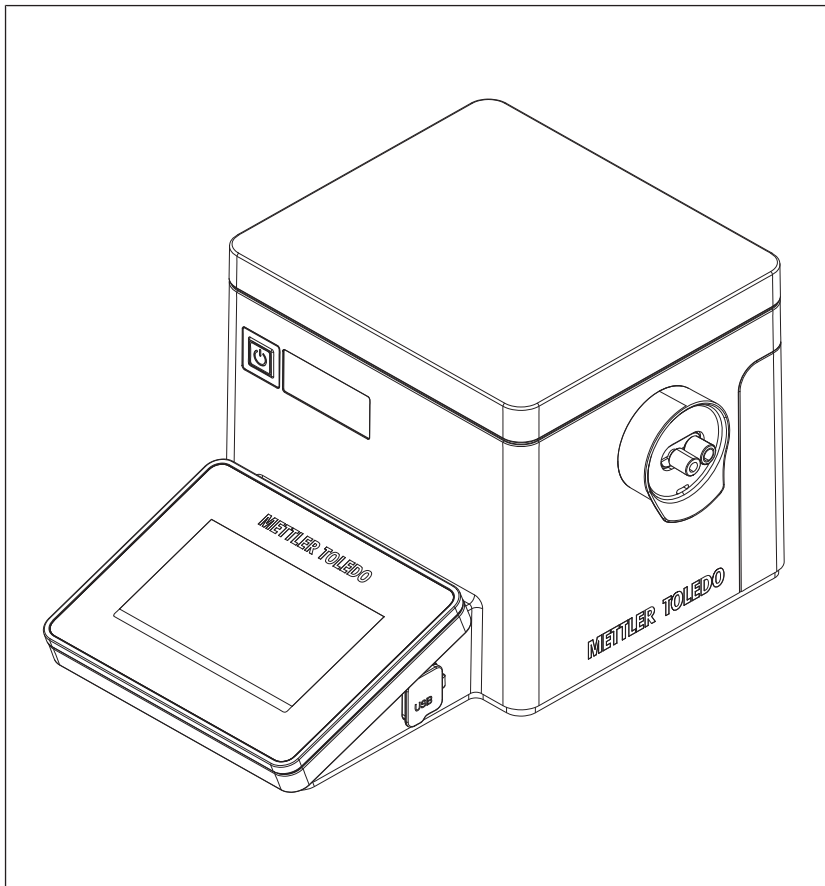


EasyPlus™ Density

Easy D30 / Easy D40



METTLER TOLEDO

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1 Introduction

Thank you for choosing a METTLER TOLEDO density meter. The density meters Easy D30 and Easy D40 are easy-to-operate instruments for measuring density and related values.

About this document

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

The instructions in this document refer to density meters Easy D30 and Easy D40 running firmware version 1.0 or higher.

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

► www.mt.com/contact

Conventions and symbols



Refers to an external document.

Elements of instructions

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

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

See also

- 📄 Download the Reference Manual ► Page 7

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**

This instrument is designed to be used by trained staff. The density meters Easy D30 and Easy D40 are intended to measure the density and related values of liquids.

Any other type of use and operation beyond the limits of use stated by Mettler-Toledo GmbH without consent from Mettler-Toledo GmbH is considered as not intended.

Responsibilities of the instrument owner

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

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

Safety notes**WARNING****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 power supply cable and AC adapter designed for your instrument.
- 2 Connect the power cable to a grounded power outlet.
- 3 Keep all electrical cables and connections away from liquids and moisture.
- 4 Check the cables and the power plug for damage and replace damaged cables and power plugs.

**NOTICE****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.

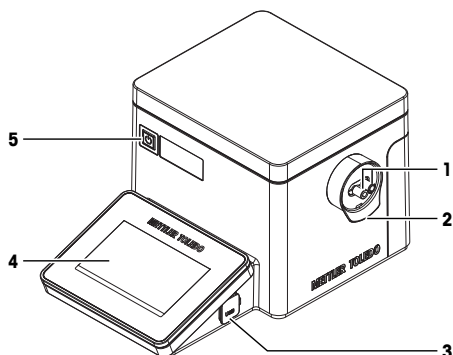
- Only use parts from METTLER TOLEDO that are intended to be used with your instrument.

FCC Rules

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.

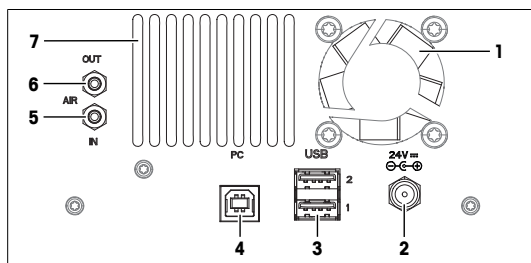
3 Design and function

3.1 Overview density meter



| Nr. | Name | Function |
|-----|-------------------|---|
| 1 | Cell adapters | Used to fill, drain and dry the measuring cell |
| 2 | Protective sleeve | Protects the housing from contact with samples or cleaning solutions |
| 3 | USB-A socket | Used to transfer data to and from a USB flash drive and to connect USB devices |
| 4 | Touch screen | Displays information and is used to enter information |
| 5 | Power button | The power button has the following functions: <ul style="list-style-type: none"> • Start up the density meter. • Shut down the density meter. |

3.2 Rear panel

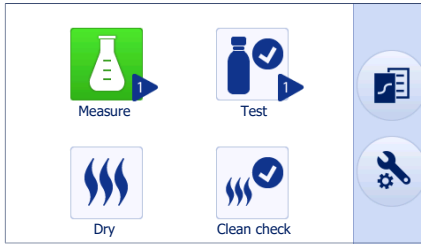


| Nr. | Name | Function |
|-----|----------------------|--|
| 1 | Fan | Moves air over the heat sink of the Peltier element |
| 2 | 24V | DC Socket to connect the AC adapter |
| 3 | USB1/USB2 | USB-A socket to connect USB devices, for example printers or barcode readers |
| 4 | PC | USB-B socket to connect a computer |
| 5 | AIR IN | Gas inlet of the built-in air pump, used to connect a drying unit |
| 6 | AIR OUT | Gas outlet of the built-in air pump, used to connect the drying tube |
| 7 | Ventilation openings | Intake of air to cool the heat sink of the Peltier element |

