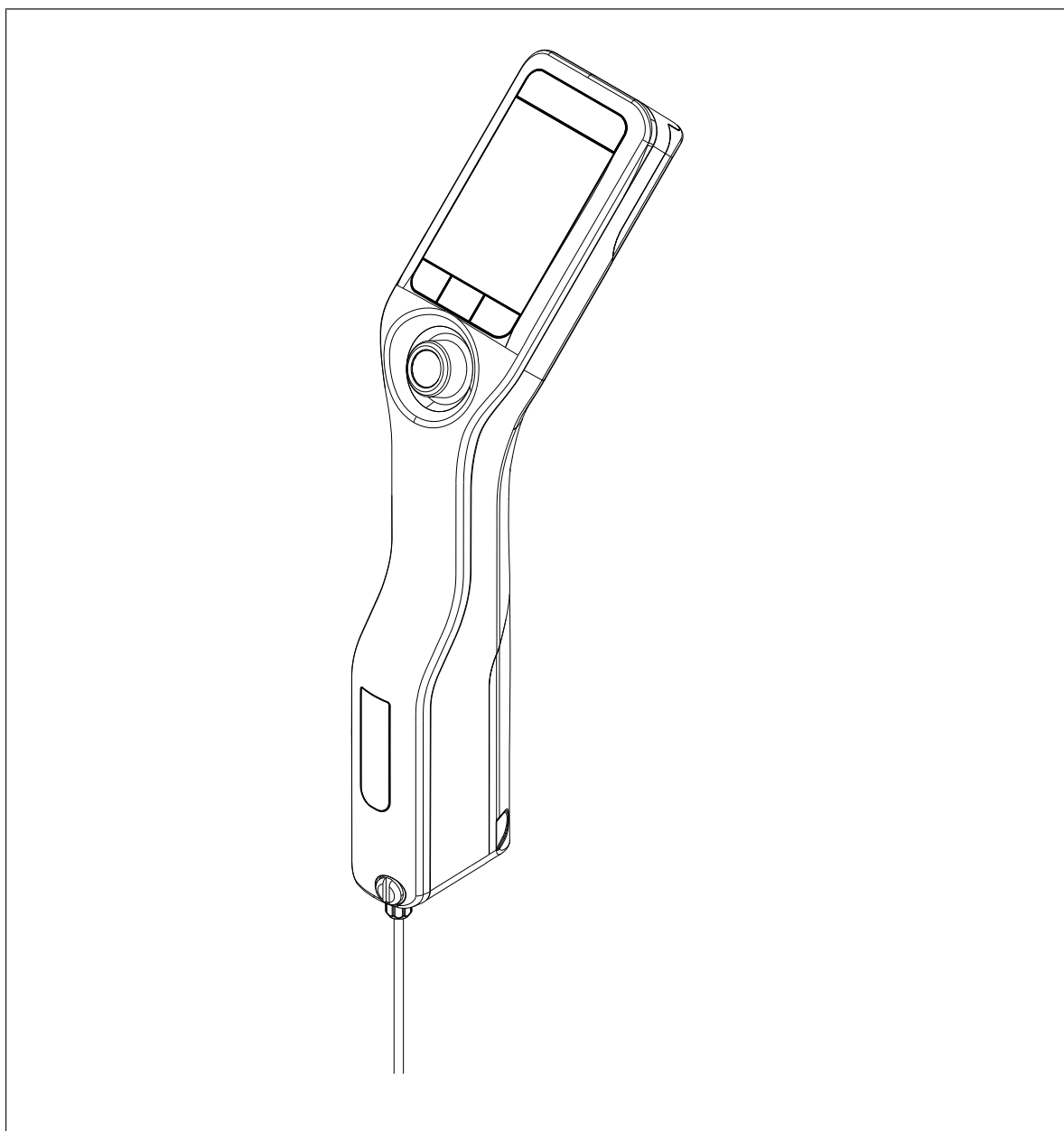


Handheld Density Meter

Densito/DensitoPro



METTLER TOLEDO

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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.

About this document

The instructions in this document refer to handheld density meters Densito and DensitoPro running firmware version V1.0.0 or higher.

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

► www.mt.com/legal

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 dealer or service representative.

► www.mt.com/contact

Conventions and symbols

Note for useful information about the product.



Refers to an external document.

Elements of instructions

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

2 Safety Information

- This Reference Manual contains a full description of the instrument and its use.
- Keep the Reference Manual for future reference.
- Include the Reference Manual if you transfer the instrument to other parties.

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

2.1 Definitions of signal words and warning symbols

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

Signal words

WARNING A hazardous situation with medium risk, possibly resulting in death or severe injury if not avoided.

NOTICE A hazardous situation with low risk, resulting in damage to the instrument, other material damage, malfunctions and erroneous results, or loss of data.

Warning symbols



Electrical shock

2.2 Product specific safety notes

Intended use

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

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

- The ambient conditions are 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.

This device complies with Industry Canada licence-exempt RSS standard(s) and part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Responsibilities of the instrument owner

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

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



 WARNING

Danger of 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 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

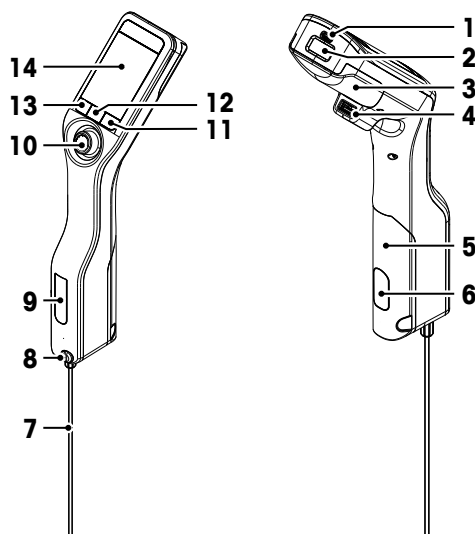
Risk of damage to the instrument due to the use of unsuitable parts!

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

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

3 Design and Function

3.1 Instrument overview



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

3.2 Overview of functions

Samples are filled into the measuring cell using a sampling tube or syringe. Sample IDs can be allocated to each measurements for better identification. The Density Meter supports the scanning of barcodes and writing on RFID tags to allocate sample IDs to the measurements.

By creating methods, it is possible to perform standard measurements repeatedly. Two workflow modes are available to decide whether to perform with a guided or manual workflow. In the manual workflow the user is completely free to design his own individual measuring routine. In the guided mode the user will be guided step by step via instructions on the display.

The 360° navigation stick and the three keys ensure an easy navigation through the menus.

The density meter uses the oscillating U-tube method. To fill the measuring cell the built-in sample pump or a syringe may be used. The results are automatically calculated into one of the following units: density, specific gravity, API degrees, Brix, % Alcohol, % H2SO4, °Baumé, °Plato, Proof or a user-defined unit. A temperature sensor measures the sample temperature right at the measuring cell. The temperature is displayed and can be used internally for automatic temperature compensation of the density reading if required. The backlight of the display ensures clear visibility of results. The backlight of the oscillator enables to observe the filling process in detail.

Settings

The following settings can be configured:

- Measurement: the operation type and the confirmation of the results can be configured.
- Global units: the density and temperature units can be configured.
- Printer: the printer type for printing results can be configured.
- RFID/Barcode: XXX
- Date/Time: The date and time can be configured.
- Language_ the system language and keyboard layout can be configured.
- Audio signal: the audio signal when a key is pressed can be configured.
- Display: the display backlight can be configured.

Maintenance & Service

The following maintenance and service actions can be performed:

- Firmware update: a firmware update can be performed.
- Reset to factory settings: instrument can be reset to the factory settings.
- Reset to factory adjustment: instrument adjustment can be reset to the factory settings.
- Import/Export: data and measuring results can be imported/exported.
- MT Service: XXX

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 identification or the selected standard. • MS: measurement using a method • TE: test • ADJ: adjustment
3	Sample ID ribbon	Displays the sample ID.

