇨ The density meter restarts.

8.6 View the firmware version and other system information

- The home screen is open.

1 Press the **Menu** key.

2 Navigate to **Information**.

⇨ The firmware version and other system information are displayed.

Parameter	Description
Instrument type	Shows if the density meter is a Densito or DensitoPro.
SNR instrument	Shows the serial number of the instrument.
Firmware version	Shows the firmware version of the density meter.
Licenses	Opens a window with information on the End User License Agreement, third party licenses and open source attribution files.

9 Technical data

9.1 Density meter

Characteristic		Value
Power rating instrument	Input values	5 V DC, 1.0 A
	Connector type	USB C
Power rating AC/DC adapter	Input values	100…240 V AC, 0.3 A
	Input frequency	50 - 60 Hz
	Output values	5 V DC, 1.0 A
Battery	Type	Rechargeable lithium-ion battery
	Capacity	2400 mAh
	Temperature range for charging	0…40 °C
Dimensions	Width	56 mm
	Length	288 mm
	Depth	80 mm
	Weight	355 g
Screen	Technology	Color screen
	Size	2.4"
	Resolution	240 x 320 pixels
USB type A	Data rate	USB 2.0, host fullspeed
	Output voltage	5 V DC ±5 %
	Max. output current	250 mA
USB type C	Data rate	USB 2.0, device fullspeed
	Input voltage	5 V DC ±10 %
	Max. input current	400 mA, max. 1 A with AC adapter
RFID reader (DensitoPro only)	Compatibility	METTLER TOLEDO Smart Tags
Barcode reader (DensitoPro only)	Format	Linear barcodes
Materials	Housing	PBT (polybutylene terephthalate)
	Measuring cell	Borosilicate glass
	Piston	PTFE (polytetrafluorethylene) Stainless steel (X8CrNiS18-9 (1.4305), X10CrNi18-8 (1.4310) and X5CrNi18-10 (1.4301))
	Cylinder	PVDF (polyvinylidene difluoride) FKM (fluoroelastomer) FFKM (perfluoro-elastomers) Borosilicate glass
	Filling tube	PTFE (polytetrafluorethylene)
	Connector for filling tube or syringe	PP (polypropylene)
	Locking screw	PVDF (polyvinylidene difluoride)

Ambient conditions

Characteristic	Value
Ambient temperature (Densito)	-10…+50 °C

Characteristic	Value
Ambient temperature (DensitoPro)	0…+50 °C
Relative humidity	Max. 80 % (non-condensing) at 31 °C, linear fall to 50 % at 40 °C
Altitude	Up to 2000 m above sea level
Pressure	Atmospheric pressure
Use	In interior spaces
Overvoltage category	II
Pollution degree	2
IP code	IP5X

Storage temperatures

Characteristic		Value
Instrument		-20 °C…+50 °C
Battery	Storage for up to 1 month	-20 °C…+60 °C
	Storage for up to 3 months	-20 °C…+45 °C
	Storage for up to 1 year	-20 °C…+30 °C

9.2 Measurement

Characteristic		Value
Density	Measuring range	0.000…3.000 g/cm^3
	Accuracy [1)]	± 0.001 g/cm^3
	Repeatability	± 0.0005 g/cm^3
	Resolution	0.0001 g/cm^3
Temperature	Temperature range for sample	0…50 °C
	Resolution	0.1 °C
	Accuracy	±0.2 °C
Viscosity	Using sample pump	0...100 mPa*s
	Using syringe	0...1000 mPa*s
Volumes	Sample pump	5 mL
	Min. sample volume	2 mL
Temperature compensation		Automatic or by using a user-defined temperature correction coefficient
Application	Max. number of methods	30
	Stored results	1100

[1)] For viscosity range of 0…200 mPa*s

Measurement scales

Characteristic		Value
Ethanol (d) % w/w	Range	0.0...100.0 % w/w
	Accuracy	±0.5 % w/w
Ethanol (d) % v/v	Range	0.0...100.0 % v/v
	Accuracy	±0.5 % v/v
Proof (IP)	Range	0.0...175.0 Proof
	Accuracy	±1.75 Proof