See also

Technical data ▶ Page 28




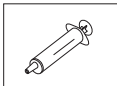

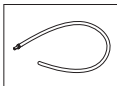



3.3 Overview of functions



| Icon | Name | Description |
|------|--------------------------|--|
| | Measure | Configure and start a measurement method to measure the density or related values of a sample. <ul style="list-style-type: none"> Easy D30: one measurement method is available. Easy D40: six measurement methods are available. |
| | Test | Configure and start a test method to check the measurement accuracy with a liquid standard. <ul style="list-style-type: none"> Easy D30: one test method is available. Easy D40: two test methods are available. |
| | Dry | Start and stop the air pump outside of a method. |
| | Clean check | Check if the measuring cell is clean and dry. The density meter measures the density of air and compares the measured value to the nominal value. |
| | Results | Access and manage the results of the last 20 measurements, tests and adjustments. |
| | Setup & Tools | Access the following functions. <ul style="list-style-type: none"> Settings: change instrument settings. Language: change the language of the user interface. Adjustment: configure and start an adjustment method to adjust the measurement accuracy. Diagnostics: run diagnostics. Toolbox: Update the firmware, restore factory settings and factory adjustment and access service information. |
| – | LongClick™ | Tap and hold the icon of one of the following apps to start it directly from the home screen. <ul style="list-style-type: none"> Measure Test Dry Clean check Adjustment |

4 Installation and commissioning

4.1 Scope of delivery

| Part | Order number | Easy D30 | Easy D40 |
|---|--------------|----------|----------|
|  Density meter | – | • | • |
|  AC adapter with power cable | 30472916 | • | • |
|  SimpleCheck Density Water 0.998 | 30466986 | • | • |
|  Syringes (2 pcs) 10 mL | – | • | • |
|  Waste tube <ul style="list-style-type: none"> • Tube (250 mm) • Washer • Connector | 30472918 | • | • |
|  Drying tube <ul style="list-style-type: none"> • Tube (300 mm) • Connector | 51337228 | • | • |
|  User Manual | – | • | • |
|  Declaration of conformity | – | • | • |
|  Test report | – | • | • |

4.2 Download the Reference Manual

- 1 Go to the website www.mt.com/library.
- 2 Select the **Technical Documentation** tab.
- 3 Enter the product type in the search field and start the search.
- 4 Select the Reference Manual from the result list.

- 5 Select the link.
⇒ The Reference Manual is either opened or downloaded depending on the browser settings.
- 6 Check which firmware version is installed on your density meter.
- 7 If the Reference Manual is not written for the installed firmware version, contact your authorized METTLER TOLEDO service representative or dealer.

► www.mt.com/contact

See also

- 📖 Introduction ► Page 3
- 📖 View the firmware version and other system information ► Page 28

4.3 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 to your authorized METTLER TOLEDO service representative or dealer.

► www.mt.com/contact

4.4 Position the density meter

The density meter has been developed for indoor operation in a room with stable temperature.

The following site requirements apply:

- Dew point below measurement temperature
- Ventilation as needed by the chemicals that are used
- Ambient conditions within the limits specified in the technical data
- No powerful vibrations
- No direct sunlight
- No corrosive gas atmosphere
- No explosive atmosphere
- No powerful electric or magnetic fields

Procedure

- 1 Place the density meter on a level surface.
- 2 Make sure that there are at least 15 cm clearance behind the density meter.
- 3 Make sure that nothing blocks the ventilation openings in the rear panel of the density meter.

See also

- 📖 Technical data ► Page 28

4.5 Connect the density meter to the power supply

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



⚠ WARNING

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 power supply cable and AC adapter designed for your instrument.
- 2 Connect the power cable to a grounded power outlet.
- 3 Keep all electrical cables and connections away from liquids and moisture.
- 4 Check the cables and the power plug for damage and replace damaged cables and power plugs.



NOTICE

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.

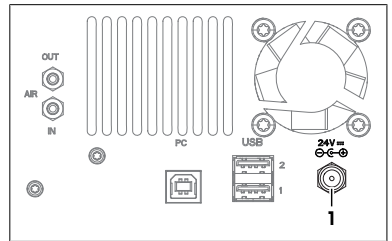
- 1 Do not cover the AC adapter.
- 2 Do not put the AC adapter in a container.

Procedure

- 1 Install the cables in such a way that they cannot be damaged or interfere with operation.
- 2 Insert the plug of the power cable in the socket of the AC adapter.
- 3 Insert the plug of the AC adapter in the **24V** (1) socket on the rear panel.
- 4 Secure the plug by firmly tightening the knurled nut.
- 5 Insert the plug of the power cable into a grounded power outlet that is easily accessible.

See also

- 📖 Start up the density meter ▶ Page 12



4.6 Disconnect the density meter from the power supply

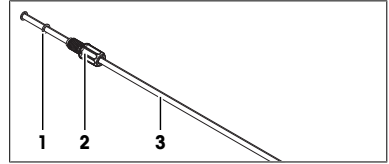
- The density meter is shut down.
- 1 Pull the plug of the power cable out of the power outlet.
 - 2 Unscrew the knurled nut from the **24V** socket on the rear panel.
 - 3 Pull the plug of the AC adapter out of the **24V** socket on the rear panel.

See also

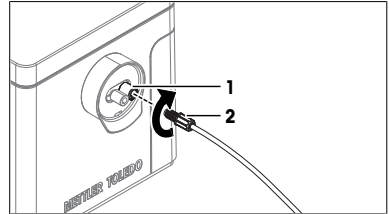
- 📖 Shut down the density meter ▶ Page 12

4.7 Install the waste tube

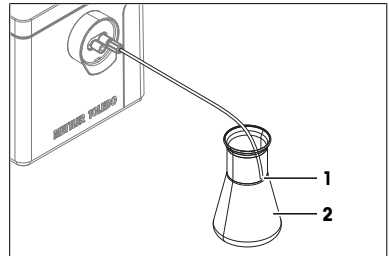
- Washer (1), connector (2) and tube (3) of the waste tube are assembled.



- Screw the connector of the waste tube (2) into the rear cell adapter (1) and tighten it.
- Shorten the waste tube as needed.



- Place the end of the waste tube (1) into the waste container (2).
- Position the waste tube so that it is angled downwards to prevent any liquid from flowing out through the front cell adapter.
- Make sure that the end of the waste tube (1) does not touch the waste.