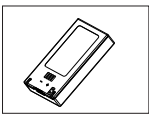
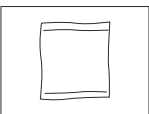
No.	Name	Explanation
4	Measuring ribbon	Displays the unit, the measured value or result and the temperature of the measuring cell.
5	Sampling ribbon	Displays the current status of the sample pump or syringe.
6	Key functions ribbon	Displays the function of the keys.

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 2400mAh	30330855	•	•
 Power Supply and Worldwide Adapters	30449255	•	•
 USB-C Cable	30449253	•	•
 Density standards (3 pcs) 6 mL	51325005	•	•
 Tag SmartSample (10 pcs)	30449268	—	•
 User Manual	—	•	•
 Declaration of conformity	—	•	•
 Test report	—	•	•

4.2 Unpack the instrument

- 1 Remove the density meter from the protective packaging.
- 2 Store the packing material for later transport over long distances.
- 3 Check if you received all parts listed in the scope of delivery.
- 4 Inspect the parts visually for flaws or damage.
- 5 If parts are missing or damaged, report it immediately and file a freight claim if needed.
- 6 Remove the plastic strip that separates the contacts of the battery and the density meter.

See also

 Replace the battery ► Page 50

4.3 Charge the density meter

You can either charge the density meter using the supplied AC adapter or a computer. Recharging an empty battery takes approximately three hours.

4.3.1 Charge with the AC adapter

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



WARNING

Danger of 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 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

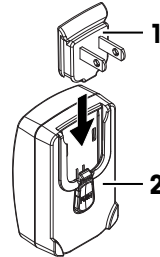
Danger of damage to the AC adapter due to overheating!

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

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

Assemble the AC adapter

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

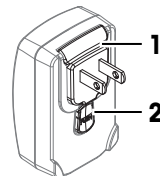


Connect the density meter to the power supply

- 1 Insert the USB-C plug of the USB-C cable in the USB-C socket of 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 adapter in a power outlet that is easily accessible.
- ⇒ The density meter starts charging and the  icon is displayed.

Change the plug of the AC adapter

- 1 Pull the plug of the AC 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 AC adapter.



4.3.2 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-C cable in the USB-C socket of 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.

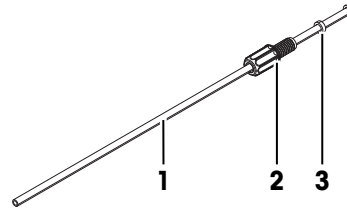
4.4 Setup for working with the sample pump

4.4.1 Activate the sample pump mode

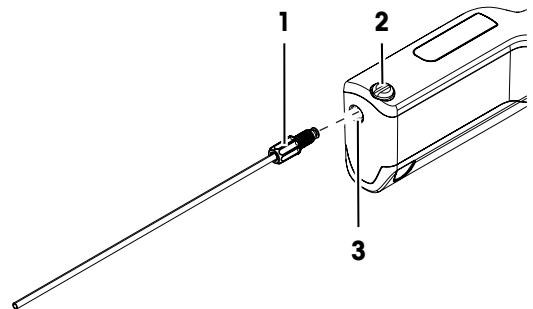
- 1 Press the **Menu** key.
 - 2 Navigate to **Settings > Measurement > Sampling**.
⇒ The **Sampling** window opens.
 - 3 Navigate to **Sample pump**.
 - 4 Press the **OK** key.
 - 5 Navigate back to the home screen.
- ⇒ The icon  is displayed in the sampling ribbon.

4.4.2 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.



4.5 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 42

4.6 Activate and deactivate the barcode reader (DensitoPro only)

- 1 Press the **Menu** key.
- 2 Navigate to **Settings > RFID / Barcode > Type**.
⇒ The scan **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 43

4.7 Install accessories

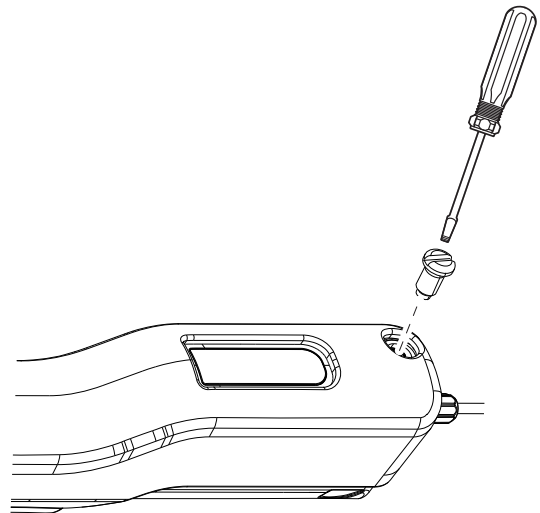
4.7.1 Setup for working with a syringe

4.7.1.1 Activate the syringe mode

- The piston is in the lowermost position.
- 1 Press the **Menu** key.
 - 2 Navigate to **Settings > Measurement > Sampling > 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.

4.7.1.2 Install the connector for the syringe

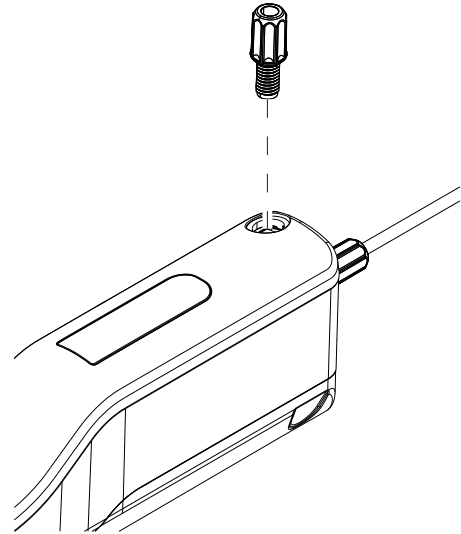
- The connector for the syringe is available.
 - The filling tube is installed.
- 1 Unscrew the locking screw counterclockwise with a flat screwdriver and remove it.



- 2 Screw the connector into the filling opening and tighten it.

See also

- 📄 Accessories ► Page 61
- 📄 Install the filling tube ► Page 13



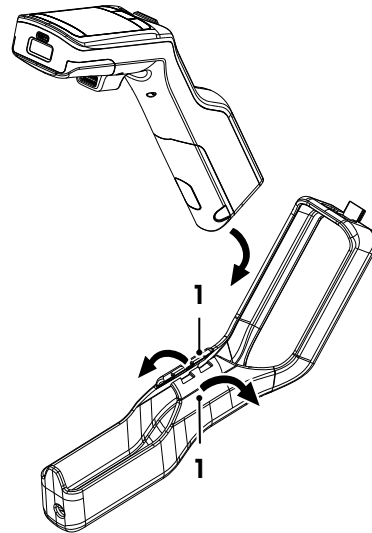
4.7.2 Install and remove the protective cover

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

- Dust
- Dirt
- Moisture
- Bumps
- Scratches

4.7.2.1 Install the protective cover

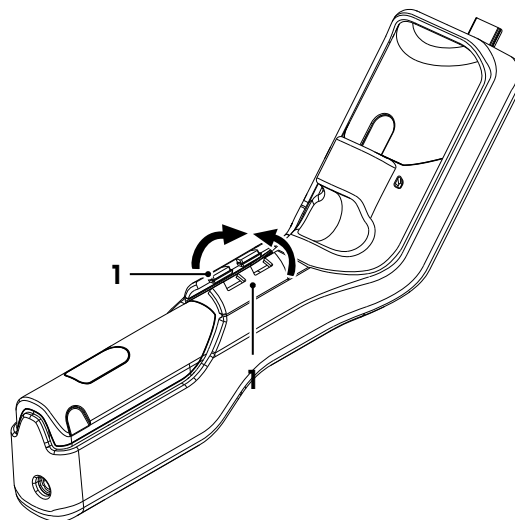
- The density meter is shut down.
- 1 Remove the filling tube.
 - 2 Remove the locking screw or the connector for the syringe.
 - 3 Slightly stretch the middle parts (1) of the cover and place the density meter into the cover.
 - 4 Push the middle parts (1) to each other so that they mesh.



- 5 Install the filling tube.
- 6 Reinstall the locking screw or the connector for the syringe.

