Operating Instructions
Liquiline Mobile CML18

Multiparameter mobile device

Endress+Hauser [EH]

People for Process Automation

Table of contents

1   About this document

1.1   Safety information

Structure of information	Meaning
⚠ DANGER **Causes (/consequences)** If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation **will** result in a fatal or serious injury.
⚠ WARNING **Causes (/consequences)** If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation **can** result in a fatal or serious injury.
⚠ CAUTION **Causes (/consequences)** If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
NOTICE **Cause/situation** If necessary, Consequences of non-compliance (if applicable) ▶ Action/note	This symbol alerts you to situations which may result in damage to property.

1.2   Symbols

🛈	Additional information, tips
☑	Permitted
☑☑	Recommended
☒	Not permitted or not recommended
🔲	Reference to device documentation
🖹	Reference to page
🖾	Reference to graphic
↳	Result of an individual step

1.3   Symbols on the device

⚠–🔲	Reference to device documentation
⬛	Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

2   Basic safety instructions

2.1   Requirements for the personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.

🛈 Repairs not described in the Operating Instructions provided must be carried out only directly at the manufacturer's site or by the service organization.

🛈 The battery may only be changed directly at the manufacturer's premises or by the service organization.

2.2   Intended use

Liquiline Mobile CML18 is a multiparameter mobile device for connecting digital sensors with Memosens technology and optional operation by smartphone or other mobile devices via Bluetooth.

The device is designed for reliable operation in the field or laboratory and is particularly suitable for the following industries:
- Life sciences
- Chemical industry
- Water and wastewater
- Food and beverages
- Power stations
- Other industrial applications of liquid analysis

🛈 The device contains a lithium ion battery. For this reason, the device may only be exposed to the operating and storage temperatures indicated.

   The device may not be exposed to mechanical shocks of any kind.

   The device may not be operated under water.

Any use other than that intended puts the safety of people and the measuring system at risk. Therefore, any other use is not permitted.

The manufacturer is not liable for harm caused by improper or unintended use.

2.3   Workplace safety

As the user, you are responsible for complying with the following safety conditions:
- Installation guidelines
- Local standards and regulations
- Regulations for explosion protection

2.4   Operational safety

Before commissioning the entire measuring point:

1. Verify that all connections are correct.
2. Ensure that electrical cables and hose connections are undamaged.
3. Do not operate damaged products, and protect them against unintentional operation.
4. Label damaged products as defective.

During operation:

▶ If faults cannot be rectified,
  take products out of service and protect them against unintentional operation.

2.5   Product security

2.5.1   State of the art

The product is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. The relevant regulations and international standards have been observed.

3   Product description

3.1   Product design
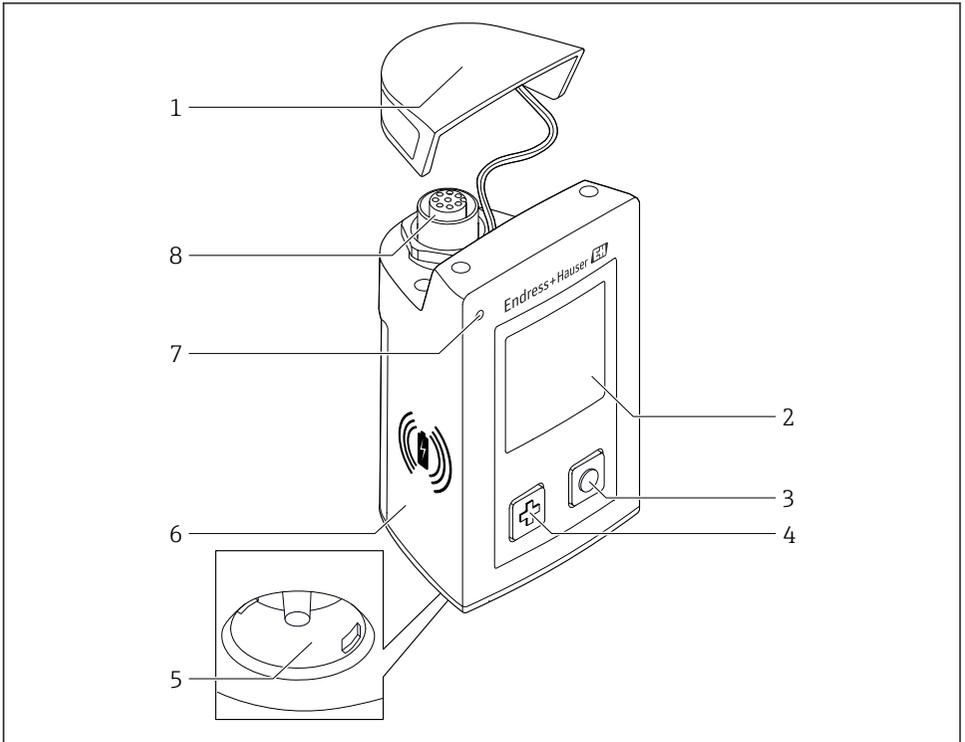
A0040968

🔲 *1   CML18*

1   Protective cap
2   Display screen with automatic screen rotation
3   "Select" button
4   "Next" button
5   Memosens connection
6   Area for wireless charging
7   Status LED
8   M12 connection

3.1.1   Measuring parameters

The mobile device is designed for digital Memosens sensors with an inductive plug-in head and fixed cable sensors with the Memosens protocol and no external power supply:
- pH
- ORP
- Combined pH/ORP sensors
- Conductive conductivity
- Inductive conductivity
- Dissolved oxygen (optical/amperometric)

In addition to measuring the main parameters, Memosens sensors can be used to measure temperature.

The measuring range is adapted to the individual sensor type.

4   Incoming acceptance and product identification

4.1   Incoming acceptance

1. Verify that the packaging is undamaged.
   ↳ Notify the supplier of any damage to the packaging.
     Keep the damaged packaging until the issue has been resolved.
2. Verify that the contents are undamaged.
   ↳ Notify the supplier of any damage to the delivery contents.
     Keep the damaged goods until the issue has been resolved.
3. Check that the delivery is complete and nothing is missing.
   ↳ Compare the shipping documents with your order.
4. Pack the product for storage and transportation in such a way that it is protected against impact and moisture.
   ↳ The original packaging offers the best protection.
     Make sure to comply with the permitted ambient conditions.

If you have any questions, please contact your supplier or your local Sales Center.

4.2   Product identification

4.2.1   Nameplate

The nameplate contains the following information:
- Manufacturer identification
- Device designation
- Order code
- Serial number
- Protection class
- Ambient and process conditions
- Input and output values

▸ Compare the information on the nameplate with the order.

4.2.2   Identifying the product

Product page

www.endress.com/CML18

Interpreting the order code

The order code and serial number of your product can be found in the following locations:
- On the nameplate
- In the delivery papers

Obtaining information on the product

1. Go to www.endress.com.

2. Page search (magnifying glass symbol): Enter valid serial number.

3. Search (magnifying glass).
   ↳ The product structure is displayed in a popup window.

4. Click the product overview.
   ↳ A new window opens. Here you fill information pertaining to your device, including the product documentation.

Manufacturer address

Endress+Hauser Conducta GmbH+Co. KG
Dieselstraße 24
70839 Gerlingen
Germany

4.3   Scope of delivery

The scope of delivery comprises:
- 1 Liquiline Mobile CML18
- 1 set of Operating Instructions in German
- 1 set of Operating Instructions in English

Inductive charger and power unit are available separately.

▶ If you have any queries:
  Please contact your supplier or local sales center.

4.4   Storage and transport

The device contains a lithium ion battery. For this reason, the device may only be exposed to the operating and storage temperatures indicated.

The device may not be exposed to mechanical shocks of any kind.

The device may not be operated under water.

5   Electrical connection

5.1   Connecting the sensor

5.1.1   Connecting the Memosens sensor directly
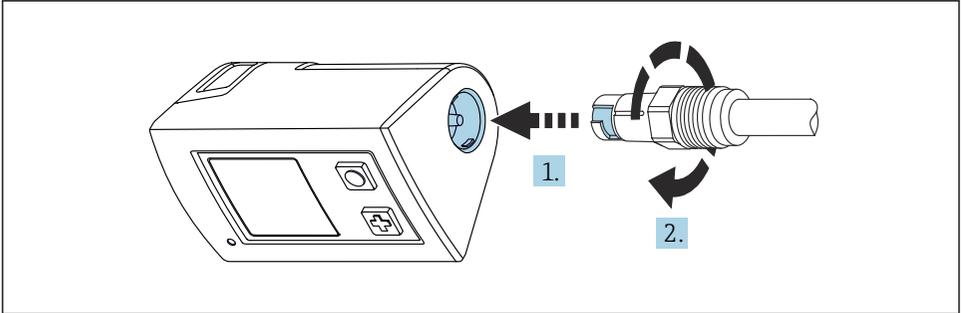
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⊞ *2   Sensor connection*

1. Insert the sensor into the Memosens connection.
2. Click the Memosens connection into place.

5.1.2   Connecting the Memosens sensor with M12 fixed cable connection

A0040974   A0040972

1. Remove the protection cap.
2. Insert the M12 fixed cable.
3. Screw on the M12 fixed cable.

5.1.3   Connecting the sensor via the Memosens M12 cable

The M12 cable has two different connectors:
- M12 connector for connecting to the device
- Memosens connection to connect the Memosens sensor

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🖼 *3   Cable connection*
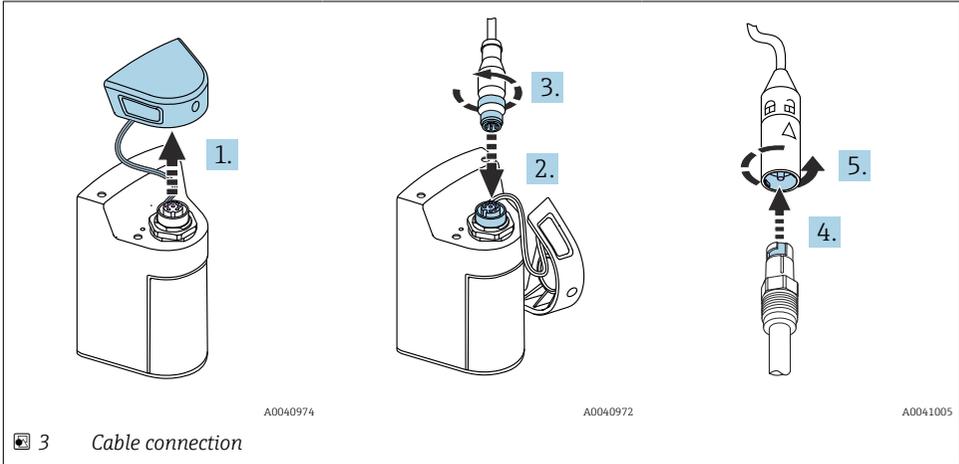
1. Remove the protective cap.
2. Insert the M12 connector.
3. Screw on the M12 connector.
4. Insert the sensor into the Memosens connection.
5. Click the Memosens connection into place.

5.2   Ensuring the degree of protection
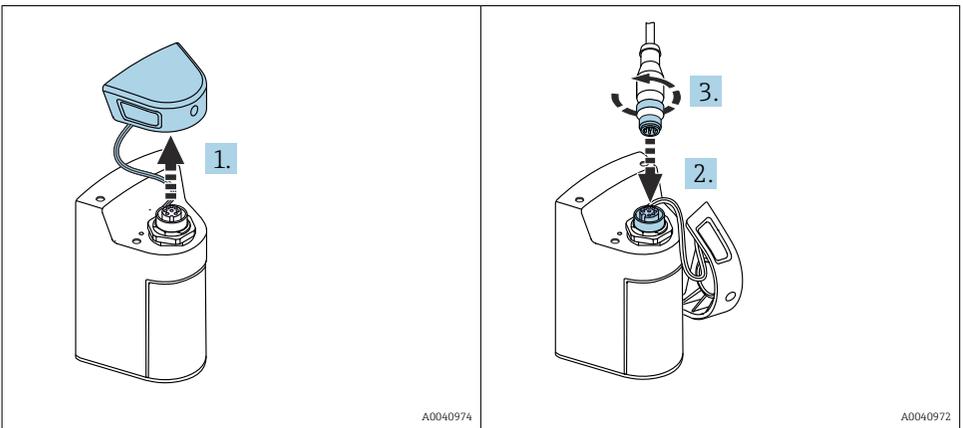
Only the mechanical and electrical connections which are described in these instructions, and which are necessary for the required intended use, may be established on the device delivered.