Characteristic		Value
Proof (US)	Range	0.0...200.0 Proof
	Accuracy	±2.0 Proof
Light Baumé	Range	10...100 °Bé
	Accuracy	±0.4 °Bé
Heavy Baumé	Range	0...72 °Bé
	Accuracy	±0.1 °Bé
H_2SO_4 % w/w	Temperature range	10…50 °C
	Concentration range	0.0...90.0 % w/w
	Accuracy	±1.0 % w/w
H_2SO_4 % v/v	Temperature range	10…50 °C
	Concentration range	0.0...90.0 % v/v
	Accuracy	±1.0 % v/v
Brix (d) % w/w	Range	0.0...85.0 % w/w
	Accuracy	±0.3 % w/w
Plato	Range	0.0...85.0 °P
	Accuracy	±0.3 °P

9.3 Charging stand

Characteristic		Value
Power rating charging stand	Input values	5 V DC, 1.0 A
	Connector type	USB C
Power rating AC/DC adapter	Input values	100…240 V AC, 0.3 A
	Input frequency	50 - 60 Hz
	Output values	5 V DC, 1.0 A
Dimensions	Width	71 mm
	Length	250 mm
	Depth	117 mm
	Weight	390 g
Materials	Housing	ABS (acrylonitrile butadiene styrene) POM-C (polyacetal copolymer) Stainless steel (X5CrNi18-10 (1.4301))

Ambient and storage conditions

Ambient temperature	-10…+50 °C
Storage temperature	-20…+50 °C
Relative humidity	Max. 80 % (non-condensing) at 31 °C, linear fall to 50 % at 40 °C
Altitude	Up to 2000 m above sea level
Pressure	Atmospheric pressure
Use	In interior spaces
Overvoltage category	II
Pollution degree	2

9.4 Protective cover

Characteristic		Value
Dimensions	Width	63 mm
	Length	277 mm
	Depth	122 mm
	Weight	75 g
Materials		EPDM (ethylene propylene diene monomer (M-class) rubber)

10 Accessories

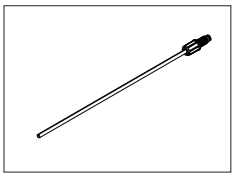
The following accessories and parts are available for the density meters Densito and DensitoPro.

All parts and accessories are specified with their order number, and quantity where more than one part is included.

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

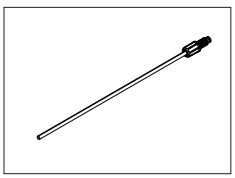
▶ www.mt.com/contact

10.1 Sampling



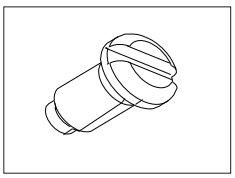
Filling Tube
190 mm
- Tube
- Connector syringe/filling tube
- Washer

30330847



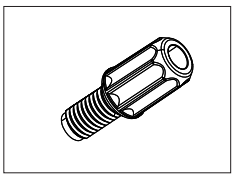
Filling tube
600 mm
- Tube
- Connector syringe/filling tube
- Washer

30330848



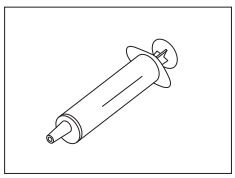
Locking Screw, Densito

30330852



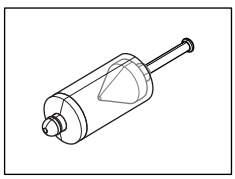
Connector syringe/filling tube

30330853



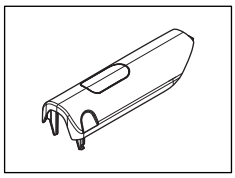
Disposable syringe (100 pcs)
10 mL

51338100



Sample pump
- Piston
- Glass cylinder

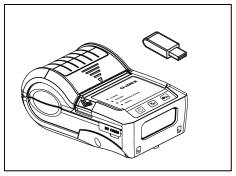
30330849



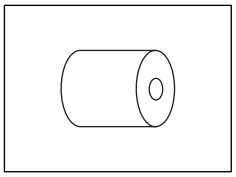
Sample pump cover

30330851

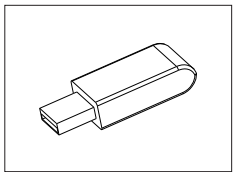
10.2 Printers



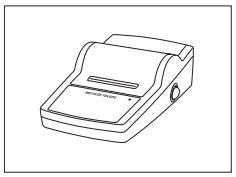
Bluetooth Printer Godex MX20 with Dongle **30330864**