See also

- 📖 Replace the filling tube ▶ Page 51
- 📖 Install the connector for the syringe ▶ Page 14

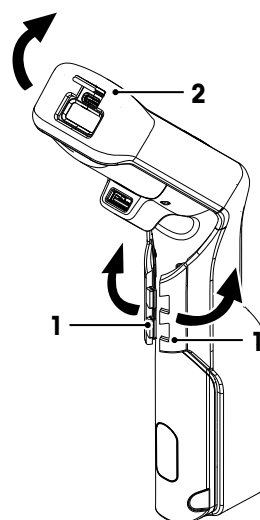


4.7.2.2 Remove the protective cover

- The density meter is shut down.
- 1 Remove the filling tube.
- 2 Remove the locking screw or the connector for the syringe.
- 3 Pull the meshed parts (1) apart.
- 4 Remove the cover from the top of the density meter (2).
- 5 Install the filling tube.
- 6 Install the locking screw or the connector for the syringe.

See also

- 📖 Replace the filling tube ▶ Page 51
- 📖 Install the connector for the syringe ▶ Page 14



4.7.3 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 a **Bluetooth** license. For more information, contact an authorized METTLER TOLEDO dealer or service representative.

See also

- 📖 Accessories ▶ Page 61

4.7.3.1 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 Connect the USB-A plug of USB cable with the USB-A socket of the printer.
 - 6 Connect the USB-A plug with the USB-A socket of the density meter.
 - 7 Switch on the printer.
- ⇒ The connection is established.

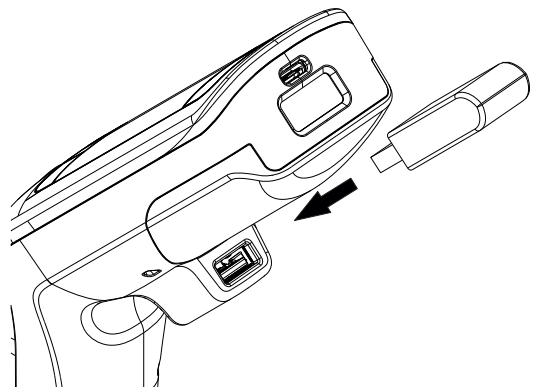
See also

- Configure the automatic printing of results ► Page 29

4.7.3.2 Connect a Bluetooth printer

The **Printer selection** window lists all **Bluetooth** printers, which are available to connect with the density meter.

- The **Bluetooth** printer is set up and running.
- 1 Insert the **Bluetooth** dongle in 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 Press the **Menu** key.
 - 7 Navigate to **Printer selection**.
⇒ The **Printer selection** window with a list of available **Bluetooth** printers opens.
 - 8 Navigate to the **Bluetooth** printer you want to connect.
 - 9 Press the **OK** key.
- ⇒ The icon  is displayed in the status ribbon.



See also

- Connect a printer ► Page 16
- Configure the automatic printing of results ► Page 29

4.7.3.3 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 16

4.7.4 Connect to EasyDirect

EasyDirect Density & Refractometry is a data management software to manage a database of measurement results. By connecting the density meter via a USB-C cable to a computer on which EasyDirect Density & Refractometry is installed, the data can be directly exported to the software.



Operating EasyDirect Density & Refractometry is described in the help of the software.

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

4.8 Configure the density meter

4.8.1 Change the date and time format

The following date formats are available:

- **dd/mm/yyyy**: day/month/year, e.g. 30/11/2018
- **mm/dd/yyyy**: month/day/year, e.g. 11/30/2018
- **yyyy/mm/dd**: year/month/day, e.g. 2018/11/30
- **dd.mm.yyyy**: day.month.year, e.g. 30.11.2018

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.

4.8.2 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 > 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.

4.8.3 Change the density unit

Three density units are available.

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

The density unit in which the measuring results are displayed can be defined.

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/cm³] is still used for adjustments and tests.

Procedure

- 1 Press the **Menu** key.
- 2 Navigate to **Settings > Global units > Density unit > 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

4.8.4 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 30 60 90 120 seconds
Auto shutdown	Defines if the density meter is shut down when no action has been performed for a given time.	Off 2 5 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.

4.8.5 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

Action	Password protected
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.

4.8.5.1 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.

4.8.5.2 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.

4.8.5.3 Change the password

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

4.8.6 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 the 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 held upside down.

4.8.7 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.

4.8.8 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.
⇒ The **Keyboard layout** window opens.

4.8.9 Change the system language

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

- 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.

4.8.10 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.

4.9 Configure density determinations

Three different types of density determinations are available.

- **Methods**: determine the density of a substance.
- **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.

4.9.1 Create, change or delete a method

4.9.1.1 Create a method

The new method is listed in the **Methods** window with the name you enter in the parameter **Method ID**. can be set with up to 25 characters to distinguish the methods from each other. 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.
- 1 Press the **Menu** key.
 - 2 Navigate to **Methods**.
⇒ The **Methods** window opens.
 - 3 Press the **New** key.
⇒ The **Method settings** window opens.
 - 4 Navigate to **Method ID** and enter a name with up to 25 characters.
 - 5 Press the **OK** key.
⇒ The method is listed in the **Methods** window.
 - 6 Change the parameters as needed.

See also

- 📖 Configure the user guidance ► Page 23
- 📖 Configure the measurement reliability ► Page 25
- 📖 Configure the result conversion ► Page 25
- 📖 Configure the automatic documentation of results ► Page 28
- 📖 Configure result limits ► Page 29

4.9.1.2 Change a method

- 1 Press the **Menu** key.
- 2 Navigate to **Methods**.
⇒ The **Methods** window opens.
- 3 Navigate to the method you want to edit.
⇒ The **Method settings** window opens.
- 4 Change the parameters as needed.

See also

- 📖 Configure the user guidance ► Page 23
- 📖 Configure the measurement reliability ► Page 25
- 📖 Configure the result conversion ► Page 25
- 📖 Configure the automatic documentation of results ► Page 28
- 📖 Configure result limits ► Page 29

4.9.1.3 Delete a method

- More than one method is created.
 - The method you want to delete is not active, marked by a square.
- 1 Press the **Menu** key.
 - 2 Navigate to **Methods**.
 - ⇒ The **Methods** window opens.
 - 3 Navigate to the method you want to delete.
 - ⇒ The **Method settings** window opens.
 - 4 Press the **Delete** key.
 - ⇒ The message **Do you want to delete the method?** is displayed.
 - 5 Navigate to **Yes**.
 - 6 Press the **OK** key.
 - ⇒ The method is no longer listed in the **Methods** window.

4.9.2 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 23
- 📖 Configure the automatic documentation of results ► Page 28
- 📖 Configure a standard ► Page 30
- 📖 Configure the tolerance for a test ► Page 30

4.9.3 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 23
- 📖 Configure the automatic documentation of results ► Page 28
- 📖 Configure a standard ► Page 30

4.9.4 Configure the user guidance

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

See also

- Change a method ► Page 22
- Change a test ► Page 23
- Change an adjustment ► Page 23

4.9.4.1 Define the level of user guidance

The **Workflow** parameter defines the level of user guidance during the measurement. 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.

See also

- Create, change or delete a method ► Page 22
- Change a method ► Page 22

4.9.4.2 Define the pump speed

The parameter **Fill speed** defines the speed of the pump for filling the measuring cell. Three speed levels are available.

Speed level	% of maximum pump speed	Fill time for water
High	80 %	Approx. 4 s
Medium	40 %	Approx. 8 s
Low	10 %	Approx. 30 s

The higher the sample viscosity the lower is the recommended fill speed.

See also

- Change a method ► Page 22

4.9.4.3 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 filled into the measuring cell during the last fill cycle 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.

See also

- Change a method ► Page 22

4.9.4.4 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 substances 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 fill and drain the measuring cell.

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

See also

- Change a method ► Page 22
- Typical phases of density determinations ► Page 33

4.9.4.5 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

- Press the **Menu** key.
- Navigate to **Settings > Measurement > Confirmation of results**.
⇒ The **Confirmation of results** window opens.
- Navigate to **Yes** to activate or **No** to deactivate the **Confirmation of results**.
- Press the **OK** key.