▶ Exercise care when carrying out the work.

Otherwise, the individual types of protection (Ingress Protection (IP), electrical safety, EMC interference immunity) agreed for this product can no longer be guaranteed due, for example, to covers being left off or cable (ends) that are loose or insufficiently secured.

6 Operation options

6.1 Overview of operation options

6.1.1 Operation options

There are three options for operating and configuring the device:
- Internal operating menu with keys
- Memobase Pro app via Bluetooth® LE wireless technology → 🖹 18
- SmartBlue app via Bluetooth® LE wireless technology → 🖹 27

6.1.2 Display and operating elements
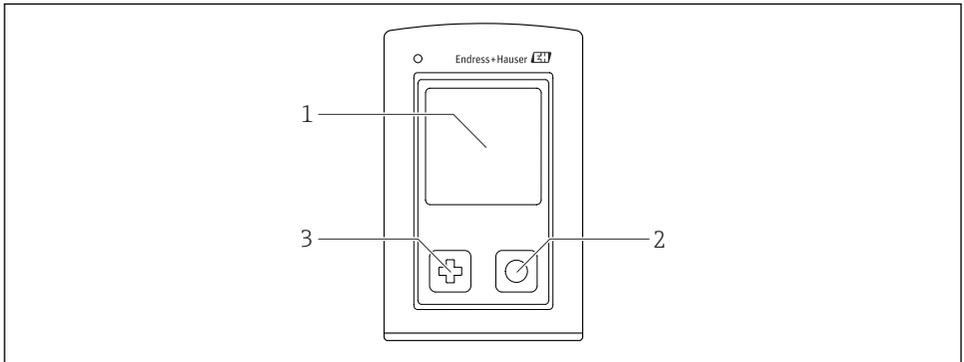
A0040996

🖻 4 *Overview of display and operating elements*

1   Display
2   "Select" button
3   "Next" button

Button functions

Button	Device switched off	On measuring screen	In the menu
⊞	Switch on	Scroll through measuring screens	Scroll down
⊙	Switch on	Save current measured values (Grab Sample)	Confirm/select
⊞ (long hold)	-	Open the menu	Change to the measuring screen
⊞ + ⊙ (Press and hold for more than 7 seconds until the green LED lights up and the device restarts.)	Forced hardware reset	Forced hardware reset	Forced hardware reset

6.2   Structure and function of the operating menu

6.2.1   Menu structure

Power-off	
Power-off	▶

Application					
Data logger	▷	Data logger	▶		
		Log interval	▶		
		Cond. unit	▶		
		Res. unit	▶		
		Erase data	▷	Erase grab values	▷	Abort	▶
						Erase	▶
				Erase continuous logs	▷	Abort	▶
						Erase	▶
Data logger plot	▶				
Units	▶				

Diagnostics			
Sensor info	▶		
Calibration info	▶		
Diagnostics list	▶		
Data logger entries	▶		
Display test	▶		
Device info	▷	Manufacturer	▶
		Software version	▶
		Serial number	▶
		Name	▶
		Extended order code	▶

System/Language	
Display language	▶
Bluetooth	▶
Display brightness	▶

System/Language			
Signal sounds	▶❘		
M12 CSV	▶❘		
Power management	▷	Power save w. charger	▶❘
		Power save w/o charger	▶❘
		Power-off w. charger	▶❘
		Power-off w/o charger	▶❘
Regulatory information	▶❘		

Support links	
Support links	▶❘

Guidance	
1 point calib. (ORP/Redox)	▶❘
2 point calibration (pH and ISFET)	▶❘
Cell constant (Inductive/conductive conductivity)	▶❘
Installation factor (Conductive conductivity)	▶❘
Air 100% rh (Oxygen)	▶❘
Air variable (Oxygen)	▶❘
1 point calib. (Oxygen)	▶❘

6.2.2 Display
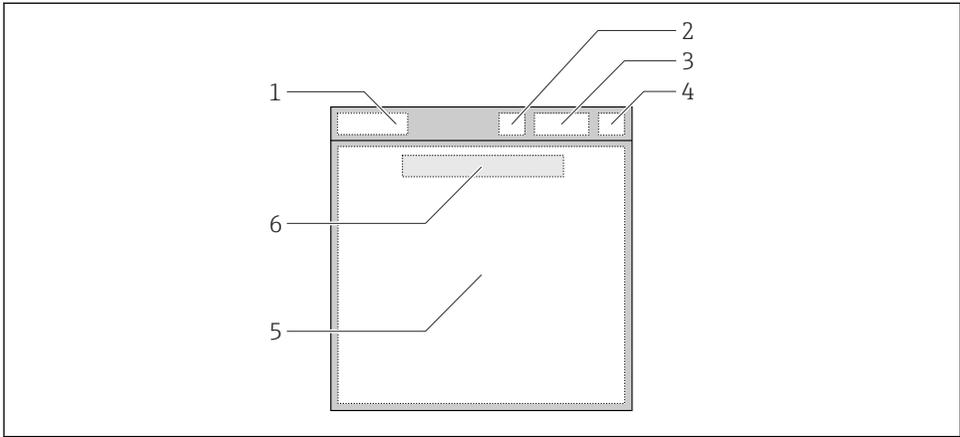
A0044047

🖾 *5   Schematic representation of the display structure*

1   Menu path/title of measuring screen
2   Bluetooth status
3   Battery level, charging information
4   NAMUR indicator
5   Measuring screen
6   Date and time (displayed in main menu and if no sensor is connected)

Status according to NAMUR NE107 categories:

NAMUR indicator	Status
OK	The device and sensor are working reliably.
F	Failure of device or sensor. F status signal as per NAMUR NE107
M	Device or sensor requires maintenance. M status signal as per NAMUR NE107
C	Device or sensor undergoing function check. C status signal as per NAMUR NE107
S	Device or sensor being operated out of specification. S status as per NAMUR NE107

6.2.3 Measuring screens

The display can show 3 measuring screens that the user can switch between:

| Measuring screen (1 of 3)	Measuring screen (2 of 3)	Measuring screen (3 of 3)
Primary value	Primary and secondary measured value	All measured values of the sensor input

6.3 Operation via Memobase Pro app

6.3.1 Operation options

- Connection of two CML18 devices simultaneously with color coding for differentiation
- Save measured values via the app and via CML18
- Create samples by scanning a QR code or manual data entry
- Assign measured values of a sample
- Clearly identify samples with unique ID, photo, GPS coordinates and comment function
- Export measured values to a CSV file
- Calibrate sensors using guided wizard, traceable storage of calibration data
- Enter data from buffer solutions and reference buffer solutions. E+H buffer solutions and reference buffer solutions can be imported by scanning a QR code.

The Memobase Pro app is available in the relevant app stores for iOS devices and Android devices.

6.3.2   Installing the Memobase Pro app and registering users
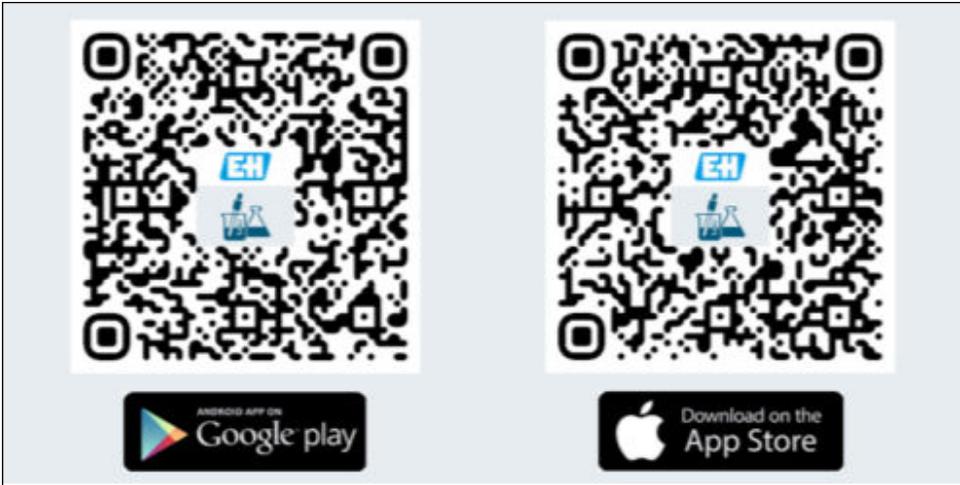
1. Scan the QR code and install the Memobase Pro app on the mobile device.
2. Start the app after installation.
   ↳ The guided user registration starts automatically.

6.3.3   Connecting the device to the Memobase Pro app

1
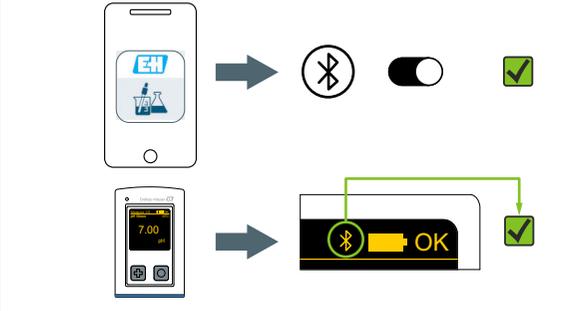
2

Default user name: admin
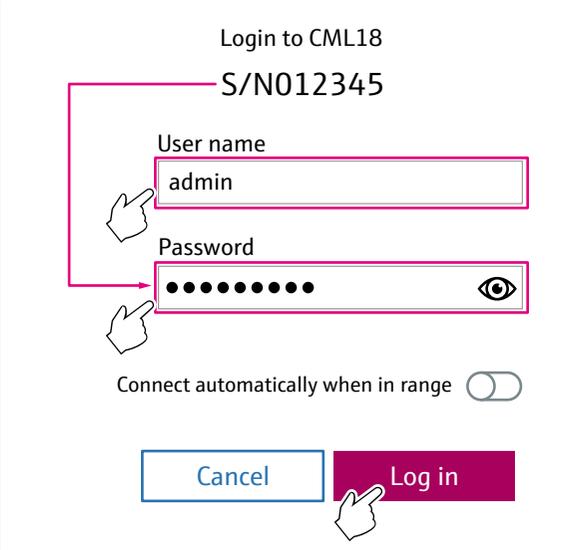Default password: Serial number of CML18