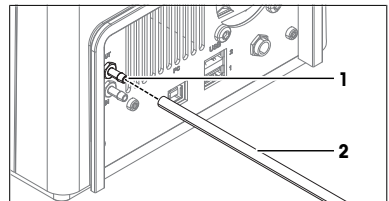


See also

- Replace the waste tube ▶ Page 26

4.8 Install the drying tube

- Push the open end of the drying tube (2) over the barbed outlet (1) of the built-in air pump.



4.9 Change the atmospheric pressure

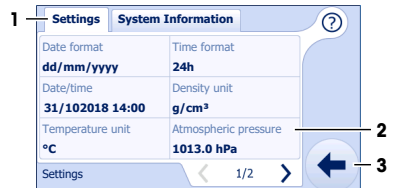
The density meter uses the value of the **Atmospheric pressure** parameter to calculate the nominal density of air. The value must correspond to the average atmospheric pressure at the place of installation.

| Height above sea level | | Atmospheric pressure |
|------------------------|--------|----------------------|
| [m] | [feet] | [hPa] |
| 0 | 0 | 1013 |
| 200 | 656 | 990 |
| 400 | 1312 | 966 |
| 600 | 1969 | 943 |
| 800 | 2625 | 921 |
| 1000 | 3281 | 899 |
| 1200 | 3937 | 877 |

| Height above sea level | | Atmospheric pressure |
|------------------------|--------|----------------------|
| [m] | [feet] | [hPa] |
| 1400 | 4593 | 856 |
| 1600 | 5249 | 835 |
| 1800 | 5906 | 815 |
| 2000 | 6562 | 795 |
| 2200 | 7218 | 776 |
| 2400 | 7874 | 756 |

Procedure

- 1 Go to > > > **Settings** (1).
- 2 Tap **Atmospheric pressure** (2).
- 3 Enter the average atmospheric pressure in hPa and tap .
- 4 To return to **Setup & Tools**, tap (3).



See also

- Check if the measuring cell is clean and dry ▶ Page 21

4.10 Change the language

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

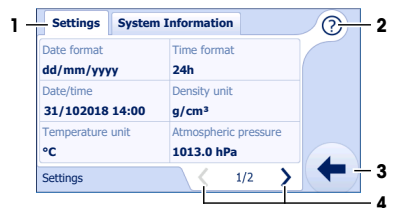
4.11 Configure the density meter

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

- Date and time
- Density unit
- Temperature unit
- Atmospheric pressure
- Audio signal

Procedure

- 1 Go to > > > **Settings** (1).
- 2 Change the parameters as needed.
- 3 To display parameter descriptions, tap (2).
- 4 To move between windows, use the arrows (4).
- 5 To return to **Setup & Tools**, tap (3).



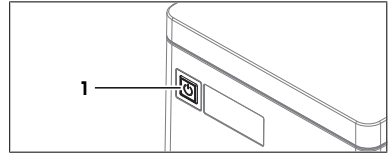
See also

- Display parameter descriptions ▶ Page 12

5 Operation

5.1 Start up the density meter

- The density meter is connected to the power supply.
- Press the power button (1) until the density meter plays a beep.
- ⇒ The welcome screen opens.
- ⇒ The density meter plays a beep and the home screen opens.



See also

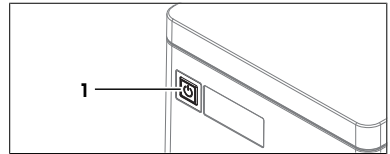
- Connect the density meter to the power supply ▶ Page 8

5.2 Shut down the density meter

Because the measuring cell adapts slowly to temperature changes, METTLER TOLEDO recommends to only shut down the density meter if it is not used for several days.

Procedure

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



Shut down the density meter in emergency situations

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

See also

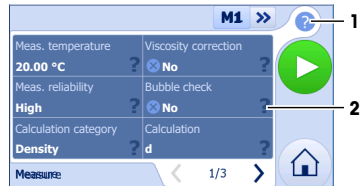
- Disconnect the density meter from the power supply ▶ Page 9

5.3 Display parameter descriptions

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



- 2 Tap the question mark (2) for the parameter description you want to display.
- 3 Tap ? (1) to close the help and change the parameter settings.



5.4 Typical phases of a density determination

Density determinations usually include three phases.

- Fill the measuring cell and measure the density.
- Rinse the measuring cell to remove residue of the sample.
- Dry the measuring cell.

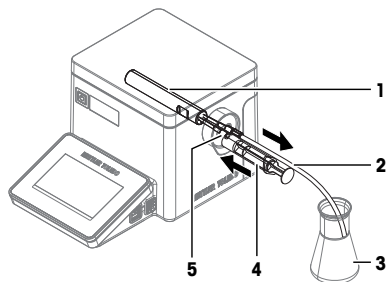
5.4.1 Fill the measuring cell

There are two ways to fill the measuring cell using a syringe.

- Push samples into the measuring cell; suitable for all samples
- Pull samples into the measuring cell; not suitable for viscous samples and degassing samples

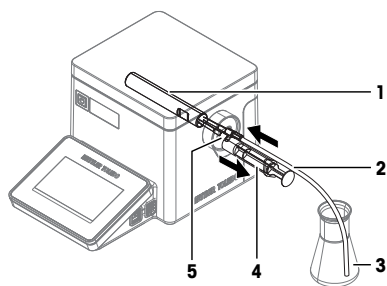
Push samples into the measuring cell

- The sample is in the syringe (4). Users push the sample into the measuring cell (1), through the waste tube (2) and in the waste container (3).
- A clean syringe is needed for each sample.
- If some of the sample sticks to the opening of the cell adapter (5), the next sample is contaminated.



Pull samples into the measuring cell

- The sample is in the sample container (3). Users pull the sample through the waste tube (2), into the measuring cell (1) and then into the syringe (4).
- The sample is already analyzed, when it passes through the opening of the cell adapter (5) that can be contaminated.
- If the waste tube (2) is not clean and dry, the sample can be contaminated.



5.4.2 Rinse the measuring cell

At the end of this phase, the residue in the measuring cell must have the following properties.

- Evaporate without leaving incrustations.
- Evaporate easily.

To clean the measuring cell, it has to be rinsed with one or two different cleaning solutions.