See also

- Define the level of user guidance ► Page 24

4.9.5 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 for 10 seconds. 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 for 10 seconds. 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

- Change a method ► Page 22

4.9.6 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 gravity

- **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.

See also

 Change a method ► Page 22

4.9.6.1 Density and specific gravity

Available conversions:

- **d**: Density at measurement temperature
- **Comp. d**: Temperature compensated density
- **SG**: Temperature compensated specific gravity
- **SG (t/t)**: Specific gravity at measurement temperature

Density at 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 based on the ISO 15212-1 standard.

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 temperature influence is compensated by the temperature coefficient α based on the following formula.

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

- d_{comp} : temperature compensated density
- d_{meas} : density at measurement temperature
- α : temperature coefficient as defined in **Alpha*1000 > Alpha entry**
- T_{meas} : measurement temperature
- T_{comp} : compensation temperature as defined in **Compensation temp.**

Temperature compensated specific gravity

$$SG = \frac{d_{comp}(\text{Sample})}{d_{comp}(\text{H}_2\text{O})}$$

- **SG**: specific gravity
- $d_{comp}(\text{Sample})$: 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**.
- $d_{comp}(\text{H}_2\text{O})$: Density of water compensated to the temperature defined in **Compensation temp. 2**

Specific gravity at measurement temperature

$$SG(t/t) = \frac{d(\text{Sample})}{d(\text{H}_2\text{O})}$$

- **SG(t/t)**: specific gravity
- **d(Sample)**: Density of the sample at the measurement temperature.
- **d(H₂O)**: Density of water compensated to the measurement temperature.

See also

 Define the temperature-compensation coefficient α ► Page 30

4.9.6.2 Alcohol concentration

Available calculations:

- **Alcohol %w/w**: Mass percent
- **Alcohol %v/v 60°F**: Volume percent, compensated to 60 °F
- **Alcohol %v/v 20°C**: Volume percent, compensated to 20 °C
- **Proof (US) @ 60°F**: Proof degree with US unit, compensated to 60 °F
- **Proof (IP) @ 60°F**: Proof degree with IP unit, compensated to 60 °F

4.9.6.3 American Petroleum Institute (API)

The conversion of the measured value to the selected result 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** defines to which of the following formats the result is converted:

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

4.9.6.4 Baumé scale

Available conversions:

- **Heavy Baumé 15°C**: for densities > 1 g/cm³, compensated to 15 °C
- **Light Baumé 15°C**: for densities < 1 g/cm³, compensated to 15 °C
- **Heavy Baumé 60°F**: for densities < 1 g/cm³, compensated to 60 °F
- **Light Baumé 60°F**: for densities < 1 g/cm³, 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 30

4.9.6.5 Sulphuric acid concentration

Available conversions:

- **H₂SO₄ %w/w**: Concentration of sulfuric acid in [%] by weight.
- **d H₂SO₄ 20°C**: Density of sulfuric acid or battery acid at 20 °C.

4.9.6.6 Sugar concentration

Available conversions:

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

4.9.7 Configure the automatic documentation of results

See also

- 📖 Change a method ► Page 22
- 📖 Change a test ► Page 23
- 📖 Change an adjustment ► Page 23

4.9.7.1 Configure the sample or standard identification

For methods, the parameters **Sample ID entry** and **Sample ID** are available to configure the identification of results.

For tests, the parameters **Standard ID entry** and **Standard ID** are available to configure the identification of results.

Automatic numbering is only available for methods.

Action of the system	Sample ID entry Standard ID entry	Sample ID Standard ID
No identification is assigned to the result.	None	Not available
No unique identification is assigned to the results. • The identification you define in the parameter Sample ID is used for all results of the method. • The identification you define in the parameter Standard ID is used for all results of the test.	Fixed	0...25 characters
Users enter the identification before the density measurement starts. Users enter the identification manually. With a DensitoPro users can read the identification with the barcode/RFID reader and confirm the read value. • Guided density determination: users are prompted to enter the identification when the method starts. The density determination continues when the user has entered a valid sample ID. • Unguided density determination: Users have to enter the identification without a prompt before the measurement starts. If they do not enter an identification, the identification of the previous result or no identification is used.	Variable	Not available
An automatically generated identification is assigned to the result. The identification automatically increases by 1, when a new measurement is started with the same method.	Automatic numbering	Not available

See also

- 📖 Change a method ► Page 22

4.9.7.2 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	Short report	Long report
Method ID	•	•
Sample ID	•	•
Status	•	•
Density	•	•
Temp.	•	•
Date / Time	•	•
SNR	—	•

See also

- 📖 Change a method ▶ Page 22
- 📖 Connect a printer ▶ Page 16

4.9.7.3 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 ▶ Page 18

4.9.8 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**.

See also

- 📖 Change a method ▶ Page 22

4.9.9 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 ?? 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

- 📖 Change a test ► Page 23
- 📖 Change an adjustment ► Page 23
- 📖 Define the temperature-compensation coefficient α ► Page 30

4.9.10 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: $2 \cdot (\text{instrument resolution}) + \text{operator repeatability}$
- Certified organic standards with a high temperature-compensation coefficient: uncertainty of the standard + limit of error of instrument + temperature error + operator repeatability

See also

- 📖 Change a test ► Page 23

4.9.11 Define the temperature-compensation coefficient α

The density meter uses the temperature-compensation coefficient α to convert a 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 polynomial:** the density meter calculates α based on a second order polynomial using coefficients that users enter.

4.9.11.1 Enter a known value for α

- The result of $\alpha \cdot 1000$ 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 $\alpha \cdot 1000$.
- 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.
$$\alpha = \left(\frac{d_2}{d_1} - 1 \right) / (T_1 - T_2)$$
- 4 Calculate the result of $\alpha * 1000$.

Example

Density at 26 °C (T_1) = 0.7844 g/cm³

Density at 15 °C (T_2) = 0.7937 g/cm³

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

$$\alpha = ((1.011856 - 1) / 11) = 0.011856 / 11 = 0.001078$$

$$\alpha * 1000 = 1.078$$

4.9.11.2 Density meter calculates a fixed value for α

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

4.9.11.3 Define the second order polynomial used to calculate α

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

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

- The three coefficients a, b and c are known.
- 1 Navigate to **Alpha*1000** > **Alpha entry** and select **2nd order polynomial**.
 - 2 Press the **OK** key.
 - 3 Enter the values for the coefficients a, b and c.

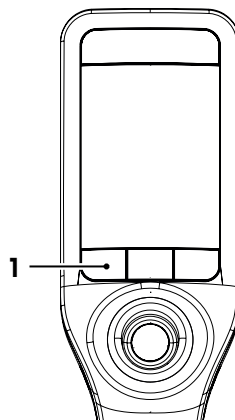
Calculate the coefficients a, b and c

- 1 Prepare solutions with different concentrations.
- 2 Define two temperatures, one above and 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.

5 Operation

5.1 Start up the density meter

- Press Key 1 (1).
 - ⇒ A short beep is played.
 - ⇒ A welcome message is displayed.
- ⇒ The home screen opens. The density meter is ready to use.



5.2 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.
 - ⇒ The dialog **Do you want to shut down the instrument?** opens.
- 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.

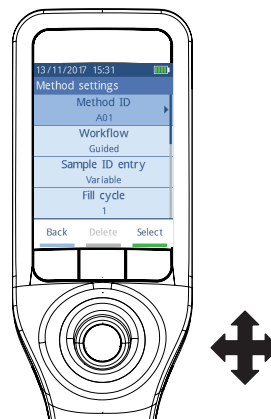
See also

- 📖 Activate and deactivate a cleaning reminder ► Page 21

5.3 Navigate and enter information

5.3.1 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.

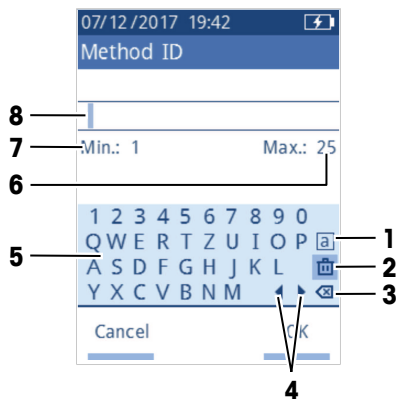
Shortcut to the method list

- The home screen is open.
- Move the navigation joystick to the left.