Login to CML18

S/N012345

User name

admin

Password

●●●●●●●●
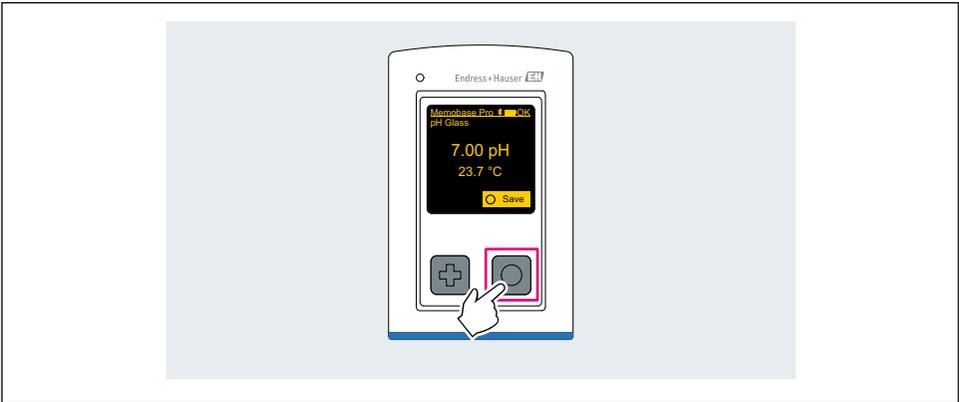
Connect automatically when in range
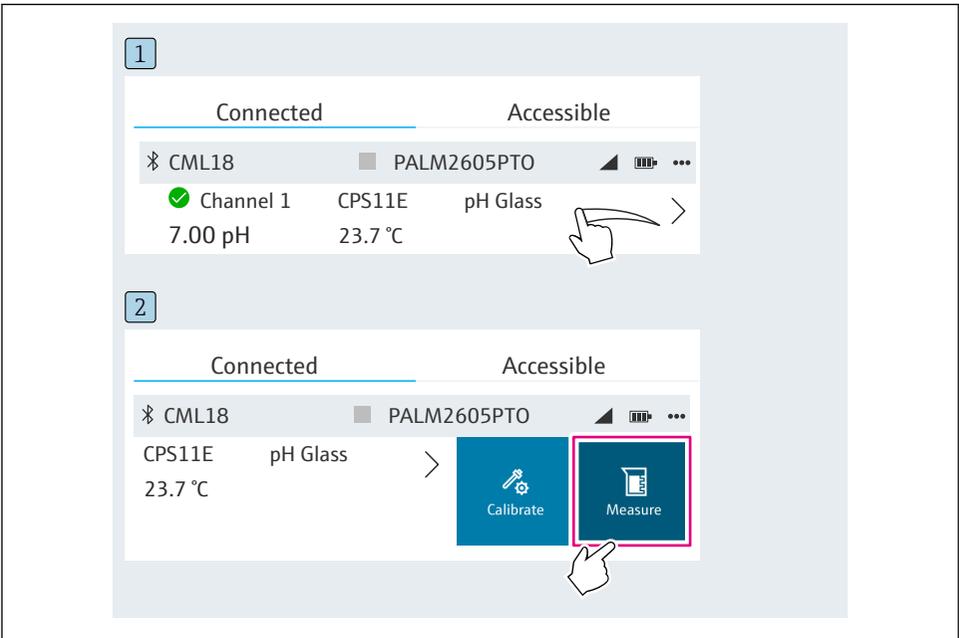
Cancel   Log in

A0055343

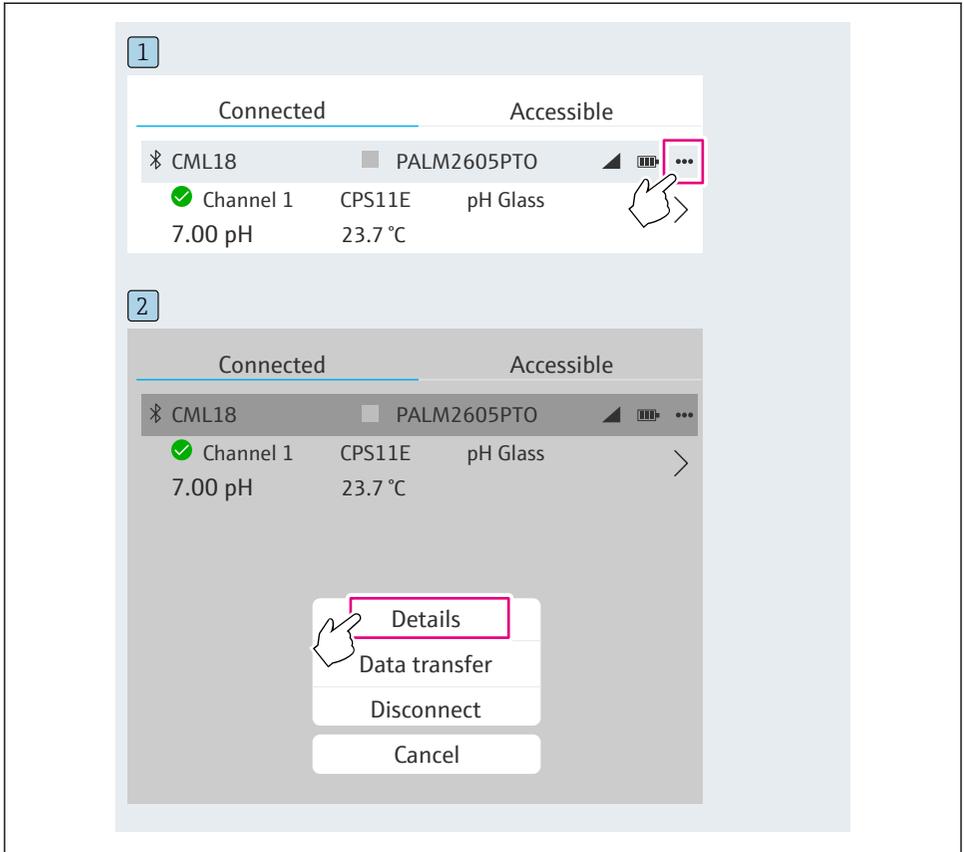### 6.3.4   Saving the measured value

Via the device

A0055328

Via the Memobase Pro app
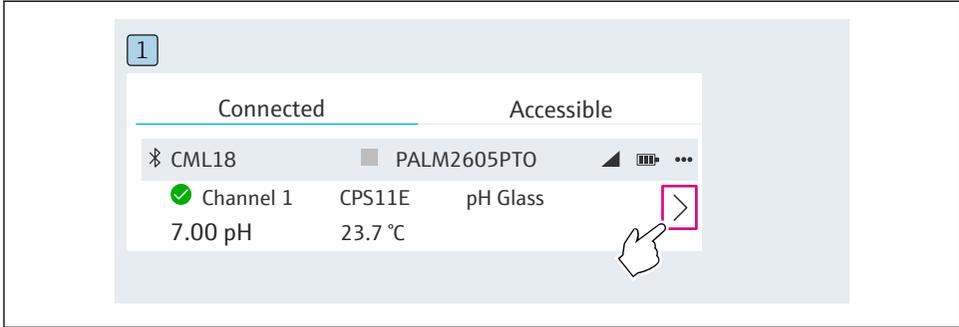

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6.3.5   Configuring the device

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Functions:
- Display device details
- Enter a name for the device
- Define channel ID: Name and color of the channel
- Connect automatically
- Device management
  - Firmware update
  - Change password
  - Change recovery code
  - Change date and time

6.3.6   Displaying sensor details

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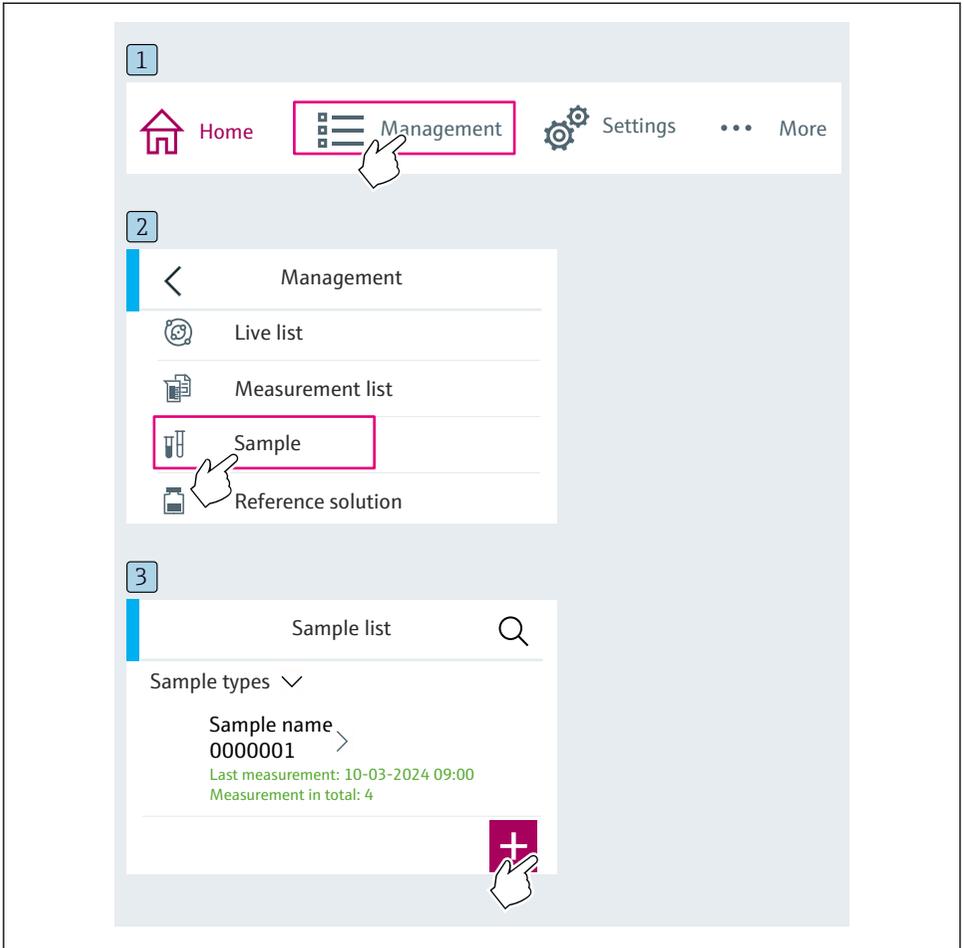Functions:
- Detailed display and graphic representation of all the measured values of the sensor
- Save the measured value
- Calibrate the sensor
- Display the operating information and calibration information of the sensor location
- Perform calibration settings and measurement settings for the sensor

6.3.7   Creating a sample

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6.3.8 Exporting measured values
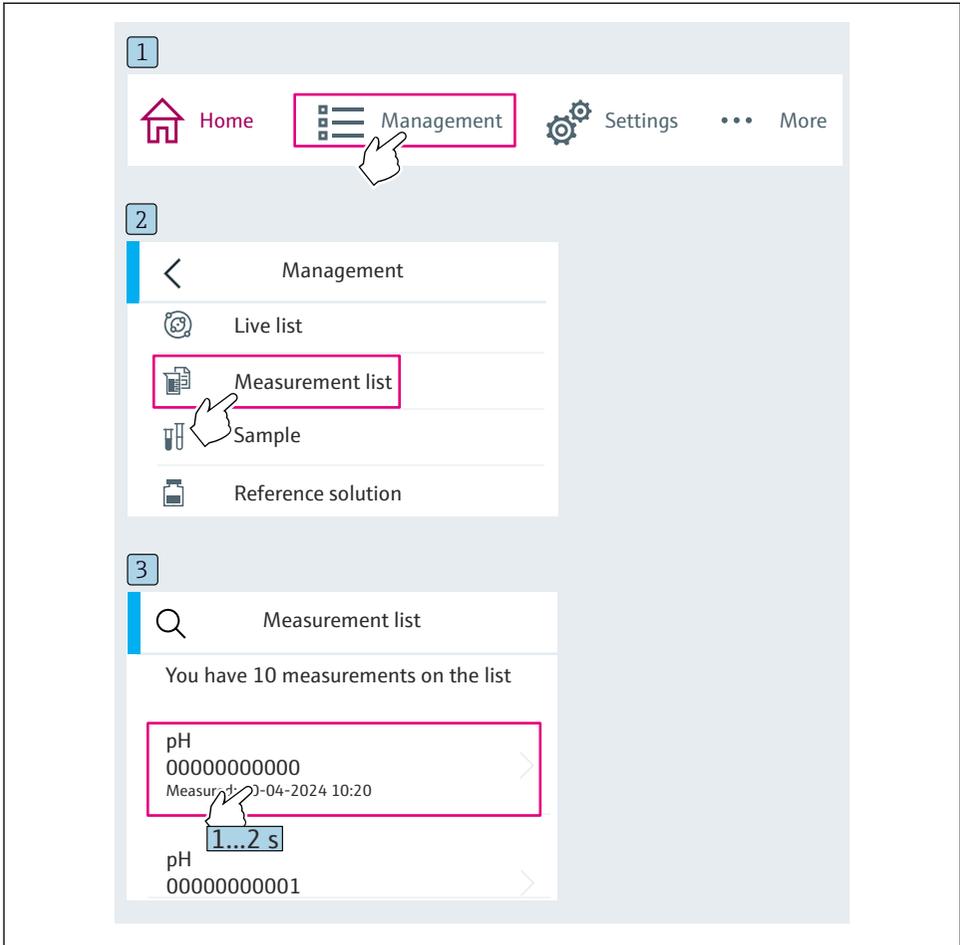
A0055331

