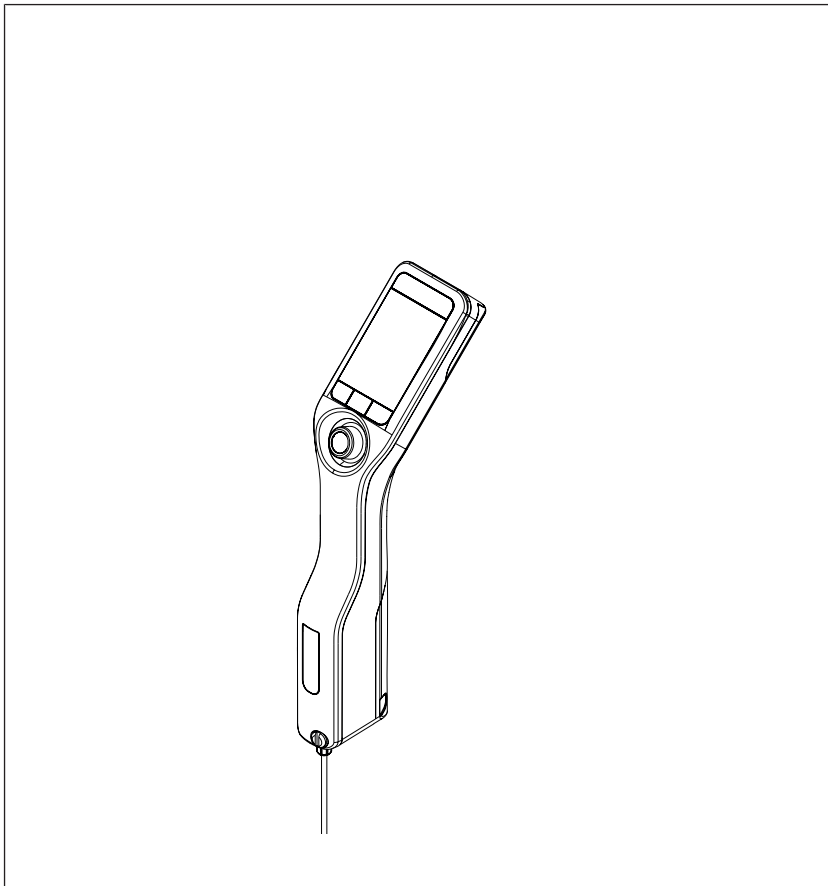


# Handheld Density Meter

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

This document provides you with the information you need to get started with your METTLER TOLEDO handheld density meter.

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



For a full description of the handheld density meter and its functions, refer to the Reference Manual, supplied as PDF file online.

► [www.mt.com/library](http://www.mt.com/library)

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

► [www.mt.com/contact](http://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

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

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

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



User Manual and Reference Manual are available online.

► [www.mt.com/library](http://www.mt.com/library)

## 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 the 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.

### FCC Rules

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.

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

### Responsibilities of the instrument owner

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

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

## Safety notes



### **WARNING**

#### **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**

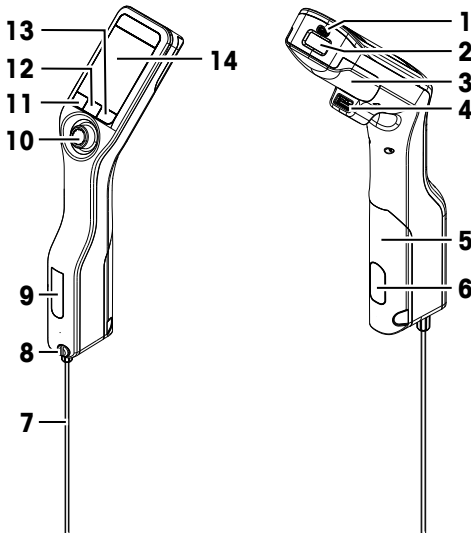
#### **Risk of damage to the instrument due to the use of unsuitable parts!**