5.3.2 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		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.
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 21

5.4 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.

5.4.1 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. This is only possible if the residue is soluble in 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 low and medium viscosity. Syringes are typically used if the viscosity of the samples is above 200 mPa.

See also

-  Example: Density determination using the sample pump ► Page 34
-  Example: Density determination using a syringe ► Page 37
-  Example: Density determination of cold or hot samples ► Page 39

5.4.2 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 drain the measuring cell or if you need to rinse it.

Drain

If the next sample dissolves the sample you just measured, you can drain the cell.

Rinse

If the next sample does not dissolve the sample you just measured, you have to rinse the measuring cell with a solvent. The cleaning solution must dissolve the sample that was 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 46

5.5 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).

Summary of the configuration

- Guided density determination
- Filling and draining with the sample pump
- Evaluation if result lies within specified limits

You can find more information about the configuration of a method in the chapter [Configure density determinations ► Page 22].

5.5.1 Configure the method

- The density unit is set to [g/cm³].
 - **Confirmation of results** in **Settings** is activated.
- 1 Press the **Menu** key.
 - 2 Navigate to **Methods**.
 - ⇒ The **Methods** window opens.
 - 3 Press the **New** key.
 - ⇒ The **Method settings** window opens.

- 4 Navigate to **Method ID** and enter a name with up to 25 characters.
- 5 Press the **OK** key.
 - ⇒ The method is listed in the **Methods** window.
- 6 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 sample ID 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 pump speed.
Measurement reliability	Medium	The result is saved as soon as the measured temperature value stays within 0.4 °C 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/cm ³	Defines the lower limit of the range.
Upper limit	0.9977 g/cm ³	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 19
- 📖 Activate and deactivate the confirmation of results ► Page 25
- 📖 Configure density determinations ► Page 22

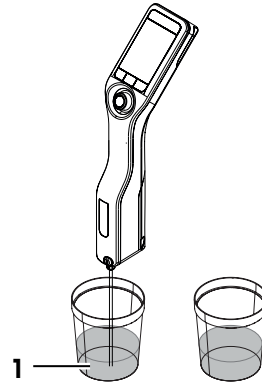
5.5.2 Perform the density determination

Start the method

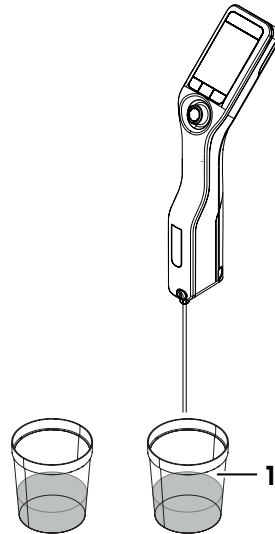
- The density meter is set up to work with the sample pump.
 - The piston is in the lowermost position.
- 1 Press the **Menu** key.
 - 2 Navigate to **Methods**.
 - 3 Navigate to the method you want to use and press the **Start** key.
 - ⇒ The home screen opens.
 - 4 Press the **Start** key.
 - ⇒ The **Sample ID** window opens.
 - 5 Enter the identification.
 - 6 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 starts and stops when the piston is in the uppermost position.

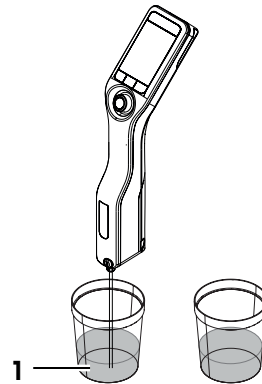


- 3 Hold the filling tube over the waste beaker (1).
- 4 Press the **OK** key.
 - ⇒ The sample pump starts and stops when the piston is in the lowermost position.
- 5 Clean the end of the filling tube with a clean tissue.
- 6 Repeat the steps once.



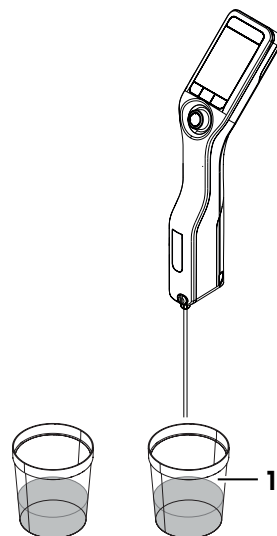
Fill the measuring cell and measure the density

- 1 Immerse the filling tube into the sample (1).
- 2 Press the **OK** key.
 - ⇒ The sample pump starts and stops when the piston is in the 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 starts and stops when the piston is in the lowermost position.
- 3 Clean the end of the filling tube with a clean tissue.



5.6 Example: Density determination using a syringe

The following chapters show you how to configure and perform a density determination of a viscose sample like 40 % w/w sugar solution at room temperature (23 °C).

Summary of the configuration

- Guided density determination
- Filling and draining with a syringe

You can find more information about the configuration of a method in the chapter [Configure density determinations ► Page 22].

5.6.1 Configure the method

- **Confirmation of results** in **Settings** is activated.
- 1 Press the **Menu** key.
 - 2 Navigate to **Methods**.
⇒ The **Methods** window opens.
 - 3 Press the **New** key.
⇒ The **Method settings** window opens.
 - 4 Navigate to **Method ID** and enter a name with up to 25 characters.
 - 5 Press the **OK** key.
⇒ The method is listed in the **Methods** window.
 - 6 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 sample ID 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 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 25

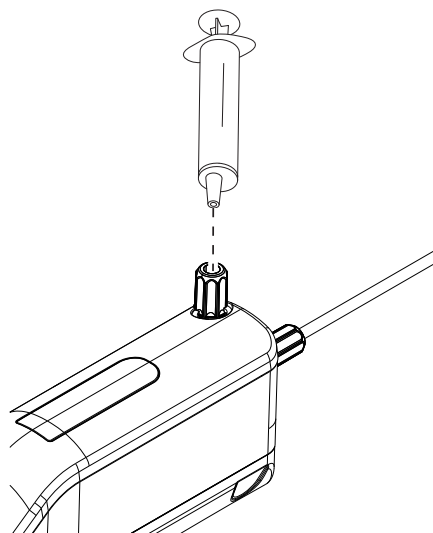
5.6.2 Perform the density determination

Start the method

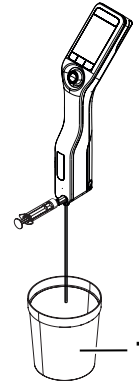
- The density meter is set up to work with a syringe.
 - The measuring cell is drained.
- 1 Press the **Menu** key.
 - 2 Navigate to **Methods**.
 - 3 Navigate to the method you want to use and press the **Start** key.
 - ⇒ The home screen opens.
 - 4 Press the **Start** key.
 - ⇒ The **Sample ID** window opens.
 - 5 Enter the identification.
 - 6 Press the **OK** key.

Fill the measuring cell and measure the density

- 1 Fill the 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.
 - ⇒ The sample flows with a laminar flow into the measuring cell.
- 5 Push approximately 6 ml of the sample through the measuring cell.
- 6 Leave the syringe in the connector.
- 7 Make sure there are no bubbles in the measuring cell.
- 8 Press the **OK** key.

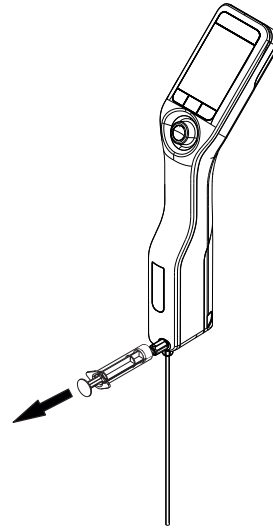


- ⇒ The measurement starts.
- ⇒ When the background of the measuring ribbon changes color, the measurement is finished.
- ⇒ The measured value is saved in the results.

- 9 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.



5.7 Example: Density determination of cold or hot samples

The following chapters show you how to configure and perform a density determination of deionized water that is more than 5 °C warmer or colder than ambient temperature.

Summary of the configuration

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

You can find more information about the configuration of a method in the chapter [Configure density determinations ► Page 22].