4

Measurement list

Select all   2 selected

pH
00000000000
Measured: 10-04-2024 10:20

pH
00000000001
Measured: 10-04-2024 10:30

5

on iOS device (iPhone/iPad)

Files → On my iPad → Memobase Pro → Exports

on Android device

My files → Internal storage → Memobase Pro → Exports

A0055342

6.3.9   Calibrating the sensor
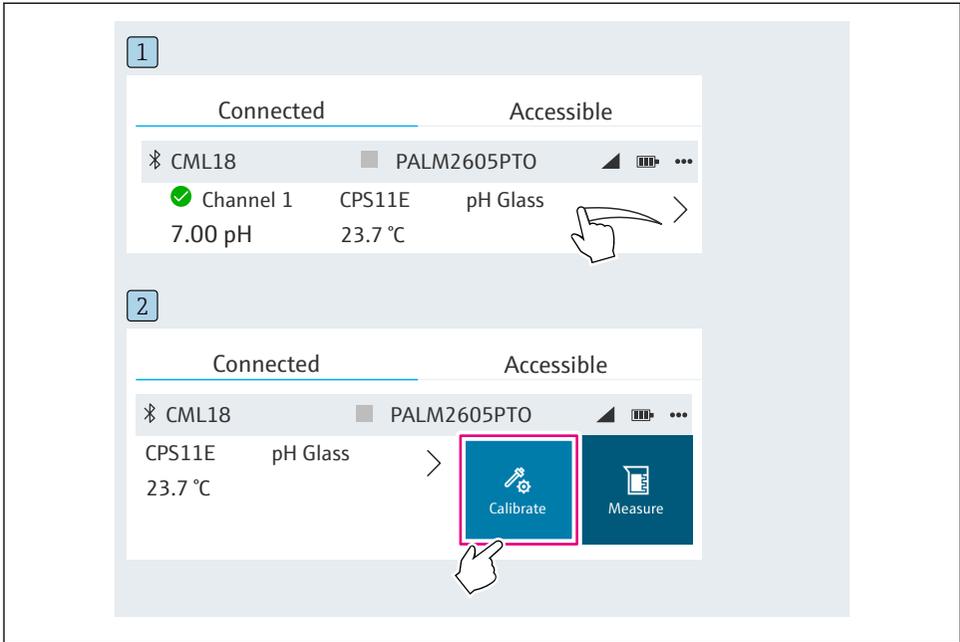
A0055332

6.3.10   Adding the reference buffer solution
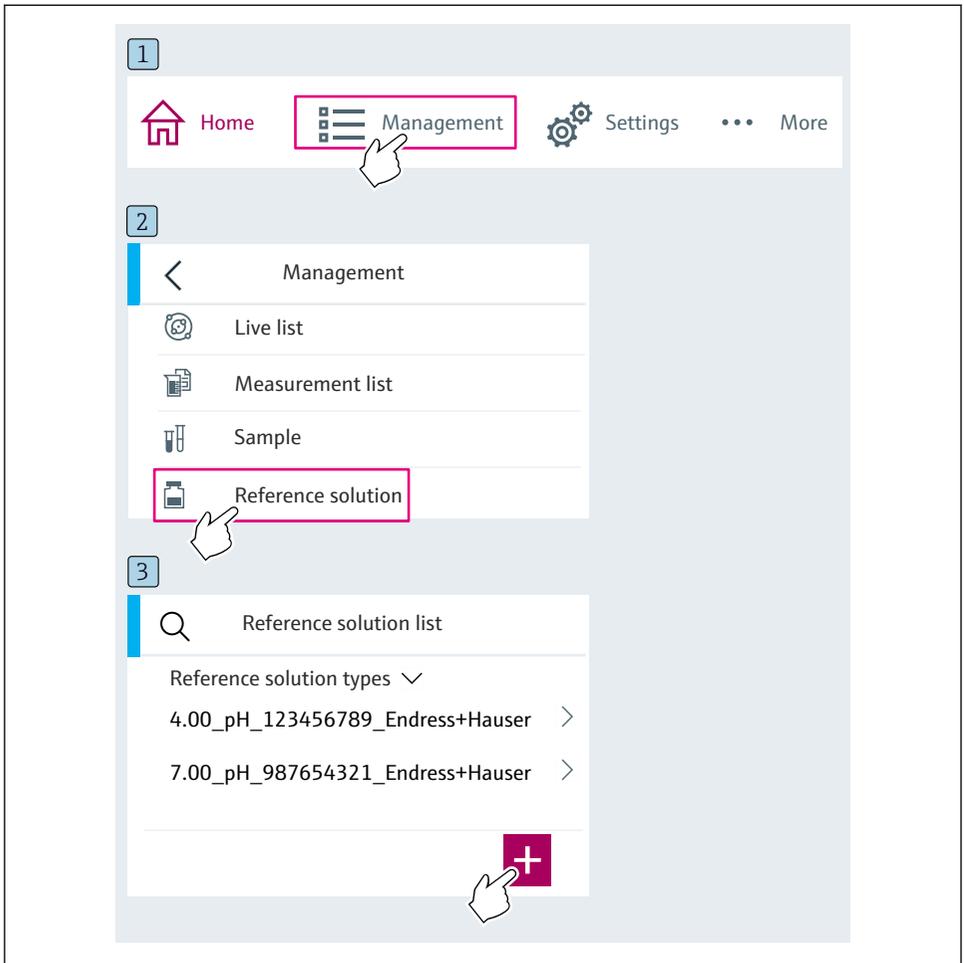
A0055333

6.4   Operation via SmartBlue app

The SmartBlue App is available for download from the Google Play Store for Android devices and from the Apple App Store for iOS devices.

Download the SmartBlue App.

▶ Use the QR codes to download the app.

A0033202

🖼 *6   Download links*

System requirements
- iOS devices: iPhone 4S or higher from iOS9.0; iPad2 or higher from iOS9.0; iPod Touch 5th generation or higher from iOS9.0
- Devices with Android: from Android 4.4 KitKat and Bluetooth® 4.0
- Internet access

▶ Open the SmartBlue App.

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🖼 *7   SmartBlue App icon*

> Bluetooth must be enabled on both devices.
>
> Enable Bluetooth → 🖺 36
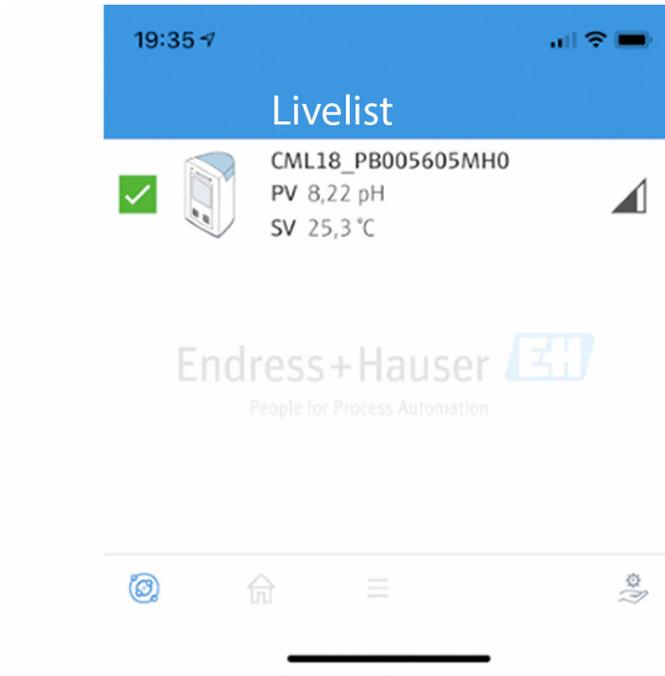
⊞ *8   SmartBlue App Livelist*

The Livelist displays all of the devices that are within range.

▶ Tap the device to select it.

▶ Log in with user name and password.

- User name: **admin**
- Initial password: **Serial number of the device**

🛈 Change the user name and password after logging in for the first time.

In the Home view, the current measured values are displayed along with the device information (tag, serial number, firmware version, order code).
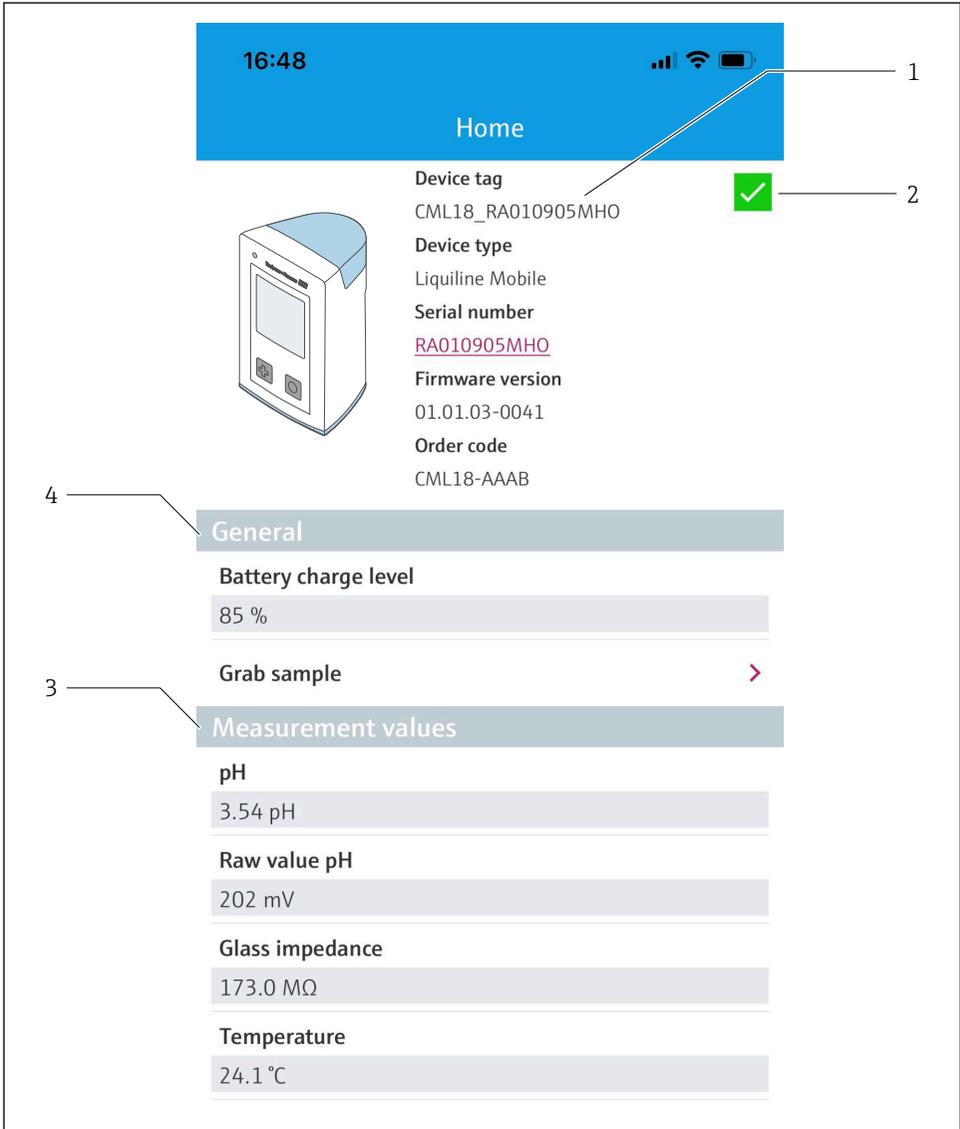
A0048102

🖾 *9   Home view of SmartBlue app with current measured values*

1   CML18 system and device information
2   Current NAMUR status and shortcut to diagnostic list
3   Overview of measured values of connected sensor
4   Battery charge level and sampling option