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

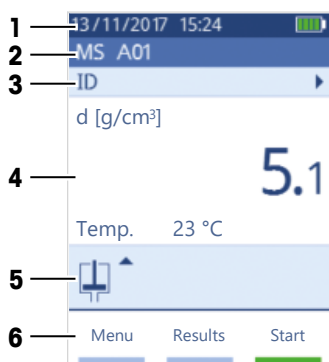


| No. | Name   | Function  |
|-----|--|---|
| 1   | USB-C socket                                     | To connect the density meter with the AC adapter or a computer.             |
| 2   | RFID reader and barcode reader (DensitoPro only) | To scan a linear barcode or read and write information to Smart 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 if the sample pump is filled or empty. |

| No. | Name                               | Function  |
|-----|------------------------------------|---|
| 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 1                              | To start up the density meter, select menu items and to navigate.                                       |
| 12  | Key 2                              | To select menu items and to navigate.   |
| 13  | Key 3                              | To select menu items and to navigate.   |
| 14  | Screen                             | To display settings and results.  |

## 3.2 User interface

### 3.2.1 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. <ul style="list-style-type: none"> <li>• <b>MS</b>: measurement using a method</li> <li>• <b>TE</b>: test</li> <li>• <b>ADJ</b>: adjustment</li> </ul> |
| 3   | Sample ID ribbon     | Displays the sample ID.   |
| 4   | Measuring ribbon     | Displays the unit, the measured value or result and the temperature of the measuring cell.  |
| 5   | Sampling ribbon      | Displays the current status of the sample pump or syringe.  |
| 6   | Key functions ribbon | Displays the function of the keys.  |

### 3.2.2 Icons on the screen




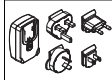

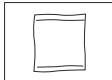


| Icon | Location      | Explanation                        |
|------|---------------|------------------------------------|
|      | Status ribbon | Barcode reader is scanning.        |
|      | Status ribbon | RFID reader is reading or writing. |





| Icon  | Location        | Explanation   |
|---|-----------------|---|
|  | 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<br>190 mm<br><ul style="list-style-type: none"> <li>• Tube</li> <li>• Connector syringe/filling tube</li> <li>• Washer</li> </ul> | 30330847     | •       | •          |
|  Battery Li-Ion<br>2400mAh  | 30330855     | •       | •          |
|  Power Supply and Worldwide<br>Adapters  | 30449255     | •       | •          |
|  USB-C Cable  | 30449253     | •       | •          |
|  Density standards (3 pcs)<br>6 mL  | 51325005     | •       | •          |
|  Tag SmartSample (10 pcs)   | 30449268     | –       | •          |
|  User Manual  | –            | •       | •          |

| Part  |                           | Order number | Densito | DensitoPro |
|---|---------------------------|--------------|---------|------------|
|  | Declaration of conformity | –            | •       | •          |
|  | Test report               | –            | •       | •          |

## 4.2 Unpack the density meter

- 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.

## 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**

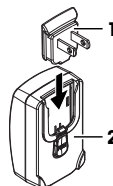
##### **Danger of damage to the AC adapter due to overheating!**

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.



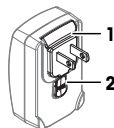
### Connect the density meter to the power supply

- 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 prongs 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.

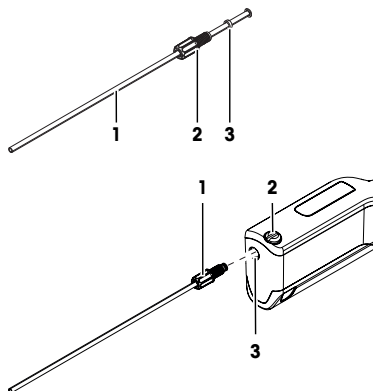
## 4.4 Setup for working with the sample pump

### 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.

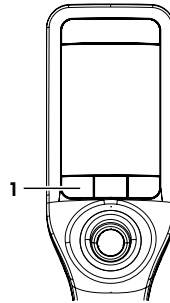
## 4.6 Activate and deactivate the barcode reader (DensitoPro only)

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

## 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.



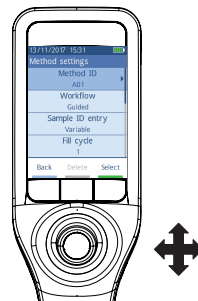
### 5.2 Shut down the density meter

- 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.