5.7.1 Configure the method

- The density unit is set to [g/cm³].
 - **Confirmation of results** in **Settings** is activated.
- 1 Press the **Menu** key.
 - 2 Navigate to **Methods**.
 - ⇒ The **Methods** window opens.

- 3 Press the **New** key.
⇒ The **Method settings** window opens.
- 4 Navigate to **Method ID** and enter a name with up to 25 characters.
- 5 Press the **OK** key.
⇒ The method is listed in the **Methods** window.
- 6 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 identification before they start the measurement.
Fill speed	High	The pump fills the measuring cell with 80 % of the pump speed.
Measurement reliability	Medium	The result is saved as soon as the measured temperature value stays within 0.4 °C 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	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 25

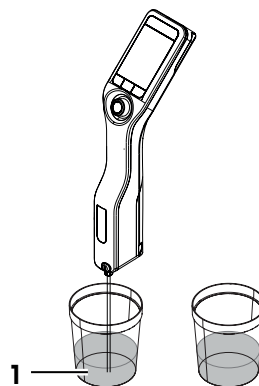
5.7.2 Perform the density determination

Start the method

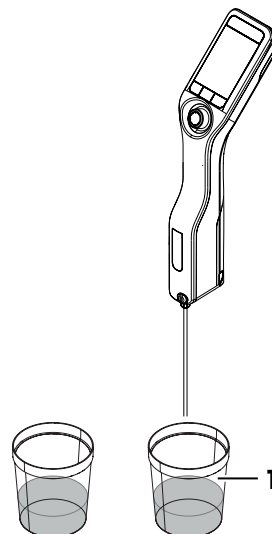
- The density meter is set up to work with the sample pump.
 - The measuring cell is drained.
 - The piston is in the lowermost position.
- 1 Press the **Menu** key.
 - 2 Navigate to **Methods**.
 - 3 Navigate to the method you want to use and press the **Start** key.
⇒ The home screen opens.
 - 4 To enter a **Sample ID**, move the navigation joystick to the right.
⇒ The **Sample ID** window opens.
 - 5 Enter the identification.
 - 6 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 starts and stops when the piston is in the uppermost position.

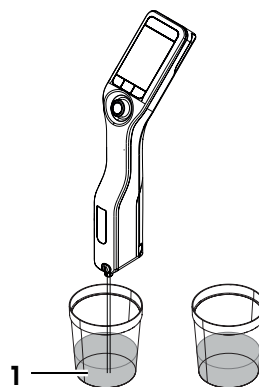


- 3 Hold the filling tube over the waste beaker (1).
- 4 Move the navigation joystick downwards and let go.
⇒ The sample pump starts and stops when the piston is in the lowermost position.
- 5 Clean the end of the filling tube with a clean tissue.
- 6 Repeat the steps once.



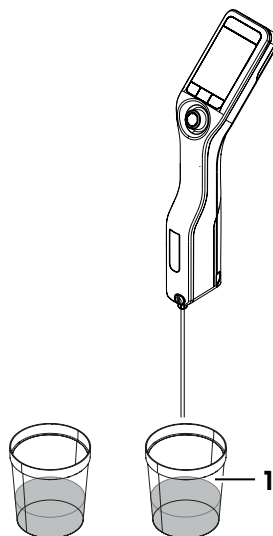
Fill the measuring cell and measure the density

- 1 Immerse the filling tube into the sample (1).
- 2 Move the navigation joystick upwards and let go.
⇒ The sample pump starts and stops when the piston is in the 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 temperatures and 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 starts and stops when the piston is in the lowermost position.
- 3 Clean the end of the filling tube with a clean tissue.



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

With the RFID reader, you can read or write identifications for samples or standards to Smart Tags. The RFID reader only recognizes the following characters.

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

5.8.1 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 Navigate to the desired character and press the navigation joystick to confirm the selection.
 - 4 Hold the RFID reader over a Smart Tag and wait until an audio signal is played.
⇒ The notification **RFID tag is written** is displayed.
⇒ The identification is saved on the Smart Tag.

See also

 Activate and deactivate the RFID reader (DensitoPro only) ► Page 13

5.8.2 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.
⇒ If there is no information on the **RFID** tag, the notification **No data on RFID tag** is displayed.

See also

 Activate and deactivate the RFID reader (DensitoPro only) ► Page 13

5.9 Read information with the barcode reader (DensitoPro only)

With the barcode reader, you can read identifications 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.
- When you are prompted to enter an identification, press the **Barcode** key and hold the barcode reader over the barcode.
- ⇒ An audio signal is played and the identification is saved.

See also

 Activate and deactivate the barcode reader (DensitoPro only) ► Page 13

5.10 View, export, print and delete results

5.10.1 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.

5.10.2 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.

5.10.3 Export and print results

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

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

See also

-  Accessories ► Page 61
-  Connect to EasyDirect ► Page 18
-  Connect a printer ► Page 16

5.10.3.1 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

- 📖 Connect to EasyDirect ► Page 18
- 📖 Configure the filter ► Page 45

5.10.3.2 Print results

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

Information	Short report	Long report
Method ID	•	•
Sample ID	•	•
Status	•	•
Density	•	•
Temp.	•	•
Date / Time	•	•
SNR	—	•

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

- 📖 Connect a printer ► Page 16
- 📖 Configure the filter ► Page 45

5.10.3.3 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 EasyDirect Density & Refractometry ► Page 44
- 📖 Print results ► Page 44

6 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 dealer or service representative.

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

► www.mt.com/contact

6.1 Maintenance schedule

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

Frequency	Task	See
Daily	Clean the measuring cell at the end of the work day.	[Clean the measuring cell ► Page 46]
	Perform a test with deionized water.	[Check the measurement accuracy ► Page 48]

See also

► Activate and deactivate a cleaning reminder ► Page 21

6.2 Clean the density meter



NOTICE

Danger of 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.

6.2.1 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.

6.2.2 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 agents:

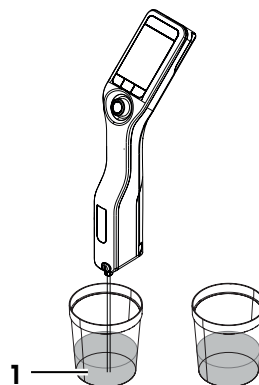
Sample	Cleaning solution
Water	Deionized water
Water based	
Acids, concentrated	Water (flush the measuring cell with plenty of water to remove the heat from the reaction of water and acid)
Alkaline, concentrated	0.3...0.5 % deconex solution
Samples with fats or oily components	0.3...0.5 % deconex solution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

See also

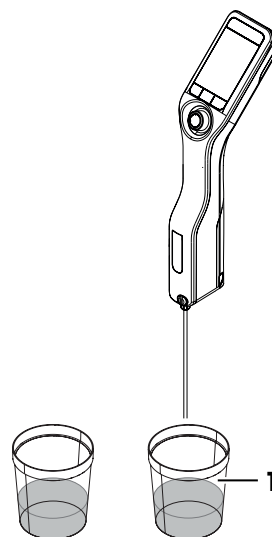
📄 Activate and deactivate a cleaning reminder ► Page 21

6.2.2.1 Clean using the sample pump

- The density meter is set up to work with the sample pump.
 - The cleaning solution is defined.
 - The piston is in the lowermost position.
- 1 Immerse the filling tube in the cleaning solution.
 - 2 Move the navigation joystick upwards and let go.
 - ⇒ The sample pump starts and stops when the piston is in the uppermost position.

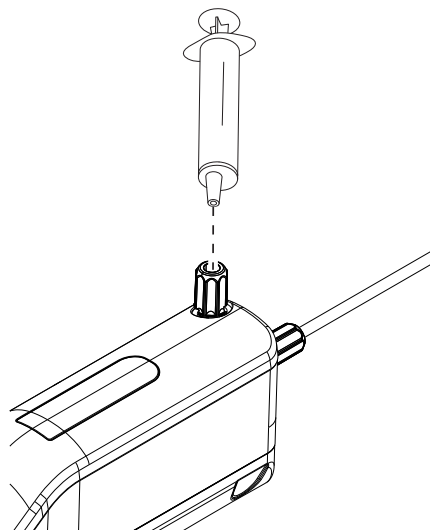


- 3 Lift the filling tube out of the cleaning solution and hold it over the waste beaker (1).
- 4 Move the navigation joystick downwards and let go.
 - ⇒ The sample pump starts and stops when the piston is in the lowermost position.
- 5 Clean the end of the filling tube with a clean tissue.
- 6 Repeat 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.