- Purpose of the cleaning solution 1: Dissolve the sample, so that no sample is left in the measuring cell. If the cleaning solution 1 does not easily evaporate, a second cleaning solution must be used.
- Purpose of the cleaning solution 2: Dissolves the cleaning solution 1 and evaporates easily without leaving any residue.

METTLER TOLEDO recommends the following cleaning solutions.

| Sample | Cleaning solution 1 | Cleaning solution 2 |
|-----------------------------------|--|-------------------------|
| Water, water based | Deionized water | Acetone, ethanol (100%) |
| Acids (concentrated) | Water (flush the measuring cell with plenty of water to remove the heat from the reaction of water and acid) | Acetone, ethanol (100%) |
| Alkaline solutions (concentrated) | 0.3...0.5 % deconex solution | Acetone, ethanol (100%) |

| Sample | Cleaning solution 1 | Cleaning solution 2 |
|---|--|--|
| Samples with fats or oily components | 0.3...0.5 % deconex solution | Acetone, ethanol (100%) |
| Petrochemical samples, edible oils and fats | Toluene, xylene or petrol ether mixtures | Room temperature: low-boiling petrol ether mixture or acetone Temperature > 30 °C: hexane or similar organic solvents |

5.4.3 Dry the measuring cell

At the end of this phase, the measuring cell contains no residue and is ready for a new analysis or storage.

For humid environments, METTLER TOLEDO recommends to dry the ambient air that is pumped through the measuring cell using a bed of desiccant (e.g. a drying unit with silica gel). The desiccant keeps dust and moisture back and reduces the risk that a hardly visible layer of condensation forms on the walls of the measuring cell. The risk that moisture from the ambient air condenses in the measuring cell depends on the relative humidity of the air and the difference between the room temperature and the temperature of the measuring cell.

- The higher the relative humidity of the air, the higher the risk
- The farther the temperature of the measuring cell lies below room temperature, the higher the risk

To check if the measuring cell is dry, users can measure the density of air or perform a **Clean check**. If the measured value is within the tolerance range of the nominal value at the measuring temperature, the measuring cell is clean and dry.

See also

 Check if the measuring cell is clean and dry ▶ Page 21

5.5 Example: density determination of tap water



The following chapters show you how to configure a measurement method and determine the density of tap water in g/cm³ at 20 °C.

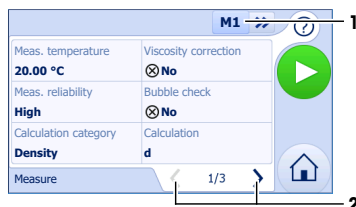


You can find more information about the configuration of methods and working with other types of samples in the Reference Manual. **See** [Download the Reference Manual ▶ Page 7].

You can find parameter descriptions in the help embedded on the instrument. **See** [Display parameter descriptions ▶ Page 12].

5.5.1 Configure the measurement method

- Go to  > .
 - ⇒ Easy D40: The parameter window for the last used measurement method (1) opens.
 - ⇒ Easy D30: The parameter window for the measurement method opens.
- Change the parameter settings to the values shown in the following table.
- Use the arrows (2) to move between windows.



| Parameter | Setting | Explanation |
|----------------------|---------|---|
| Meas. temperature | 20.0 °C | The density meter keeps the temperature of the measuring cell at 20 °C. |
| Viscosity correction | No | The measured value is not corrected for the effect of viscosity. |

| Parameter | Setting | Explanation |
|---|-----------------|--|
| Meas. reliability | High | The measuring duration is longer but the measurements are as accurate as specified in the technical data. |
| Bubble check (Easy D40 only) | No | The instrument does not check for the presence of air bubbles in the measuring cell. |
| Calculation category (Easy D40 only) | Density | A density is calculated. |
| Calculation | d | The density at the measurement temperature is calculated. |
| Result limits | Yes | The density meter evaluates if the result is within a defined range. <ul style="list-style-type: none"> • Results within limits: green writing • Results outside limits: red writing |
| Lower limit | 0.9980 | The lower limit of the range is set to 0.9980 g/cm ³ . |
| Upper limit | 0.9984 | The upper limit of the range is set to 0.9984 g/cm ³ . |
| Prompt for sample | Yes | The density meter prompts users to add the sample. |
| Sample ID | Variable | The density meter prompts users to enter the sample ID as soon as they have added the sample. |
| Rinse | Yes | The density meter prompts users to rinse the measuring cell. |
| Dry | Yes | The density meter prompts users to dry the measuring cell. |
| Drying duration | 30 s | The air pump is switched on for 30 s. |
| Printout | None | The result is not printed. |
| Export to USB (Easy D40 only) | No | The result is not exported. |

5.5.2 Fill the measuring cell

Material

- Waste container
- 3-component syringe with O-ring
- Tap water

Procedure

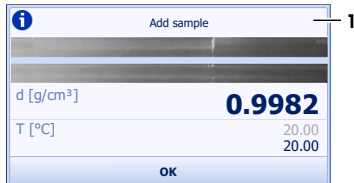
- The measuring cell is clean and dry.

1 Tap  (1).

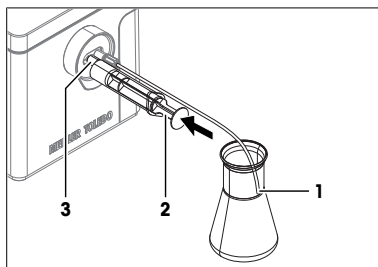


⇒ You are prompted to add the sample (1).

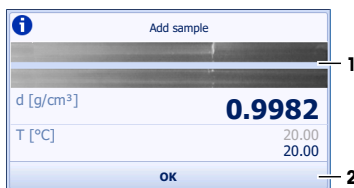
- 2 Fill a clean 10 mL syringe with 2...5 mL of the sample.
- 3 Make sure that there are no bubbles in the syringe.



- 4 Make sure that the end of the waste tube (1) does not touch the waste.
- 5 Insert the syringe into the cell adapter (3).
- 6 Press the plunger (2) slowly and continuously into the syringe.
 - ⇒ The sample flows from the syringe into the measuring cell.



- 7 Push the sample into the measuring cell until the measuring cell and at least 10 cm of the waste tube are filled with sample.
- 8 Leave the syringe in the cell adapter.
- 9 Check that the measuring cell (1) is free of air bubbles.
- 10 If there are air bubbles, push more sample into the measuring cell until it is free of air bubbles.
- 11 To continue, tap **OK** (2).