## 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.

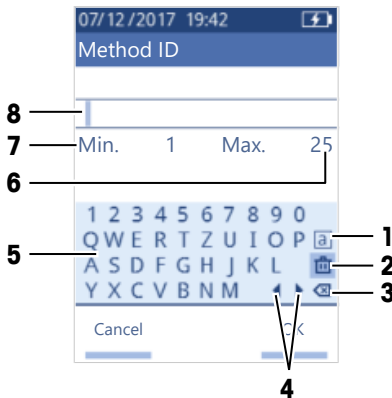
### Shortcut to the method list

- The home screen is open.
- Move the navigation joystick to the left.
  - ⇒ The **Methods** window opens.

### 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.                                      |

### 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 a viscosity up to 100 mPa\*s. Syringes are typically used if the viscosity of the samples is above 100 mPa\*s.



You can find more information on working with the syringe in the Reference Manual.

► [www.mt.com/library](http://www.mt.com/library)

#### See also

📖 Example: Density determination using the sample pump ► Page 12

### 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 cleaning solution. The cleaning solution must dissolve the sample that you just measured and the next sample. When you rinse the measuring cell, the cleaning solution removes the residue from the original sample.

#### See also

📖 Clean the measuring cell ► Page 15

### 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 or 73.4 °F).

#### Summary of the configuration

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



You can find more information about the configuration of a method in the Reference Manual.

► [www.mt.com/library](http://www.mt.com/library)

#### 5.5.1 Configure the method

- The density unit is set to [g/cm<sup>3</sup>].
  - **Confirmation of results** in **Settings** is activated.
  - The home screen is open.
- 1 Move the navigation joystick to the left.
    - ⇒ The **Methods** window opens.
  - 2 Press the **New** key.
    - ⇒ The **Method settings** window opens.

- 3 Navigate to **Method ID** and enter a name with up to 25 characters.
- 4 Press the **OK** key.
  - ⇒ The method is listed in the **Methods** window.
- 5 Change the parameter settings to the values shown in the following table.

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

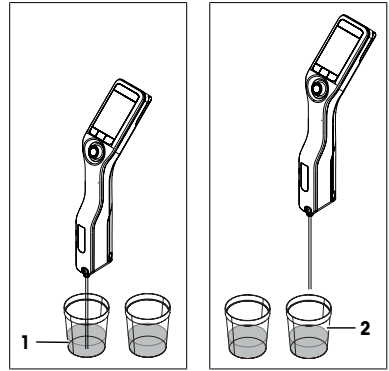
## 5.5.2 Perform the density determination

### Start the method

- The density meter is set up to work with the sample pump.
  - The piston is in the lowermost position.
  - The home screen is open.
- 1 Move the navigation joystick to the left.
  - 2 Navigate to the method you want to use and press the **Start** key.
    - ⇒ The home screen opens.
  - 3 Press the **Start** key.
    - ⇒ The **Sample ID** window opens.
  - 4 Enter the identification.
  - 5 Press the **OK** key.

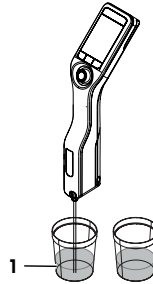
### Rinse the measuring cell

- 1 Immerse the filling tube into the sample (1).
- 2 Press the **OK** key.
  - ⇒ The sample pump starts and stops when the piston is in the uppermost position.
- 3 Hold the filling tube over the waste beaker (2).
- 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.



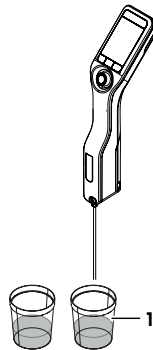
### Fill the measuring cell and measure the density

- 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.