Operation is via 4 main menus:
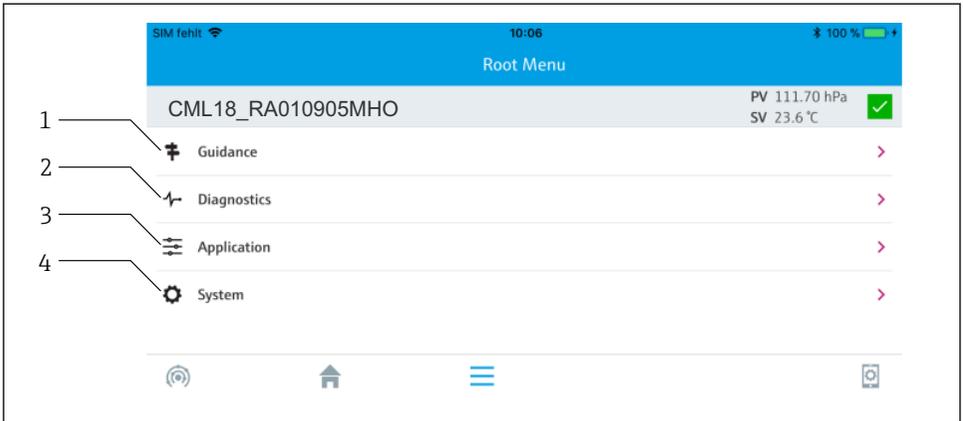
⧉ 10   *Main menus of the SmartBlue app*

1   Guidance
2   Diagnostics
3   Application
4   System

Menu	Function
Guidance	Contains functions that involve a sequence of activities in itself (= "Wizard", guided operation). E.g. Calibration or data logger export.
Diagnostics	Contains information on operation, diagnostics and troubleshooting, as well as configuration of the diagnostic behavior.
Application	Sensor data for specific optimization and for detailed process adjustment. Adapts the measuring point to the application.
System	These menus contain parameters for configuring the overall system, e.g. Time and date options.

7   Commissioning

7.1   Preliminaries

7.1.1   Charging the device

Charge the device fully before initial commissioning.

There are two possible ways to charge the device:
- Inductively (wirelessly) via Qi-certified charger
- Via cable with M12 USB data + charging cable

The following applies to both options:
- When device is switched on:
  - When charging starts, a flash symbol appears on the display and a confirmation tone sounds.
  - If charging stops before the battery is fully charged, another confirmation tone sounds.
  - An acoustic signal sounds when charging is complete.
- When device is switched off:
  - The green LED flashes during charging.
  - When charging is complete, an acoustic signal sounds and the LED is continuously lit green for 10 minutes.
  - The device then switches off.

Inductive charging via Qi charger

Only use Qi-certified chargers (Qi version 1.2)!

Further information: www.wirelesspowerconsortium.com
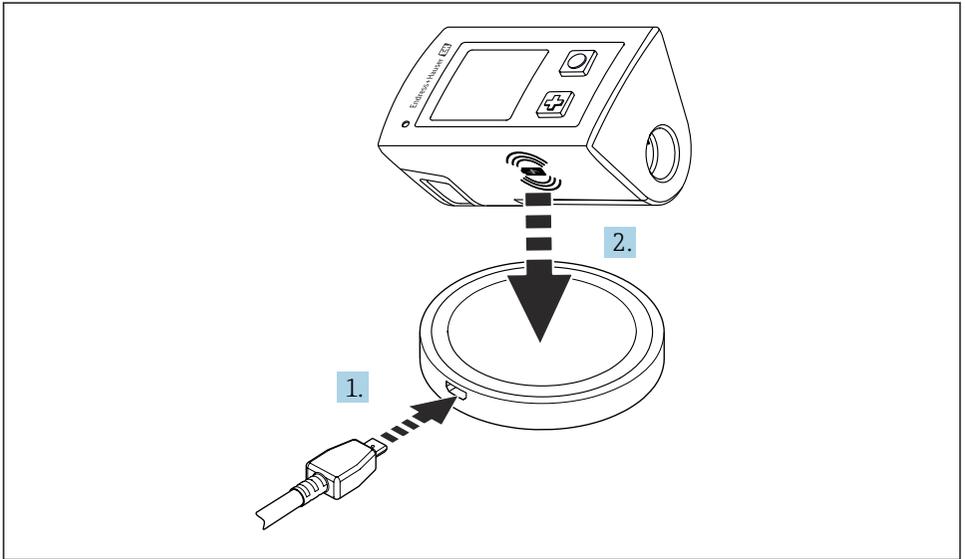
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⊡ *11   Inductive charging*

1. Connect the charger to the power source.

2. Place the device with the charging side on the charger.

Charging begins.

The battery charge level is shown on the display when the device is switched on.

If the device is switched off, the battery charge level is indicated via the LED.

An acoustic signal indicates that charging is complete.

During inductive charging, measurement via the integrated Memosens connection on the device is not possible.

A message to this effect is shown on the display.

Measurement via M12 cable is still possible.

Charging via M12 USB data + charging cable

The M12 USB data + charging cable has two different connectors:
- M12 connector for connecting to the device
- USB connector for connecting to a computer or USB charger

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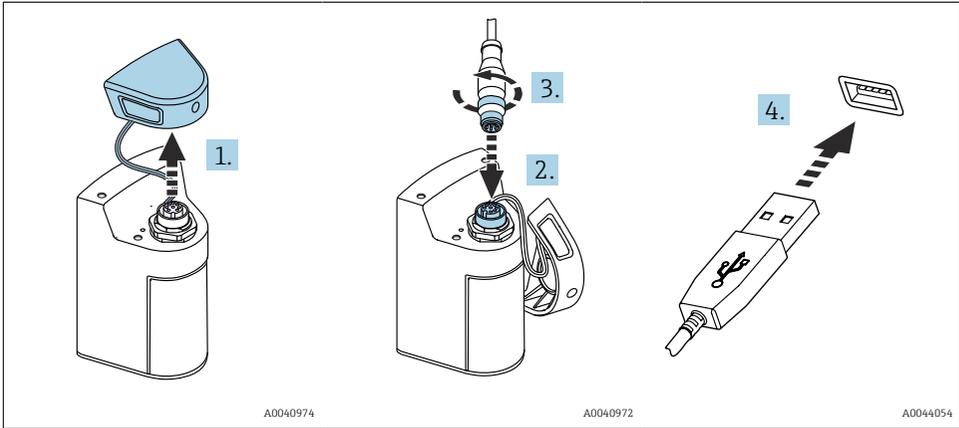
1. | Remove the protective cap.
2. | Attach the M12 connector of the cable to the device connection.
3. | Screw on the M12 connector of the cable.
4. | Connect the USB connector to a USB charger or USB port on a computer.

7.2   Function check

⚠ WARNING

Connection errors
The safety of people and of the measuring point is at risk!
▶ Put the device into operation only if you can answer **yes** to **all** the following questions.

Device condition and specifications
▶ Are the device and all the cables free from damage on the outside?
▶ Are the mounted cables strain relieved?
▶ Are the cables routed without loops and cross-overs?

7.3   Switching on the measuring instrument

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☒ *12   Switching on the device*

▶ Press ⊞ or ⊙.
  ↳ The device starts up.

A connected sensor is recognized automatically.
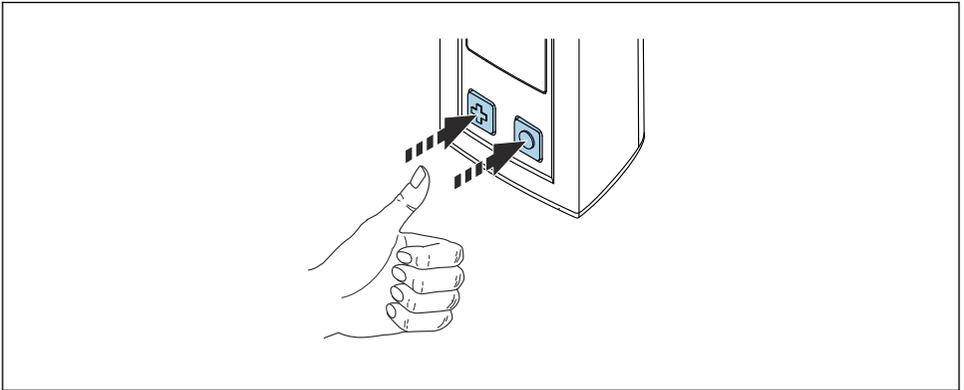
The time required before a measured value is displayed depends on the sensor type and measuring principle and can vary.

7.3.1   Switching off the measuring instrument

1. Navigate to: **Main menu/Power-off**
2. Press ⊙ to switch off the device.

7.4   Setting the display language

When the device is started for the first time, the user is prompted to select the display language. After this, proceed as described below to change the display language.

1. Navigate to: **Main menu/System/Language/Display language**
2. Press ⊙ to select the display language.

The following display languages are available:
• English
• German
• Croatian
• Spanish
• Italian
• French
• Japanese
• Korean
• Dutch

- Polish
- Portuguese
- Russian
- Chinese
- Czech
- Norwegian

7.5   Configuring the measuring instrument

7.5.1   Configuring the Bluetooth connection

1. Navigate to: **Main menu**/**System**/**Language**/**Bluetooth**
2. Press ⊙ to scroll through the predefined values.

Description of setting	Configuration options
Switch Bluetooth connection on/off	• Enabled • Disabled

ℹ️ If the Bluetooth connection is disabled, operation via the SmartBlue App is not possible.

7.5.2   Setting the date and time

Preparatory steps

1. Enable Bluetooth. → 🖺 36
2. Link the device to a mobile terminal via the SmartBlue app. → 🖺 27

1. Select the device in the SmartBlue App.
2. Select **System**.
3. Select **date/time**.
4. Select **Take over from mobile device**.
    ↳ or:
5. Manually configure the date and time.

7.6   Advanced settings

7.6.1   Displaying device information

1. Navigate to: **Main menu**/**Diagnostics**/**Device info**
2. Press ⊙ to scroll through the **Device info**.

The following information about the device is shown on the display:
- Manufacturer identification
- Software version
- Serial number
- Name
- Extended order code

7.6.2   Adjusting the energy settings

A maximum battery life of 48 h can be achieved via the energy settings.

For measurements with oxygen sensors, the device remains permanently switched on, regardless of the energy settings selected.

1.   Navigate to: **Main menu**/**System**/**Language**/**Power management**
2.   Press ◎ to scroll through the predefined values.

The following energy settings are available:
- **Power save w. charger** (power save with charger)
- **Power save w/o charger** (power save without charger)
- **Power-off w. charger** (switch off with charger)
- **Power-off w/o charger** (switch off without charger)

The power save mode is activated after the set time if there is no user interaction.

In the power save mode, the display is switched off and the device remains on standby.

There are 2 power save settings:

Power save w. charger *(power save with charger)*

Description of setting	Configuration options
Set the time until the power save mode is activated if the device is connected to the mains.	• 1 min • 5 min • **15 min** • 30 min • 1 h • 2 h • Never

Power save w/o charger *(power save without charger)*

Description of setting	Configuration options
Set the time until the power save mode is activated if the device is running on the battery.	1 min **5 min** 15 min 30 min 1 h

The device is automatically switched off after the selected time.

The device is not switched off automatically if the Bluetooth connection is enabled.

There are 2 power-off settings:

Power-off w. charger *(switch off with charger)*

Description of functions	Configuration options
Set the time until the device switches off automatically if it is connected to the mains.	1 min 5 min **15 min** 30 min 1 h 2 h - Never

Power-off w/o charger *(switch off without charger)*

Description of functions	Configuration options
Set the time until the device switches off automatically if it is running on the battery.	1 min 5 min **15 min** 30 min 1 h 2 h - Never

7.6.3   Signal sounds

1. Navigate to: **Main menu**/**System**/**Language**/**Signal sounds**
2. Press ⦾ to scroll through the predefined values.
   ↳ Other settings are possible via the SmartBlue App.