- 12 Enter the sample ID, using the **abc** key (1) to cycle between capital letters, small letters and numbers.



13 Tap

- ⇒ The revolving circle (1) shows that the measurement is in process.
- ⇒ The temperature of the measuring cell (4) is brought to the temperature defined in the method (3).
- ⇒ The measured value is displayed (2). Stable digits are black.



- ⇒ The result is saved, and you are prompted to rinse the measuring cell.



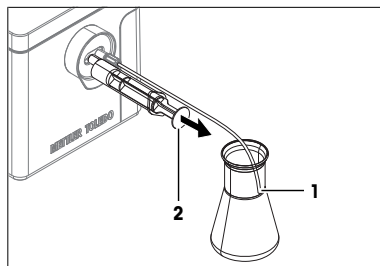
5.5.3 Rinse the measuring cell

Material

- Acetone
- Deionized water
- 3-component syringes with O-ring

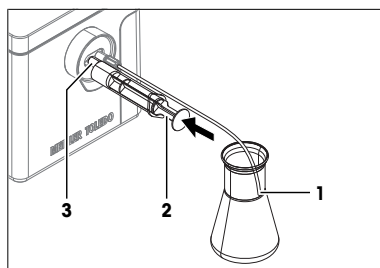
Drain the measuring cell

- 1 Make sure that the end of the waste tube (1) does not touch the waste.
- 2 Pull the plunger (2) continuously out of the syringe.
 - ⇒ The sample is pulled back into the syringe and the measuring cell fills with air.
- 3 Remove the syringe from the cell adapter and empty its content into a suitable waste container.



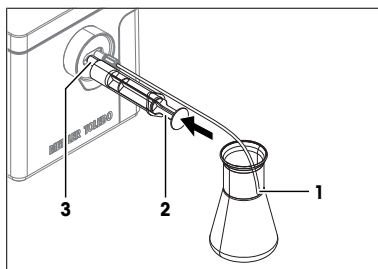
Rinse the measuring cell with deionized water

- 1 Make sure that the end of the waste tube (1) does not touch the waste.
- 2 Fill a clean syringe with deionized water.
- 3 Insert the syringe into the cell adapter (3).
- 4 Press the plunger (2) continuously into the syringe.
 - ⇒ The deionized water flows through the measuring cell and flushes out the sample.
- 5 Make sure the waste tube is angled downwards to prevent any liquid from flowing out through the front cell adapter.
- 6 Remove the syringe from the cell adapter.
- 7 Repeat the steps above two or three times.



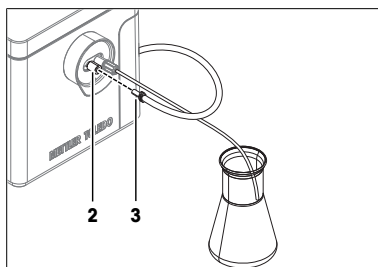
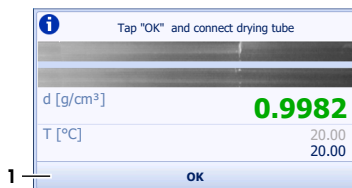
Rinse the measuring cell with acetone


- Wear protective gear as required by the safety data sheet of acetone and the safety rules of your workplace.
- 1 Make sure that the end of the waste tube (1) does not touch the waste.
 - 2 Fill a clean syringe with acetone.
 - 3 Insert the syringe into the cell adapter (3).
 - 4 Press the plunger (2) continuously into the syringe.
 - ⇒ The acetone flows through the measuring cell and flushes out the deionized water.
 - 5 Make sure the waste tube is angled downwards to prevent any liquid from flowing out through the front cell adapter.
 - 6 Remove the syringe from the cell adapter.
 - 7 Repeat the steps above two or three times.
 - 8 Dispose of the waste as required by the safety data sheet of acetone and the rules of your workplace.
 - 9 Tap **OK** (1).
- ⇒ You are prompted to dry the measuring cell.





5.5.4 Dry the measuring cell

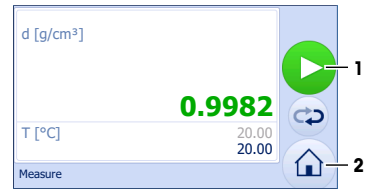
- 1 Make sure that the end of the waste tube does not touch the waste.
- 2 Tap **OK** (1) and insert the connector (3) of the drying tube into the cell adapter (2).
 - ⇒ The air flow removes any residue of the cleaning solution from the opening of the cell adapter.



- 3 To toggle between the result and the window with a video of the measuring cell and the measured value, tap  (1).
 - ⇒ The air pump stops after 30 s.
- 4 Pull the connector of the drying tube out of the cell adapter and wipe it with a clean and lint-free tissue.



- 5 To restart the method, tap  (1).
- 6 To open the home screen, tap  (2).



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 service representative or dealer.

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

► www.mt.com/contact

6.1 Maintenance schedule

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

| Frequency | Task | Link |
|-----------|--|--|
| Daily | Clean the measuring cell at the end of the work day. | [Clean the measuring cell ► Page 19] |
| | Perform a test with a SimpleCheck water standard or deionized water. | [Check the measurement accuracy ► Page 21] |



6.2 Clean the measuring cell

6.2.1 Typical phases of cleaning the measuring cell

Cleaning the measuring cell usually includes two phases:

- Rinse the measuring cell to remove residue of the sample.
- Dry the measuring cell.

See also

-  Rinse the measuring cell ► Page 13
-  Dry the measuring cell ► Page 14

6.2.2 Example: clean using deionized water and acetone

The following chapters show you how to clean the measuring cell with deionized water and acetone.