## 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](http://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 15]       |
|           | Perform a test with deionized water.                 | [Check the measurement accuracy ► Page 16] |

## 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.

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

► [www.mt.com/contact](http://www.mt.com/contact)

### 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.

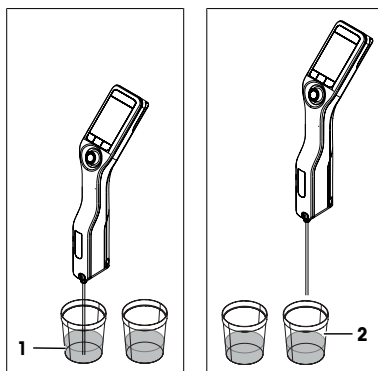
METTLER TOLEDO recommends the following cleaning agents:

| Sample      | Cleaning solution |
|-------------|-------------------|
| Water       | Deionized water   |
| Water based |                   |

| Sample                               | Cleaning solution  |
|--------------------------------------|--|
| 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                 |  |

### 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 and available.
  - The piston is in the lowermost position.
- 1 Immerse the filling tube in the cleaning solution (1).
  - 2 Move the navigation joystick upwards and let go.
    - ⇒ The sample pump 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 (2).
  - 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.



## 6.3 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 Reference Manual.

► [www.mt.com/library](http://www.mt.com/library)

### 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 or 73.4 °C).

#### 6.3.1.1 Configure the test

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

### 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 all three results.
- 5 If the results are not the same, clean the measuring cell and perform tests until the test passes or the results of three consecutive tests are the same.
- 6 If the test continues to fail and the results of three consecutive tests are the same, restore the factory adjustment data and repeat the test.
- 7 If the test continues to fail, perform an adjustment.

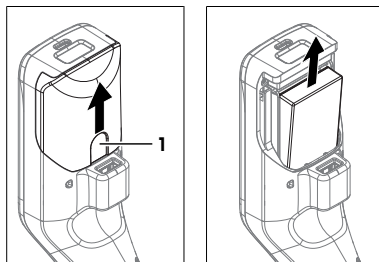
#### **See also**

 Clean the measuring cell ► Page 15

### **6.4 Replace the battery**

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

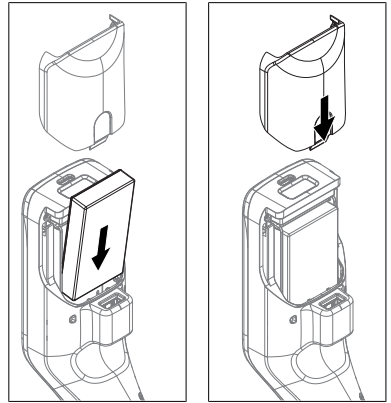
- 1 Press on the lower part (1) of the battery cover and push the battery cover up.
- 2 Pull the upper part of the battery out of the battery compartment and lift the battery out.



- 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**

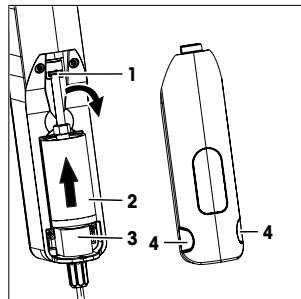
 Technical data ▶ Page 20



## 6.5 Replace the sample pump

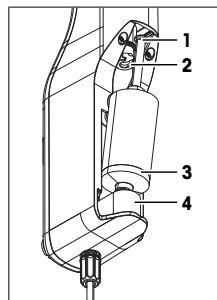
### Remove the sample pump

- 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).