Bluetooth Printer Paper (5 rolls) **30330865**



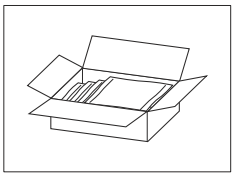
Bluetooth Dongle Godex MX20 **30330863**



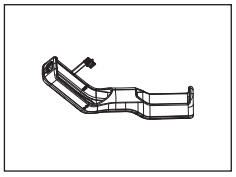
USB-P25 printer **11124301**
US/CA 11124321

10.3 Miscellaneous accessories

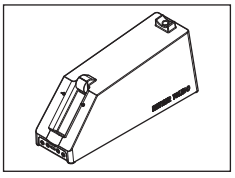
EasyDirect Density & Refractometry computer software **30451628**



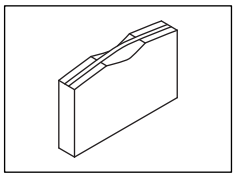
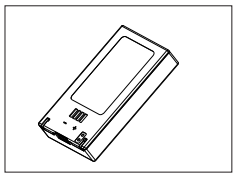
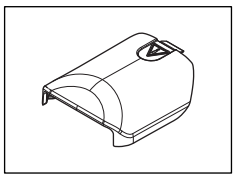
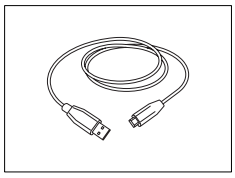
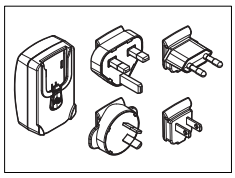
Density standards (10 pcs)
6 mL **51325005**



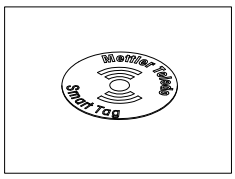
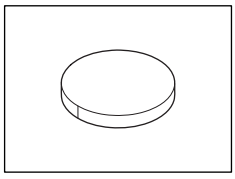
Protective Cover **30330860**



Charging stand **30330842**

	Carrying Case	**30330861**
	Battery Li-Ion 2400mAh	**30330855**
	Battery cover	**30330854**
	USB-C Cable	**30449253**
	Power Supply and Worldwide Adapters	**30449255**

Accessories for DensitoPro

	Tag SmartSample (10 pcs)	**30449268**
	Tag SmartSample Film for Tanks (10 pcs)	**30449269**

11 Appendix

11.1 Density of pure water (0…40 °C)

Temperature [°C]	Density [g/cm3]	Temperature [°C]	Density [g/cm3]
0	0.99984		
1	0.99990	21	0.99799
2	0.99994	22	0.99777
3	0.99996	23	0.99754
4	0.99997	24	0.99730
5	0.99996	25	0.99705
6	0.99994	26	0.99679
7	0.99990	27	0.99652
8	0.99985	28	0.99624
9	0.99978	29	0.99595
10	0.99970	30	0.99565
11	0.99961	31	0.99534
12	0.99950	32	0.99503
13	0.99938	33	0.99471
14	0.99925	34	0.99438
15	0.99910	35	0.99404
16	0.99894	36	0.99369
17	0.99878	37	0.99333
18	0.99860	38	0.99297
19	0.99841	39	0.99260
20	0.99821	40	0.99222

[Chemical Handbook Fundamental Version, Rev. 3, Table 5.2 (1984)]

11.2 Temperature-compensation coefficients α

Substance	Temperature range [°C]	α • 10^3/°C
Water	15…30	0.23
Ethanol	0…30	1.09
m-xylene	0…30	0.99
p-xylene	15…30	1.02
Glycerine	15…30	0.49
Chloroform	0…30	1.26
Carbon tetrachloride	0…30	1.22
Toluene	0…30	1.07
Benzene	6…30	1.21
Methanol	6…30	1.18
Acetone	0…30	1.42
Bromobenzene	0…30	0.91
Cyclohexane	0…30	1.20
Isopropanol	0…30	1.06
n-nonane	0…30	1.08

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