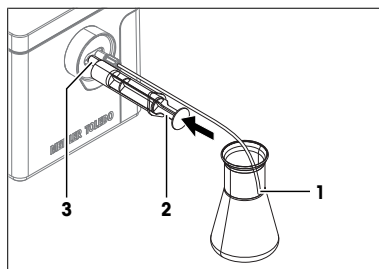
6.2.2.1 Rinse the measuring cell

Material

- Acetone
- Deionized water
- 3-component syringes with O-ring

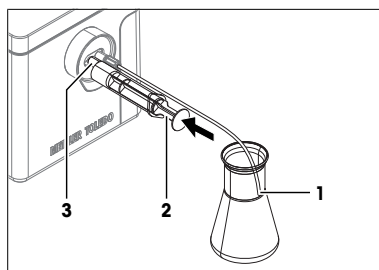
Rinse the measuring cell with deionized water

- The measuring cell is drained.
- 1 Make sure that the end of the waste tube (1) does not touch the waste.
 - 2 Fill a clean syringe with deionized water.
 - 3 Insert the syringe into the cell adapter (3).
 - 4 Press the plunger (2) continuously into the syringe.
 - ⇒ The deionized water flows through the measuring cell and flushes out the sample.
 - 5 Make sure the waste tube is angled downwards to prevent any liquid from flowing out through the front cell adapter.
 - 6 Remove the syringe from the cell adapter.
 - 7 Repeat the steps above two or three times.



Rinse the measuring cell with acetone

- Wear protective gear as required by the safety data sheet of acetone and the safety rules of your workplace.
- 1 Make sure that the end of the waste tube (1) does not touch the waste.
 - 2 Fill a clean syringe with acetone.
 - 3 Insert the syringe into the cell adapter (3).
 - 4 Press the plunger (2) continuously into the syringe.
 - ⇒ The acetone flows through the measuring cell and flushes out the deionized water.
 - 5 Make sure the waste tube is angled downwards to prevent any liquid from flowing out through the front cell adapter.
 - 6 Remove the syringe from the cell adapter.
 - 7 Repeat the steps above two or three times.
 - 8 Dispose of the waste as required by the safety data sheet of acetone and the rules of your workplace.

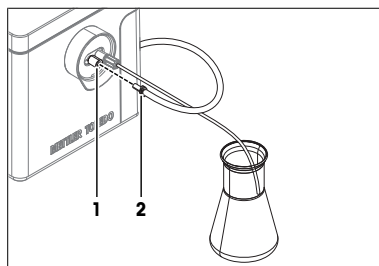


6.2.2.2 Dry the measuring cell

- 1 Make sure that the end of the waste tube does not touch the waste.
- 2 Go to > .
- 3 Tap **Drying duration** (1) and set it to 30 s.



- 4 Tap and insert the connector (2) of the drying tube into the cell adapter (1).
 - ⇒ The air flow removes any residue of the cleaning solution from the opening of the cell adapter.
 - ⇒ The air pump stops after 30 s.
- 5 Pull the connector of the drying tube out of the cell adapter and wipe it with a clean and lint-free tissue.



6.3 Check if the measuring cell is clean and dry

To check if the measuring cell is clean and dry, the density meter measures the density of air and compares it to a calculated nominal density of air. To calculate the nominal density of air, the density meter uses the value of the **Atmospheric pressure** parameter as defined in **Settings**.

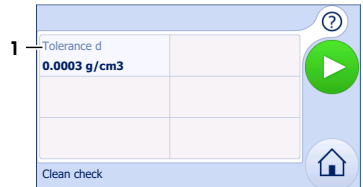
Criteria for pass or fail

- Pass (green writing): the deviation of the measured density from the calculated nominal density is smaller than the value defined in **Tolerance d**.
- Fail (red writing): the deviation of the measured density from the calculated nominal density is larger than the value defined in **Tolerance d**.

Procedure

- The **Atmospheric pressure** parameter is set to the average atmospheric pressure at the place of installation.

- 1 Go to > .
- 2 Tap **Tolerance d** (1) and set it to the value listed for your instrument type.
 - Easy D40: 0.0003 g/cm³
 - Easy D30: 0.002 g/cm³
- 3 Tap .



⇒ The temperature of the measuring cell (3) is brought to the temperature defined in the last method (2).

⇒ The measured value is displayed (1). Stable digits are black.



⇒ The results are displayed but not saved.

⇒ The deviation (5) between the measured density of air (3) and the calculated nominal density of air (1) is displayed.

- 4 To restart the **Clean check**, tap (2).
- 5 To open the home screen, tap (4).



See also

- Change the atmospheric pressure ▶ Page 10

6.4 Check the measurement accuracy

6.4.1 Typical phases of checking the measurement accuracy

Checking the measurement accuracy usually includes three phases:

- Fill the measuring cell and measure the density.
- Rinse the measuring cell to remove residue of the sample.
- Dry the measuring cell.

See also

- Fill the measuring cell ▶ Page 13
- Rinse the measuring cell ▶ Page 13
- Dry the measuring cell ▶ Page 14

6.4.2 Example: test with a SimpleCheck™ water standard

The following chapters show you how to configure a test method and determine the density of a SimpleCheck water standard in g/cm³ at 20 °C.

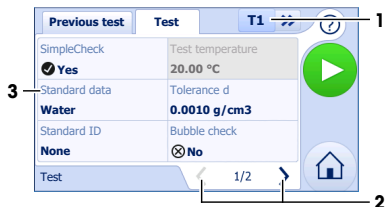


You can find more information about the configuration of methods and working with other types of samples in the Reference Manual. **See** [Download the Reference Manual ▶ Page 7].

You can find parameter descriptions in the help embedded on the instrument. **See** [Display parameter descriptions ▶ Page 12].

6.4.2.1 Configure the test method

- Go to > .
 - ⇒ Easy D40: The parameter window for the last used test method (1) opens.
 - ⇒ Easy D30: The parameter window for the test method opens.
- Change the parameter settings to the values shown in the following table.
- Use the arrows (2) to move between windows.



| Parameter | Setting | Explanation |
|-------------------------------------|-------------------------------------|---|
| SimpleCheck | Yes | The workflow for self verification with SimpleCheck™ standards is used. |
| Test temperature | 20.0 °C (read only) | The density meter keeps the temperature of the measurement cell at 20 °C. |
| Standard data | – | Opens a window to enter standard data. Users are prompted to enter or scan the standard data when they start the test method. |
| Tolerance d | Easy D40: 0.0010 Easy D30: 0.002 | The result is marked as passed if it falls within the following range. d nominal ± Tolerance d |
| Standard ID | None | No identification for the standard is used in the method. |
| Bubble check (Easy D40 only) | No | The instrument does not check for the presence of air bubbles in the measuring cell. |
| Viscosity correction | Yes (read only) | The measured value is corrected for the effect of viscosity. |
| Rinse | Yes (read only) | The density meter prompts users to rinse the measuring cell. |
| Dry | Yes (read only) | The density meter prompts users to dry the measuring cell. |
| Drying duration | 30 s | The air pump is switched on for 30 s. |
| Printout | None | The result is not printed. |