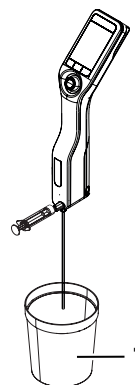


6.2.2.2 Clean using a syringe

- The density meter is set up to work with a syringe.
 - The cleaning solution is defined.
 - The measuring cell is drained.
- 1 Fill the 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.



6.2.3 Clean the protective cover

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

📖 Clean the housing ► Page 46

6.3 Check the measurement accuracy

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

You can find more information about the configuration of a test in the chapter [Configure density determinations ► Page 22].

6.3.1 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).

6.3.1.1 Configure the test

- The density unit is set to [g/cm³].
 - **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 identification 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 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 25
- 📖 Change the density unit ► Page 19

6.3.1.2 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 identification.
 - 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 starts and stops when the piston is in the uppermost position.
- 3 Hold the filling tube over the waste beaker.
- 4 Press the **OK** key.
 - ⇒ The sample pump starts and stops when the piston is in the 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 starts and stops when the piston is in the 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 starts and stops when the piston is in the lowermost position.
- 3 Clean the end of the filling tube with a clean tissue.

6.3.2 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 the 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.

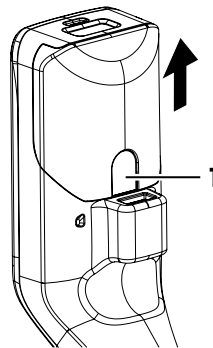
See also

- 📖 Clean the measuring cell ▶ Page 46
- 📖 Restore the factory adjustment data ▶ Page 54
- 📖 Adjust the measurement accuracy ▶ Page 54

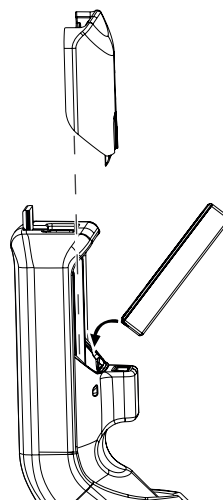
6.4 Replace the battery

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

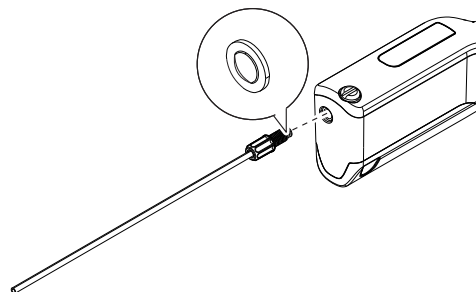
- Accessories ► Page 61
- Technical data ► Page 58

6.5 Replace the filling tube

- Screw the filling tube by hand clockwise to detach the filling tube.
- ⇒ The filling tube is detached.

See also

- Accessories ► Page 61

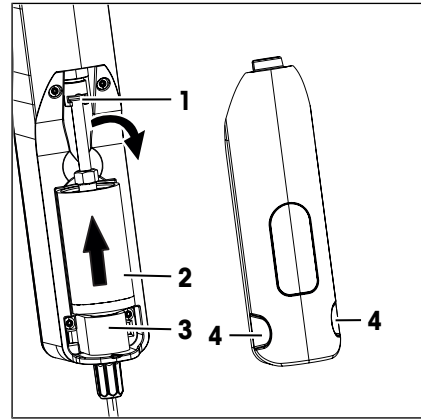


6.6 Replace the sample pump

Remove the cover of the sample pump

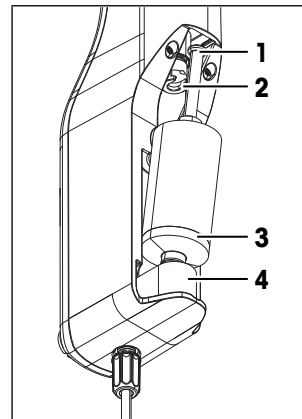
- The measuring cell is drained.
- 1 Move the navigation joystick upwards and let go.
 - ⇒ The sample pump starts and stops when the piston is in the uppermost position.
- 2 Shut down the density meter.

- 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).



Insert the sample pump

- 1 Insert the cylinder (3) of the sample pump in its guide system (4).
- 2 Insert the piston (1) in its guide system (2).
- 3 To check if the sample pump works, move the navigation joystick downwards and let go.
 - ⇒ The sample pump starts and stops when the piston is in the lowermost position.
- 4 Reinstall the cover of the sample pump.



See also

Accessories ► Page 61

6.7 Update the firmware

It is possible to update the firmware of your density meter. To update the firmware of the density meter, contact an authorized METTLER TOLEDO dealer or service representative.

► www.mt.com/contact

6.8 Prepare the density meter for storage

The density meter can be stored at temperatures of $-20\text{ }^{\circ}\text{C} \dots +50\text{ }^{\circ}\text{C}$. 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 46

6.9 Transport the density meter

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

► www.mt.com/contact

- 1 Shut down the density meter.
- 2 Disconnect the instrument from the power supply.

- 3 Disconnect any accessories from the instrument.
- 4 Clean the instrument.
- 5 If you transport the instrument over long distances, use the original packaging.
- 6 Move the instrument to the new location.

6.10 Dispose of the instrument

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 (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.



7 Troubleshooting

7.1 List of errors and problems

Problem	Possible cause	Measure
The pump does not aspirate any liquid.	The locking screw is not installed.	– Install the locking screw.
Test of measurement accuracy fails.	The measuring is cell not clean.	
	Mismatch between measured and configured standard	
	The tolerance range is too small.	
	The density meter is not adjusted correctly.	
The message "Drain the cell" is displayed when I try to start a method.	The piston is not in the lowermost position.	1 Hold the filling tube over the waste beaker.
		2 Move the navigation joystick downwards and let go. ⇒ The sample pump starts and stops when the piston is in the lowermost position.
		3 Clean the end of the filling tube with a clean tissue.
There are bubbles in the measuring cell.	Bubbles were in the syringe.	
	Fill speed is too high.	
	The liquid contains dissolved gases.	
	Connector for syringe or filling tube is not tight.	

7.2 Restore the factory adjustment data

If you restore the factory adjustment data, the current adjustment data is overwritten with the adjustment data that were determined when the density meter was adjusted during production.

- 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.

7.3 Adjust the measurement accuracy



NOTICE

Danger of incorrect results due to incorrect adjustment!

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

- 1 Make sure the results of the test are repeatable.
- 2 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.

You can find more information about the configuration of an adjustment in the chapter [Configure density determinations ► Page 22].

See also

📄 Measures if a test fails ► Page 50

7.3.1 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).

7.3.1.1 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 identification 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 pump speed.
Clean	Drain	Users are prompted to drain the measuring cell.
Printout	None	The result is not printed.

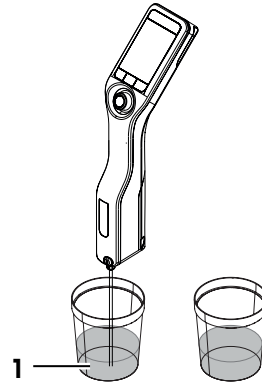
7.3.1.2 Perform the adjustment

Start the adjustment

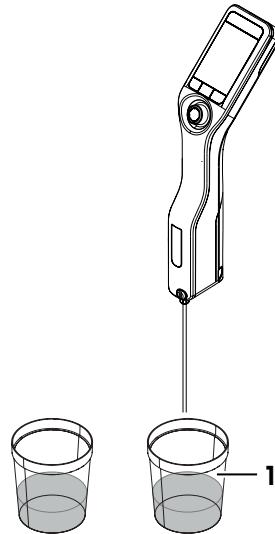
- The density meter is set up to work with the sample pump.
 - The measuring cell has been cleaned.
 - The piston is in the lowermost position.
- 1 Press the **Menu** key.
 - 2 Navigate to **Adjustment**.
⇒ The **Adjustment** window opens.
 - 3 Press the **Start** key.
⇒ The home screen opens.
 - 4 Press the **Start** key.
⇒ The **Standard ID** window opens.
 - 5 Enter the identification.
 - 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 starts and stops when the piston is in the uppermost position.