Description of setting	Configuration options
Switch signal sounds on/off	- Enabled - Disabled

Additional changes to the signal sounds can be made via the SmartBlue App.

7.6.4   Configuring M12 CSV

Measured values can be output to other devices via the device's M12 connection. The M12 USB data + charging cable→ 🕮 87 is used for this purpose. The transmitted data can, for example, be further processed in real-time in an external computer program.

A data rate of 9600 bit/s in 8N1 configuration must be used as the connection parameter at the receiving system.

1. Navigate to: **Main menu**/**System**/**Language**/**M12 CSV**
2. Press ◎ to scroll through the predefined values.

Description of setting	Configuration options
Switch on/off M12 CSV	• On • Off

ℹ️ When the M12 CSV option is enabled, no sensor can be operated via cable. Operation via the Memosens connection on the device is still possible.

A message to this effect is shown on the display.

7.6.5   Adjusting the display brightness

1. Navigate to: **Main menu**/**System**/**Language**/**Display brightness**
2. Press ◎ to adjust the display brightness.

Description of setting	Configuration options
Set the display brightness	• Low • Medium • High • Maximum

7.6.6   Hardware reset in an emergency

ℹ️ This type of restart should only be performed in an emergency if the device does not respond to any other input.

▶ Press and hold ◎ and ⊕ simultaneously for at least 7 seconds until the LED flashes green.
  ↳ The device restarts.

7.6.7   Displaying regulatory information and approvals

1. Navigate to: **Main menu**/**System**/**Language**/**Regulatory information**
2. Press ◎ to display regulatory information and approvals.

7.6.8   Data logger

Defining the log interval

i   The log interval can only be changed if the data logger is deactivated.

1.   Navigate to: **Main menu/Application/Data logger/Log interval**
2.   Press ⊙ to scroll through the predefined values.

Description of setting	Configuration options
Set the time until the next measured value is saved automatically.	• 1 s • 2 s • 10 s • 20 s • 30 s • 1 min • 5 min • 30 min • 1 h

i   If the device is woken up to record a log value, any existing switch-on / settling times of the connected sensor are not taken into account.

For measurements with oxygen sensors, the device remains permanently switched on with the data logger enabled, regardless of the energy settings selected.

Adjusting the energy settings:→ 🖹 37

Enabling/disabling the data logger

i   The data logger must be deactivated in the following cases:
   • if changes are made to the measurement settings
   • if the measured values are exported
   • Sensor replacement

1.   Navigate to: **Main menu/Application/Data logger/Data logger**
2.   Press ⊙ to scroll through the predefined values.

Description of setting	Configuration options
Enable/disable automatic data logger	• On • Off

3.   Exit the menu.
4.   Once activated, the data logger automatically starts recording the measured values.
   ↳   If the data logger is activated, the display flashes alternately between the "**Logging...**" message and the current menu path/measuring screen title.
5.   Press ⊕ to change the active measuring window.

Configuring the data logger for ultrapure water

Prior to activating the data logger, the measured value units can be adjusted for conductivity measurement with the data logger in ultrapure water. An adjustment is necessary to eliminate rounding errors in the smallest measured values.

The units for conductivity and resistance can be permanently configured.

1.   Navigate to: **Main menu/Application/Data logger/Cond. unit**
2.   Press ⊙ to scroll through the predefined values.

1.   Navigate to: **Main menu/Application/Data logger/Res. unit**
2.   Press ⊙ to scroll through the predefined values.

7.6.9   Switching units

Only the units used by the sensor are displayed.

1.   Navigate to: **Main menu/Application/Units**
2.   Press ⊙ to scroll through the predefined values.

8   Operation

8.1   Reading the measured values

8.1.1   Displaying the measured values

Measuring screens are shown on the display when a sensor is connected.

There are 3 measuring screens with different measured variables for each sensor → 🖥 16.

To scroll through the measuring screens:

▶ Press 🖽.

After the last measuring screen, the display returns to the first measuring screen.

8.1.2   Wall spacing for conductivity sensors

When measuring conductivity or calibrating conductivity sensors, maintain a minimum distance of 15 mm (0.6 in) to the floor and to the measuring vessel walls in order to avoid falsified measurements caused by wall effects.
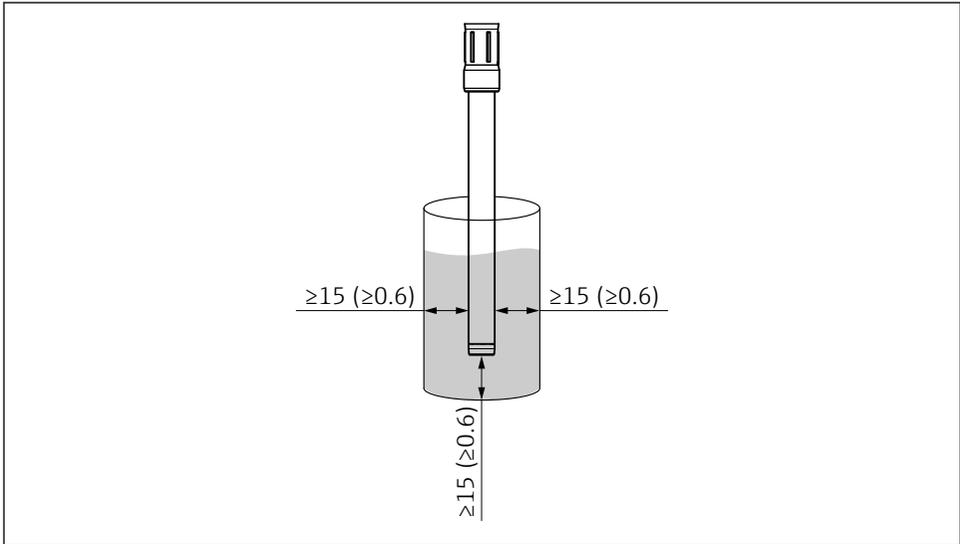
 🖾 13   Minimum distance to walls and floor of measuring vessel in mm (in)

8.1.3   Saving the sample (Grab Sample)

Samples can be assigned IDs and a user-definable text. By assigning an ID, samples can be assigned more easily to a measuring point, for example.

🛈   IDs and the associated texts can be changed via the SmartBlue app.→ 🖥 43

1. In the measurement window, press ⟲.
   ↳ A new window appears.
2. Give the sample an ID.
   ↳ Press ⊕ to scroll through the available IDs.
3. Press ⟲ to save the sample with the selected ID.
   ↳ Or: Press and hold ⊕ to discard the sample.

8.1.4 Changing the sample IDs

The 10 pre-set IDs for samples can be changed via the SmartBlue App.

Preparatory steps

1. Enable Bluetooth. → 🖹 36
2. Link the device to a mobile terminal via the SmartBlue app. → 🖹 27

Transferring the data

1. Select the device in the SmartBlue App.
2. Select **Grab sample**.
3. Select ID text.
   ↳ Click in the line of text to assign an individual text for the selected ID.

🛈 Depending on the input language selected, there are up to 32 characters available for the assignment of the individual ID.

### 8.1.5 Exporting measured values

Export to a mobile device

Saved data can be transferred from the internal device memory to mobile devices.

Preliminaries

1. Install the SmartBlue app on a mobile device. → 🖹 27
2. Enable Bluetooth. → 🖹 36
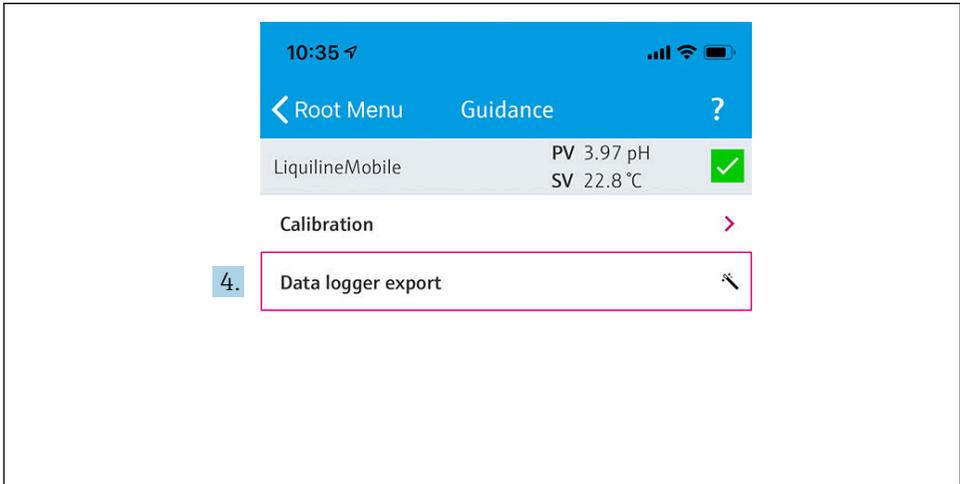3. Link the device to a mobile device via the SmartBlue app. → 🖹 27

Transferring the data

1. Select the device in the SmartBlue App.
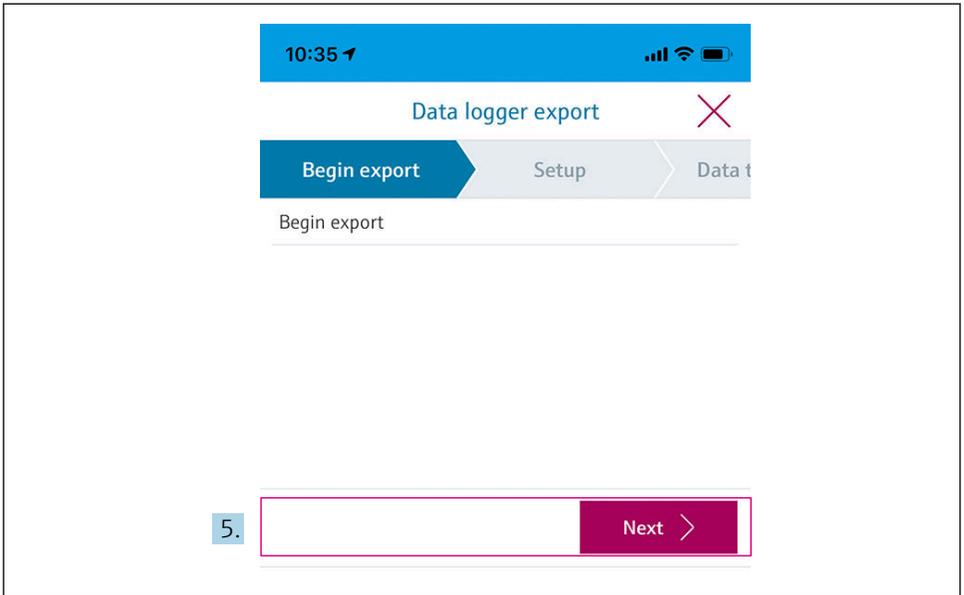2. Select ☰ in the SmartBlue app.
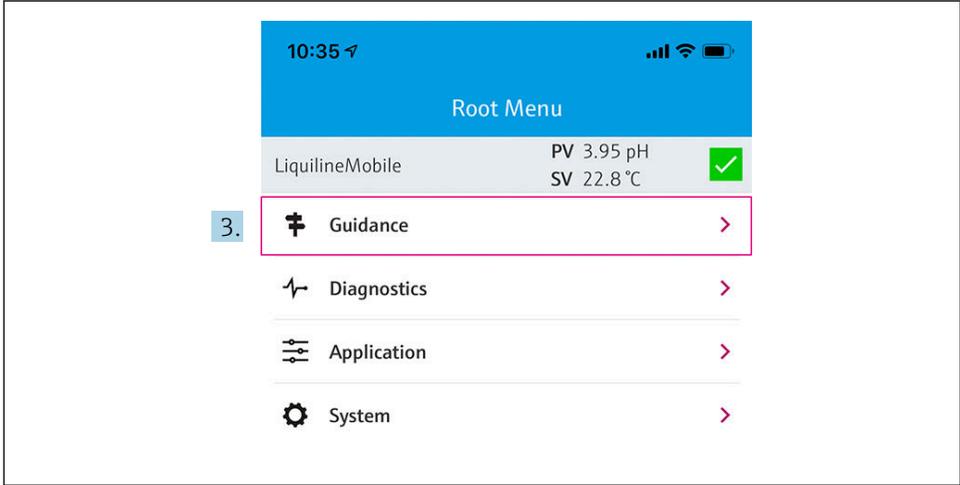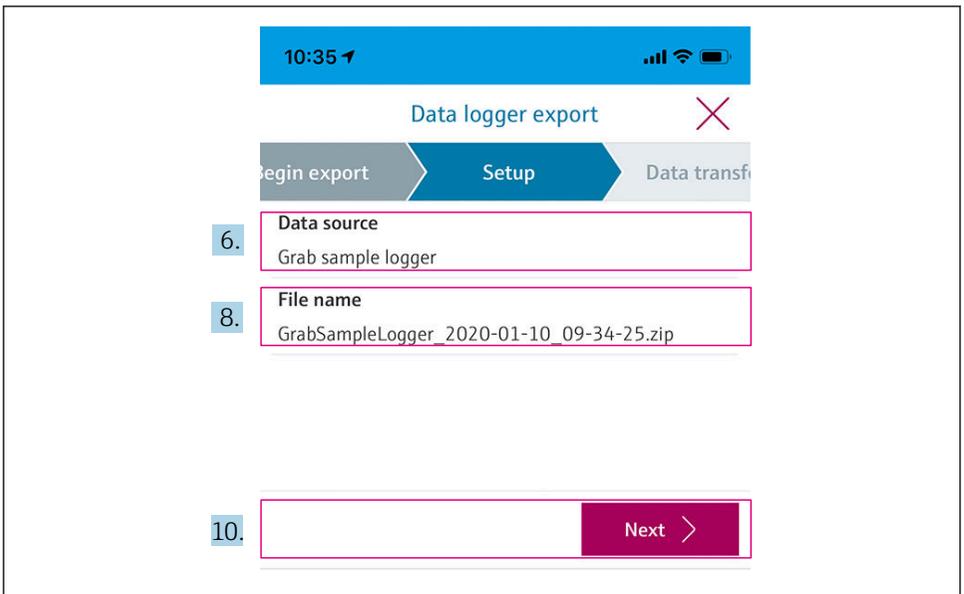
A0042257