6.4.2.2 Fill the measuring cell

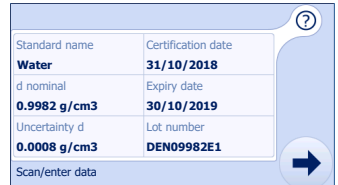
Material

- Waste container
- 3-component syringe with O-ring

- SimpleCheck Density Water 0.998

Start the method and configure the standard

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

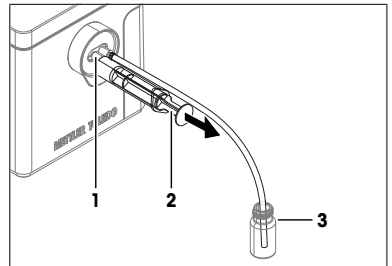


- ⇒ You are prompted to add the SimpleCheck water standard (1).



Fill the measuring cell

- 1 Make sure the inside and the outside of the waste tube are clean and dry.
- 2 Open the standard bottle.
- 3 Place the end of the waste tube in the standard bottle (3) until it touches the bottom.
- 4 Insert the syringe into the cell adapter (1).
- 5 Pull the plunger (2) slowly and continuously out of the syringe.
 - ⇒ The standard flows into the measuring cell.
- 6 Leave the syringe in the cell adapter.



- 7 Check that the measuring cell (1) is free of air bubbles.
- 8 If there are air bubbles, pull more standard into the measuring cell until it is free of air bubbles.



- 9 To continue, tap **OK**.
- ⇒ The temperature of the measuring cell (3) is brought to the temperature defined in the method (2).
 - ⇒ The measured value is displayed (1). Stable digits are black.



- ⇒ The results are saved and you are prompted to rinse the measuring cell.
- ⇒ The deviation (3) between the nominal density (1) and the measured density (2) is displayed.



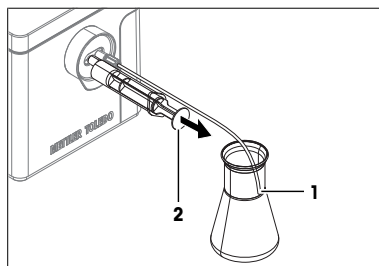
6.4.2.3 Rinse the measuring cell

Material

- Acetone
- 3-component syringes with O-ring
- Lint-free tissues

Drain the measuring cell

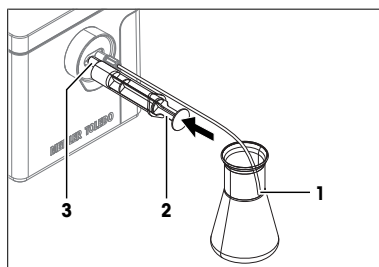
- 1 Remove the waste tube from the standard bottle and place it in the waste container (1).
- 2 Make sure that the end of the waste tube (1) does not touch the waste.
- 3 Pull the plunger (2) continuously out of the syringe.
 - ⇒ The standard is pulled back into the syringe and the measuring cell fills with air.
- 4 Remove the syringe from the cell adapter and empty its content into a suitable waste container.



Rinse the measuring cell with acetone

- Wear protective gear as required by the safety data sheet of acetone and the safety rules of your workplace.

- 1 Make sure that the end of the waste tube (1) does not touch the waste.
- 2 Fill a clean syringe with acetone.
- 3 Insert the syringe into the cell adapter (3).
- 4 Press the plunger (2) continuously into the syringe.
 - ⇒ The acetone flows through the measuring cell and flushes out the deionized water.
- 5 Make sure the waste tube is angled downwards to prevent any liquid from flowing out through the front cell adapter.
- 6 Remove the syringe from the cell adapter.
- 7 Repeat the steps above two or three times.
- 8 Dispose of the waste as required by the safety data sheet of acetone and the rules of your workplace.

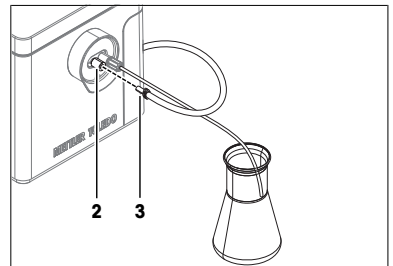
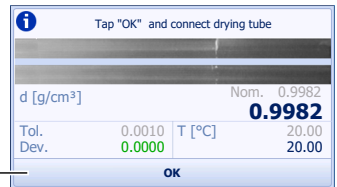





- 9 Tap **OK** (1).
- ⇒ You are prompted to dry the measuring cell.



6.4.2.4 Dry the measuring cell

- The measuring cell is rinsed.
- 1 Make sure that the end of the waste tube does not touch the waste.
 - 2 Tap **OK** (1) and insert the connector (3) of the drying tube into the cell adapter (2).
- ⇒ The air flow removes any residue of the cleaning solution from the opening of the cell adapter.



- 3 To toggle between the results and the window with the measured values and a video of the measuring cell, tap  (1).
- ⇒ The air pump stops after 30 s.
- 4 Pull the connector of the drying tube out of the cell adapter and wipe it with a clean and lint-free tissue.
- 5 To restart the method, tap  (1).
- 6 To open the home screen, tap  (2).



6.4.3 Measures if the test fails

- 1 Check that you have used the correct standard, 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 19

6.5 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 liquids enter the housing 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

See also

- 📖 Technical data ▶ Page 28

6.5.1 Clean the housing

METTLER TOLEDO recommends the following cleaning agents:

- Ethanol
- Water

Procedure

- The density meter is shut down and is disconnected from the power supply.
- Wipe the housing with a cloth moistened with the cleaning agent.

See also

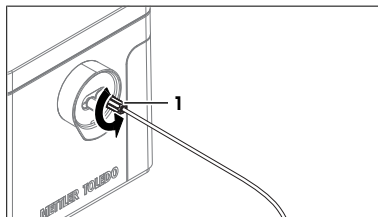
- 📖 Shut down the density meter ▶ Page 12
- 📖 Disconnect the density meter from the power supply ▶ Page 9

6.6 Replace the waste tube

- The density meter is shut down.
- 1 Unscrew the connector of the waste tube (1) and remove the waste tube.
 - 2 Install the new waste tube.