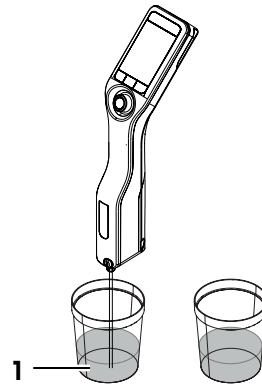


- 3 Hold the filling tube over the waste beaker (1).
- 4 Press the **OK** key.
 - ⇒ The sample pump starts and stops when the piston is in the lowermost position.
- 5 Clean the end of the filling tube with a clean tissue.
- 6 Repeat the steps once.



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 starts and stops when the piston is in the 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.

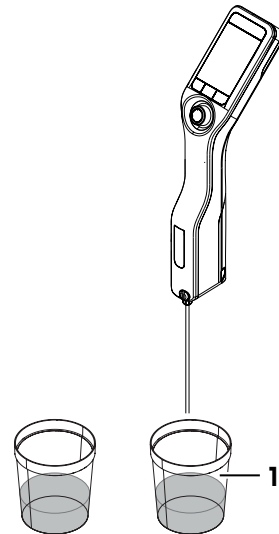


Drain the measuring cell

- 1 Hold the filling tube over the waste beaker (1).
- 2 Press the **OK** key.
 - ⇒ The sample pump starts and stops when the piston is in the lowermost position.
- 3 Clean the end of the filling tube with a clean tissue.

See also

- 📄 Activate and deactivate the confirmation of results ► Page 25



7.4 Reset to factory settings



NOTICE

Loss of data

With a factory reset all user-specific settings will be set to standard. Also all data memories (e.g. sample IDs, results, Method IDs and adjustment data) will be deleted.

- 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 Technical data

8.1 Density meter

Characteristic		Value
Power rating instrument	Input values	5 V DC, 1.0 A
	Connector type	USB C
Power rating AC 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
Dimensions	Width	56 mm
	Length	288 mm
	Depth	162 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 (polyester)
	Measuring cell	Borosilicate glass
	Parts in contact when working with sample pump	PTFE (polytetrafluorethylene) PVDF EPDM FFKM
	Filling tube	PTFE (polytetrafluorethylene)
	Connector for filling tube or syringe	PP (polypropylene)
Ambient conditions	Ambient temperature	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
	Use	In interior spaces
	Overvoltage category	II
	Pollution degree	2
Storage conditions	Temperature	-20 °C...+50 °C

SVHC candidate substances according to REACH (Article 33)

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

Directives and standards

Directives and standards complied with are listed on the declaration of conformity.

International standards and norms complied with are listed on the internet.

► www.mt.com/dere-norms

8.2 Measurement

Characteristic		Value
Density	Measuring range	0.000...3.000 g/cm ³
	Accuracy	± 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
Volumes	Sample pump	
	Sample	2 mL
Temperature compensation		Automatic or by using a user-defined temperature correction coefficient
Application	Max. number of methods	30
	Stored results	1100

Measurement scales

Characteristic		Value
Brix (d) wt%	Range	0.0...84.0 %
	Accuracy	±0.3 %
Ethanol (d) wt%	Range	0.0...100.0 %
	Accuracy	±1.0 %
Ethanol (d) vol%	Range	0.0...100.0 %
	Accuracy	±1.0 %
H₂SO₄ wt%	Range	0.0...100.0 %
	Accuracy	±1.0 %
Light Baumé	Range	10...100 °Baumé
	Accuracy	±0.4 °Baumé
Heavy Baumé	Range	0...72 °Baumé
	Accuracy	±0.1 °Baumé
Plato	Range	0.0...20.0 %
	Accuracy	±0.3 %
Proof (US)	Range	0.0...200.0
	Accuracy	±2.0
Proof (IP)	Range	0.0...175.0
	Accuracy	±1.75

Characteristic		Value
API	Range	0.0...100 °API
	Accuracy	±1.0 °API

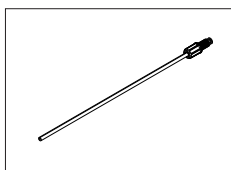
9 Accessories

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

All parts are specified with their order number and quantity in cases where more than one part is included. When ordering, some parts are only available in a minimum order quantity. In such cases, the corresponding minimum order quantity is quoted.

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

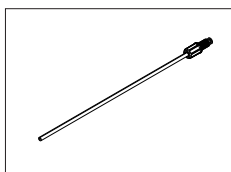
9.1 Sampling



Filling Tube
190 mm

30330847

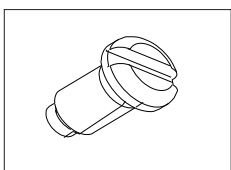
- Tube
- Connector syringe/filling tube
- Washer



Filling tube
600 mm

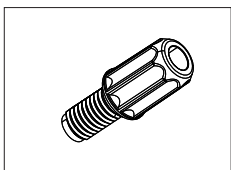
30330848

- Tube
- Connector syringe/filling tube
- Washer



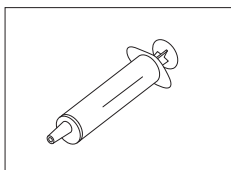
Locking Screw, Densito

30330852



Connector syringe/filling tube

30330853



Disposable syringe (100 pcs)
10 mL

51338100



Sample pump

30330849

- Piston
- Glass cylinder



Sample pump cover

30330851

9.2 Printers



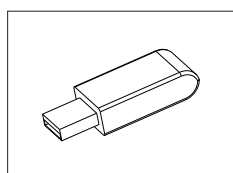
Bluetooth Printer Godex MX20 with Dongle

30330864



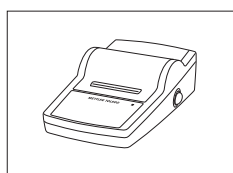
Bluetooth Printer Paper

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Bluetooth Dongle Godex MX20

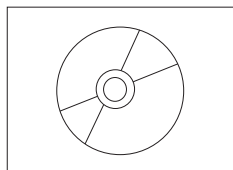
30330863



Lab equip access. data writer USB-P25/01

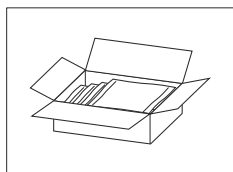
11124301

9.3 Miscellaneous accessories



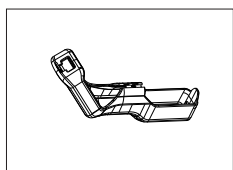
EasyDirect Density & Refractometry PC Software

30451628



Density standards (10 pcs)
6 mL

51325005



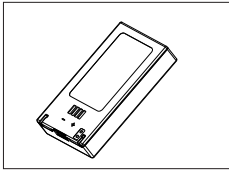
Protective Cover

30330860



Carrying Case

30330861



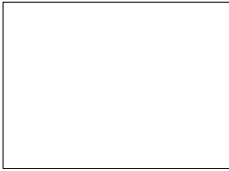
Battery Lilon 2400mAh

30330855



Battery cover

30330854



USB-C Cable

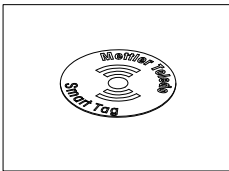
30449253



Power Supply and Worldwide Adapters

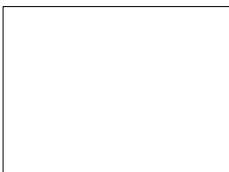
30449255

Accessories for DensitoPro



Tag SmartSample (10 pcs)

30449268



Tag SmartSample Film for Tanks, 10 pcs

30449269

10 Appendix

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To protect your product's future:

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

Please request full details about our attractive terms of service.

www.mt.com/density2go

For more information

Mettler-Toledo GmbH

Im Langacher 44
8606 Greifensee, Switzerland
www.mt.com/contact

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