3. Select **Guidance**.

A0042258

4. Select **Data transfer**.

A0042261

5. Continue with **Next**.

A0042260

6. Select **Data source**.
   ↳ Select **Grab sample logger** for saved samples.
     Select **Cont. data logger** for data records of data logger.
7. Confirm with **Ok**.
   ↳ Press ← to discard changes and close the drop-down menu.
8. Select **File name**.
   ↳ Click the text line to enter an individual name for the generated data package.
9. Confirm with **Ok**.
   ↳ Press ← to discard changes and close the drop-down menu.
10. Continue with **Next**.
    ↳ Data transfer starts.
      Progress is displayed.
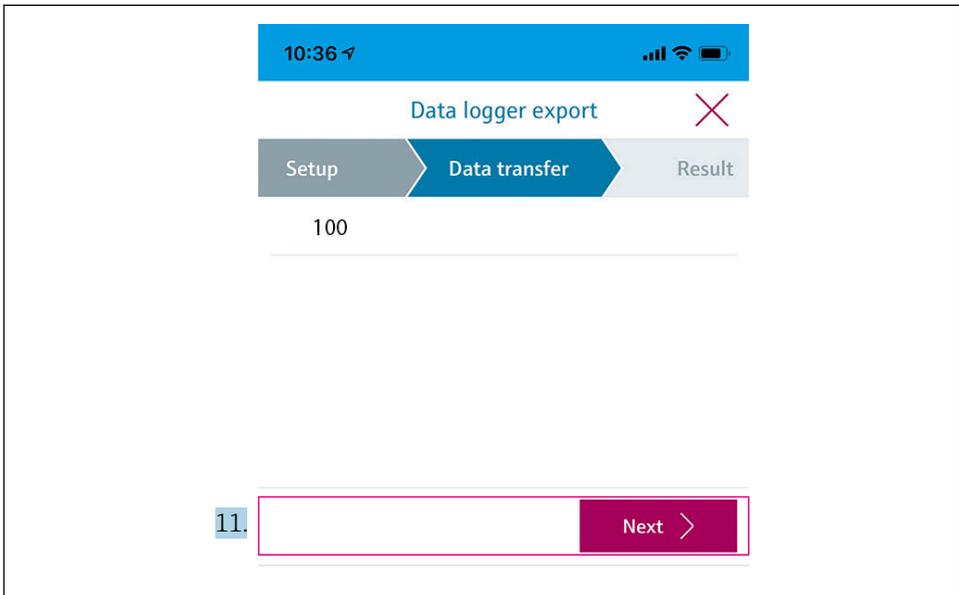
A0042263

11. When the transfer is complete, press **Next** to continue.
    ↳ The result of the data transfer is displayed.
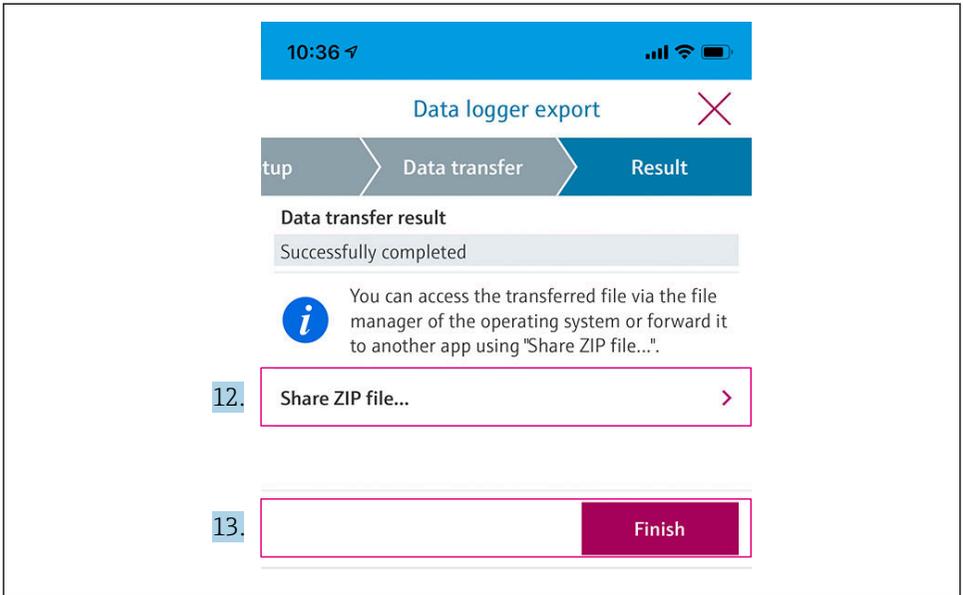
A0042265

12. Use **Share ZIP file...** to send the exported data records or save them locally.

13. Complete export by pressing **Finish**.

Export to a computer

Preparation:

1. Download the CML18 readout tool to the target computer and save it.
   - The current readout tool can be found in the Download area on the product page under www.endress.com/CML18.

2. Deactivate the data logger. → 🗎 40

1. Remove all the sensors from the device.

2. Connect the device to a computer via the M12 USB data + charging cable. → 🗎 33

3. Run the CML18 readout tool on the computer.

4. Follow the instructions given by the tool.
   - The measured values are exported to an .xlsx file for table calculation programs such as Microsoft Excel.

The export files of the grab sample and data logger measured values have a different display format.

Elements of the export file	
Data logger export file	**Grab sample export file**
Elements in the general information section of the export file: • Filename • File content • Format version • Device type • Device tag • Device serial number • Device firmware version • Sensor serial number • PV name • PV unit • SV name • SV unit • TV name • TV unit Elements of the individual measured value entries: • Sample number • Status • PV value • SV value • TV value • Timestamp	Elements in the general information section of the export file: • Filename • File content • Format version • Device type • Device tag • Device serial number • Device firmware version Elements of the individual measured value entries: • Sample number • Status • PV name • PV value • PV unit • SV name • SV value • SV unit • TV name • TV value • TV unit • Timestamp • Sensor serial number • Sample ID

Description of the individual elements of the export files	
Filename	Name of the export file, based on the date/time of the first logged entry. If the sensor, sensor type or unit settings are changed, a new export file is created.
File content	Contents of the export file: • Data logger always "Continous log" • Sample always "Grab sample logs"
Format version	Version of the format structure of the generated export file. The number increases if the structure changes with a new firmware.
Device type	Type of device used for logging. "Liquiline Mobile" in the case of CML18.
Device tag	Tag of the device used for logging.
Device serial number	Serial number of the device used for logging.
Device firmware version	Firmware version of the device used for logging.
Sample number	Unique entry number. This value is increased for each logged entry. It is reset if the entries are deleted.
Status	NAMUR device status when the entry is logged.
PV name	Name of the primary value.
PV value	Numerical display of the primary value of the logged entry.

Description of the individual elements of the export files	
PV unit	Unit of the primary value.
SV name	Name of the secondary value.
SV value	Numerical display of the secondary value of the logged entry.
SV unit	Unit of the secondary value.
TV name	Name of the tertiary value.
TV value	Numerical display of the tertiary value of the logged entry.
TV unit	Unit of the tertiary value.
Timestamp	Time and date stamp of the logged unit.
Sensor serial number	Serial number of the sensor used for logging.
Sample ID	User-defined text to identify the entry.

8.2   Adapting the measuring instrument to the process conditions

8.2.1   Configuring the sensor

Calling up the configuration dialog

Preliminaries

1. Enable Bluetooth. → 🗏 36
2. Link the device to a mobile device via the SmartBlue app. → 🗏 27

1. Select the device in the SmartBlue App.
2. Navigate to: **Main menu/Application/Sensor**
   ↳ Different menu items are available depending on the connected sensor.

Configuring the pH sensor

Damping

Path: **Main menu/Application/Sensor**

Function		Options	Info
Damping	pH damping	Enter value in the specified range Factory setting 0 s	The damping causes a floating average curve of the measured values over the time specified.
	Temperature damping	Enter value in the specified range Factory setting 0 s	

Advanced settings

Path: **Main menu/Application/Sensor/Advanced settings**

Function	Options	Info
Temp. compensation	Options • Off • Automatic • Manual Factory setting Automatic	• Off No temperature compensation takes place. • Automatic Temperature compensation takes place automatically via the sensor's temperature probe. • Manual Temperature compensation by entering the medium temperature manually.
Medium comp.	Options • Off • Two-point Factory setting Off	Take a sample of the medium and determine its pH value at different temperatures in the lab.
Offset	Enter value in the specified range Factory setting 0.00 pH	The offset compensates for a difference between a laboratory measurement and an online measurement which is caused by interference ions. Set the offset to 0 if using a compensation electrode.
Internal buffer	Enter value in the specified range Factory setting 7.00 pH	Only change when using a sensor with an internal buffer other than pH 7.

Calibration settings

Path: **Main menu/Application/Sensor/Advanced settings/Calibration settings**

Function		Options	Info
Stability criteria	Delta mV	Enter value in the specified range Factory setting 1 mV	Once the stability criterion has been reached, the app displays the measured value in mV.
	Duration	Enter value in the specified range Factory setting 20 s	

Function	Options	Info
Temp. compensation	Options • off • Automatic • Manual Factory setting Automatic	Configure compensation of buffer temperature: • Off No temperature compensation takes place. • Automatic Temperature compensation takes place automatically via the sensor's temperature probe. • Manual Temperature compensation by entering the medium temperature manually.
Buffer recognition	Options • Automatic • Fixed • Manual Factory setting Fixed	• Automatic The device recognizes the buffer automatically. The recognition depends on the setting in **Buffer manufacturer** • Fixed Choose values from a list. The list depends on the setting for **Buffer manufacturer** • Manual Enter pH values of the 2 buffers used. They must be different.
Buffer manufacturer	Options • E+H (NIST) • Ingold/Mettler • DIN 19266 • DIN 19267 • Merck/Riedel • Hamilton Factory setting E+H (NIST)	Select buffer manufacturer.
Calibration buffer 1	Options pH values depending on the buffer manufacturer selected	Select pH values of the buffers used. Temperature tables are stored for the buffers.