### Install 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.



## 6.6 Prepare the density meter for storage

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

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

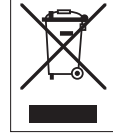
**See also**

-  Clean the density meter ▶ Page 15
-  Technical data ▶ Page 20

## 6.7 Dispose of the density meter

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

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



## 7 Technical data

### 7.1 Density meter

| Characteristic                 | Value  |  |
|--------------------------------|--|--|
| <b>Power rating instrument</b> | Input values                                   | 5 V DC, 1.0 A  |
|                                | Connector type                                 | USB C  |
| <b>Power rating AC adapter</b> | Input values                                   | 100...240 V AC, 0.3 A  |
|                                | Input frequency                                | 50 - 60 Hz   |
|                                | Output values                                  | 5 V DC, 1.0 A  |
| <b>Battery</b>                 | Type   | Rechargeable lithium-ion battery   |
|                                | Capacity                                       | 2400 mAh   |
|                                | Temperature range for charging                 | 0...40 °C  |
| <b>Dimensions</b>              | Width  | 56 mm  |
|                                | Length   | 288 mm   |
|                                | Depth  | 80 mm  |
|                                | Weight   | 355 g  |
| <b>Materials</b>               | Housing  | PBT (polybutylene terephthalate)   |
|                                | Measuring cell                                 | Borosilicate glass   |
|                                | Parts in contact when working with sample pump | PTFE (polytetrafluorethylene)<br>PVDF (polyvinylidene difluoride)<br>EPDM (ethylene propylene diene monomer (M-class) rubber)<br>FFKM (perfluoro-elastomers)<br>Borosilicate glass |
|                                | Filling tube                                   | PTFE (polytetrafluorethylene)  |
|                                | Connector for filling tube or syringe          | PP (polypropylene)   |

### Ambient conditions

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

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

### Storage temperatures

| Characteristic    | Value                      |                 |
|-------------------|----------------------------|-----------------|
| <b>Instrument</b> | -20 °C...+50 °C            |                 |
| <b>Battery</b>    | Storage for up to 1 month  | -20 °C...+60 °C |
|                   | Storage for up to 3 months | -20 °C...+45 °C |
|                   | Storage for up to 1 year   | -20 °C...+30 °C |

### Directives, standards and REACH regulation

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

SVHC candidate substances according to REACH (Article 33)

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

## 7.2 Measurement

| Characteristic     | Value                        |                                 |
|--------------------|------------------------------|---------------------------------|
| <b>Density</b>     | Measuring range              | 0.000...3.000 g/cm <sup>3</sup> |
|                    | Accuracy <sup>1)</sup>       | ± 0.001 g/cm <sup>3</sup>       |
|                    | Repeatability                | ± 0.0005 g/cm <sup>3</sup>      |
|                    | Resolution                   | 0.0001 g/cm <sup>3</sup>        |
| <b>Temperature</b> | Temperature range for sample | 0...50 °C                       |
|                    | Resolution                   | 0.1 °C                          |
|                    | Accuracy                     | ±0.2 °C                         |

<sup>1)</sup> For viscosity range of 0...200 mPa\*s

### Measurement scales

| Characteristic           | Value    |                   |
|--------------------------|----------|-------------------|
| <b>Ethanol (d) % w/w</b> | Range    | 0.0...100.0 % w/w |
|                          | Accuracy | ±1.0 % w/w        |
| <b>Ethanol (d) % v/v</b> | Range    | 0.0...100.0 % v/v |
|                          | Accuracy | ±1.0 % v/v        |
| <b>Proof (IP)</b>        | Range    | 0.0...175.0 Proof |
|                          | Accuracy | ±1.75 Proof       |
| <b>Proof (US)</b>        | Range    | 0.0...200.0 Proof |
|                          | Accuracy | ±2.0 Proof        |

| Characteristic                           |                     | Value             |
|--|---------------------|-------------------|
| <b>Light Baumé</b>                       | Range               | 10...100 °Bé      |
|  | Accuracy            | ±0.4 °Bé          |
| <b>Heavy Baumé</b>                       | Range               | 0...72 °Bé        |
|  | Accuracy            | ±0.1 °Bé          |
| <b>H<sub>2</sub>SO<sub>4</sub> % w/w</b> | Temperature range   | 10...50 °C        |
|  | Concentration range | 0.0...100.0 % w/w |
|  | Accuracy            | ±1.0 % w/w        |
| <b>H<sub>2</sub>SO<sub>4</sub> % v/v</b> | Temperature range   | 10...50 °C        |
|  | Concentration range | 0.0...100.0 % v/v |
|  | Accuracy            | ±1.0 % v/v        |
| <b>Brix (d) % w/w</b>                    | Range               | 0.0...85.0 % w/w  |
|  | Accuracy            | ±0.3 % w/w        |
| <b>Plato</b>                             | Range               | 0.0...85.0 °P     |
|  | Accuracy            | ±0.3 °P           |

### International standards and norms

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

► [www.mt.com/dere-norms](http://www.mt.com/dere-norms)





## 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](http://www.mt.com/density2go)

For more information

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