See also

- 📖 Install the waste tube ▶ Page 10

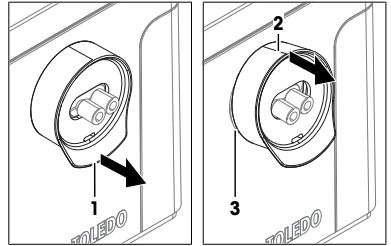


6.7 Replace the protective sleeve

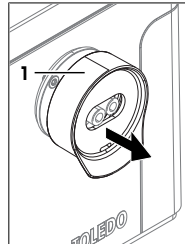
Remove the protective sleeve

- The density meter is shut down.
- No syringes or tubes are connected to the cell adapters.

- 1 Pull the grip of the protective sleeve (1) away from the housing until the lower part is free from its support (3).
- 2 Lift the upper part of the protective sleeve (2) from its support.



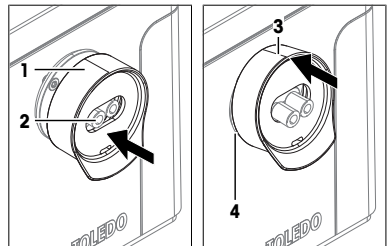
- 3 Slide the protective sleeve (1) off the cell adapters.



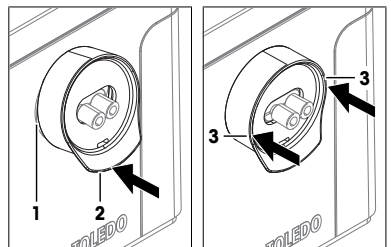
Install the protective sleeve

- The density meter is shut down.
- No syringes or tubes are connected to the cell adapters.

- 1 Slide the protective sleeve (1) on the cell adapters (2).
- 2 Place the upper part of the protective sleeve (3) over its support (4).

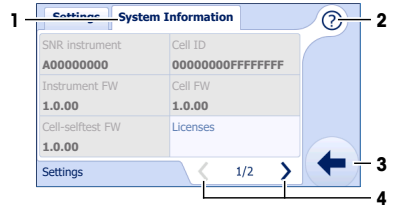


- 3 Hold the grip (2) and lift the lower part of the protective sleeve over the support (1).
- 4 Press down the sides of the protective sleeve (3) until they slide over the support.



6.8 View the firmware version and other system information

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



See also

- Display parameter descriptions ▶ Page 12

6.9 Prepare the density meter for storage

- 1 Clean the measuring cell.
- 2 Shut down the density meter.
- 3 Disconnect the density meter from the power supply.
- 4 Disconnect and remove any accessories from the density meter.
- 5 Clean the density meter.
- 6 Protect the density meter from dust.
- 7 Store the density meter in a dry and clean place.

6.10 Transport the density meter

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

▶ www.mt.com/contact

- 1 Clean the measuring cell.
- 2 Shut down the density meter.
- 3 Disconnect the density meter from the power supply.
- 4 Disconnect and remove any accessories from the density meter.
- 5 Clean the density meter.
- 6 If you transport the density meter over long distances, use the original packaging.
- 7 Move the density meter to the new location.

6.11 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

General

| Characteristic | | Value |
|-------------------------|--------------|-----------------|
| Power rating instrument | Input values | 24 V DC, 2.5 A |
| | Socket | DC-Jack, 2.5 mm |

| Characteristic | Value | |
|--------------------------------|----------------------|--|
| Power rating AC adapter | Input voltage | 100...240 V AC \pm 10 %, 1.5 A |
| | Input frequency | 50/60 Hz |
| | Output values | 24 V DC, 2.5 A |
| Dimensions | Width | 200 mm |
| | Depth | 280 mm |
| | Height | 155 mm |
| | Weight | 3.9 kg |
| Materials | Housing | Baydur (polyurethane) |
| | Touch screen | Gorilla Glass |
| | Measuring cell | Borosilicate glass |
| | Cell adapters | PTFE (polytetrafluorethylene) |
| | Waste tube | PTFE (polytetrafluorethylene) PP (polypropylene) PA12 (polyamide 12) |
| | Drying tube | Silicone PTFE (polytetrafluorethylene) |
| Ambient conditions | Ambient temperature | 5 °C...+40 °C |
| | Relative humidity | 20...80 % (not condensing) |
| | Altitude | \leq 2000 m above sea level |
| | Pressure | Atmospheric pressure |
| | Use | In interior spaces |
| | Overvoltage category | II |
| | Pollution degree | 2 |
| Storage conditions | Temperature | -20 °C...+70 °C |
| | Relative humidity | 10...90 % |

Directives, standards and REACH regulation

The instrument complies with the directives and standards that are listed on the declaration of conformity.

SVHC candidate substances according to REACH (Article 33)

| Material | CAS No. |
|-------------------------------|------------|
| PZT (Lead Zirconate Titanate) | 12626-81-2 |
| 1,2-dimethoxyethane | 110-71-4 |

7.2 Measurement

| Characteristic | | Easy D30 | Easy D40 |
|------------------------------|------------------------------|-------------------------------|--------------------------------|
| Density | Measuring range | 0...3 g/cm ³ | 0...3 g/cm ³ |
| | Accuracy | \pm 0.001 g/cm ³ | \pm 0.0005 g/cm ³ |
| | Repeatability | 0.0001 g/cm ³ | 0.00005 g/cm ³ |
| | Resolution | 0.001 g/cm ³ | 0.0001 g/cm ³ |
| Measuring temperature | Range ¹⁾ | 15...25 °C | 15...50 °C |
| | Accuracy | \pm 0.2 °C | \pm 0.1 °C |
| | Resolution | 0.01 °C | 0.01 °C |
| Sample | Min. volume | 1.2 mL | 1.2 mL |
| | Max. pressure measuring cell | 1'000'000 Pa (10 bar) | 1'000'000 Pa (10 bar) |
| | Max. filling pressure | 130,000 Pa (1.3 bar) | 130,000 Pa (1.3 bar) |

¹³⁾ Minimal temperature not more than 20 °C below ambient temperature

International standards and norms

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

► 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.

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www.mt.com/EasyPlus-Density

For more information

Mettler-Toledo GmbH

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

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