Function	Options	Info
Calibration buffer 2		
Calib. expiration time	Options • Off • During operation • When connecting Factory setting Off	This function checks the time elapsed since the last sensor calibration. This can be done continuously or once when reading the calibration data. • Off No calibration monitoring takes place. • During operation During continuous operation, this function provides information about an expired calibration interval. • When connecting During a batch process, this function ensures that only recently calibrated sensors are used. The device does not display an error message during the batch process.

Diagnostic settings

Path: **Main menu/Application/Sensor/Advanced settings/Diagnostic settings**

Function	Options	
Glass impedance	Upper limit	Options • On • Off Factory setting On
	Upper alarm limit	Enter value in the specified range Factory setting 3 000 MΩ
	Upper warning limit	Enter value in the specified range Factory setting 2 500 MΩ
	Lower limit	Options • On • Off Factory setting On
	Lower warning limit	Enter value in the specified range Factory setting 100 kΩ

Function		Options
	Lower alarm limit	Enter value in the specified range Factory setting 0 kΩ
Slope	Warning limit	Enter value in the specified range Factory setting 55 mV/pH
Zero point	Upper warning limit	Enter value in the specified range Factory setting 8 pH
	Lower warning limit	Enter value in the specified range Factory setting 6 pH
Sensor Condition Check		Options • On • Off Factory setting Off
Process monitoring	Function	Options • On • Off Factory setting Off
	Duration	Enter value in the specified range Factory setting 60 min
Operating hours limit values	Function	Options • On • Off Factory setting Off
	Operating time	Enter value in the specified range Factory setting 10 000 h
	Operating time > 80 ℃ (176 ℉)	Enter value in the specified range Factory setting 2 000 h
	Operating time > 100 ℃ (212 ℉)	Enter value in the specified range Factory setting 100 h
	Operating time < −300 mV	Enter value in the specified range Factory setting 1 000 h

Function		Options
	Operating time > 300 mV	Enter value in the specified range Factory setting 1 000 h
Delta slope	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 6 mV/pH
Delta zero point	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 0.5 pH
Sterilization	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 30

Format settings

Path: **Main menu/Application/Sensor/Advanced settings/Format settings**

pH format	Options • #.## • #.# Factory setting #.##	Configure the number of decimal places.
Temperature format	Options • #.# • #.## Factory setting #.#	

Configuring the ORP sensor

Damping

Path: **Main menu/Application/Sensor**

Function		Options	Info
Damping	Damping ORP	Enter value in the specified range Factory setting 0 s	The damping causes a floating average curve of the measured values over the time specified.
	Temperature damping	Enter value in the specified range Factory setting 0 s	

Calibration settings

Path: **Main menu/Application/Sensor/Advanced settings/Calibration settings**

Function		Options	Info
Stability criterion	Delta mV	Enter value in the specified range Factory setting 1 mV	Once the stability criterion has been reached, the app displays the measured value in mV.
	Duration	Enter value in the specified range Factory setting 20 s	
Reference buffer		Enter value in the specified range Factory setting 220 mV	
Calib. expiration time		Options • Off • During operation • When connecting Factory setting Off	This function checks the time elapsed since the last sensor calibration. This can be done continuously or once when reading the calibration data. • Off No calibration monitoring takes place. • During operation During continuous operation, this function provides information about an expired calibration interval. • When connecting During a batch process, this function ensures that only recently calibrated sensors are used. The device does not display an error message during the batch process.

Diagnostic settings

Path: **Main menu/Application/Sensor/Advanced settings/Diagnostic settings**

Function		Options
ORP/Redox measured value	Function	Options • On • Off Factory setting Off
	Upper alarm limit	Enter value in the specified range Factory setting 1000 mV
	Upper warning limit	Enter value in the specified range Factory setting 900 mV
	Lower warning limit	Enter value in the specified range Factory setting –900 mV
	Lower alarm limit	Enter value in the specified range Factory setting –1000 mV
Process monitoring	Function	Options • On • Off Factory setting Off
	Duration	Enter value in the specified range Factory setting 60 min
Operating hours limit values	Function	Options • On • Off Factory setting Off
	Operating time	Enter value in the specified range Factory setting 10000 h
	Operating time > 80 ℃ (176 ℉)	Enter value in the specified range Factory setting 2000 h
	Operating time > 100 ℃ (212 ℉)	Enter value in the specified range Factory setting 100 h

Function		Options
Sterilization	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 30

Format settings

Path: **Main menu/Application/Sensor/Advanced settings/Format settings**

Temperature format	Options ▪ #.# ▪ #.## Factory setting #.#	Configure the number of decimal places.

Configuring the conductivity sensor

Damping

Path: **Main menu/Application/Sensor**

Function		Options	Info
Damping	Conductivity damping	Enter value in the specified range Factory setting 0 s	The damping causes a floating average curve of the measured values over the time specified.
	Temperature damping	Enter value in the specified range Factory setting 0 s	

Advanced settings

Path: **Main menu/Application/Sensor/Advanced settings**

Function	Options	Info
Current cell constant	Enter value in the specified range	Value currently saved in the sensor
Compensation	Options • None • Linear • NaCl (IEC 746-3) • H_2O ISO7888 20 ℃ (68 ℉) • H_2O ISO7888 25 ℃ (77 ℉) • UPW (NaCl) • UPW (HCl) Factory setting Linear	Various methods are available to compensate for the temperature dependency.
Cond. ref. value	Enter value in the specified range	
Meas. ref. temp.	Enter value in the specified range	Reference temperature for calculating the temperature-compensated conductivity
Factor alpha	Enter value in the specified range	Enter the conductivity coefficient of the medium

Calibration settings

Path: **Main menu/Application/Sensor/Advanced settings/Calibration settings**

Function	Options	Info

Calib. expiration time	Options
	• Off
	• During operation
	• When connecting
	
	Factory setting
	Off
		This function checks the time elapsed since the last sensor calibration. This can be done continuously or once when reading the calibration data.
		
		• Off
		  No calibration monitoring takes place.
		• During operation
		  During continuous operation, this function provides information about an expired calibration interval.
		• When connecting
		  During a batch process, this function ensures that only recently calibrated sensors are used. The device does not display an error message during the batch process.

Diagnostic settings

Path: Main menu/Application/Sensor/Advanced settings/Diagnostic settings

Function		Options
Process monitoring	Function	Options • On • Off Factory setting Off
	Duration	Enter value in the specified range Factory setting 60 min
	Tolerance width	Enter value in the specified range Factory setting 10 %
Operating hours limit values	Function	Options • On • Off Factory setting Off
	Operating time	Enter value in the specified range Factory setting 60 000 h
	Operating time > 80 ℃ (176 ℉)	Enter value in the specified range Factory setting 40 000 h
	Operating time > 80 ℃ (176 ℉)> 100 nS/cm	Enter value in the specified range Factory setting 3 000 h
	Operating time > 120 ℃ (248 ℉)	Enter value in the specified range Factory setting 3 000 h
	Operating time > 140 ℃ (284 ℉)	Enter value in the specified range Factory setting 500 h
Sterilization	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 10 %

Function		Options
Polarization compensation	Function	Options • On • Off Factory setting Off
Pharmacy-water	Function	Options • Off • USP • EP Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 80 %

Format settings

Path: **Main menu/Application/Sensor/Advanced settings/Format settings**

Conductivity format	Options • Auto ▪ #.# ▪ #.## ▪ #.### Factory setting Auto	Configure the number of decimal places.
Resistivity format	Options • Auto ▪ #.# ▪ #.## ▪ #.### Factory setting Auto	
Temperature format	Options ▪ #.# ▪ #.## Factory setting #.#	

Configuring the oxygen sensor

Damping

Path: **Main menu/Application/Sensor**

Function		Options	Info
Damping	DO damping	Enter value in the specified range Factory setting 0 s	The damping causes a floating average curve of the measured values over the time specified.
	Temperature damping	Enter value in the specified range Factory setting 0 s	

Advanced settings

Path: **Main menu/Application/Sensor/Advanced settings**

Function	Options
Medium pressure	Options • Process pressure • Air pressure • Height Factory setting Air pressure
Air pressure	Enter value in the specified range Factory setting 1 013 hPa
Salinity	Enter value in the specified range Factory setting 0 g/kg

Calibration settings

Path: **Main menu/Application/Sensor/Advanced settings/Calibration settings**

Function		Options	Info
Stability criterion	Delta signal	Enter value in the specified range Factory setting 0.20 %	Once the stability criterion has been reached, the app displays the measured value.
	Delta temperature	Enter value in the specified range Factory setting 0.5 K (0.5 K)	
	Duration	Enter value in the specified range Factory setting 20 s	

Function	Options		Info

Ambient conditions	**Medium pressureMedium pressure**	Options
		• Process pressure
		• Air pressure
		• **Height**
		• As in measurement
		
		Factory setting
		Air pressure
			Specify the pressure at which calibration takes place
			• Process pressure
			  The pressure during calibration differs from the normal process pressure (calibration in the process)
			• Air pressure
			  Air pressure at which the calibration takes place (calibration in air)
			• Height
			  Altitude at which the calibration takes place (calibration in air)
			• As in measurement
			  Process conditions set in the Sensor menu correspond to the calibration conditions (calibration in the process)

	Air pressure	Enter value in the specified range Factory setting 1 013 hPa	
	Process pressure	Enter value in the specified range Factory setting 1 013 hPa	
	Height	Enter value in the specified range Factory setting 0 m (0 ft)	
	Rel. humidity	Enter value in the specified range Factory setting 100 %	

Function	Options	Info

Calib. expiration time	Options
	• Off
	• During operation
	• When connecting
	
	Factory setting
	Off
		This function checks the time elapsed since the last sensor calibration. This can be done continuously or once when reading the calibration data.
		
		• Off
		  No calibration monitoring takes place.
		• During operation
		  During continuous operation, this function provides information about an expired calibration interval.
		• When connecting
		  During a batch process, this function ensures that only recently calibrated sensors are used. The device does not display an error message during the batch process.

Ref.-Value	Options • Conc. (liquid) • Conc. (gaseous) • % saturation • Partial pressure Factory setting Conc. (liquid)	

Diagnostic settings

Path: Main menu/Application/Sensor/Advanced settings/Diagnostic settings

Function	Options	
Slope	Upper warning limit	Enter value in the specified range Factory setting 140 %
	Lower warning limit	Enter value in the specified range Factory setting 60 %
Zero point	Upper warning limit	Enter value in the specified range Factory setting 3 nA
	Lower warning limit	Enter value in the specified range Factory setting −3 nA

Function		Options
Process monitoring	Function	Options • On • Off Factory setting Off
	Duration	Enter value in the specified range Factory setting 60 min
	Tolerance width	Enter value in the specified range Factory setting 2 hPa
Operating hours limit values	Function	Options • On • Off Factory setting Off
	Operating time	Enter value in the specified range Factory setting 50 000 h
	Operating time > 40 ℃ (107 ℉)	Enter value in the specified range Factory setting 9 000 h
	Operating time > 80 ℃ (176 ℉)	Enter value in the specified range Factory setting 200 h
	Operating time < 15 nA	Enter value in the specified range Factory setting 1 000 h
	Operating time > 50 nA	Enter value in the specified range Factory setting 10 000 h
Delta slope	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 5 %

Function		Options
Delta zero point	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 1 nA
No. calibrations cap	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 6
No. sterilizations cap	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 25
Sterilization	Function	Options • On • Off Factory setting Off
	Warning limit	Enter value in the specified range Factory setting 25

Format settings

Path: **Main menu/Application/Sensor/Advanced settings/Format settings**

Format partial pressure	Options ■ #.# ■ #.## ■ #.### ■ # Factory setting #.##	Configure the number of decimal places.
Format saturation	Options ■ #.# ■ #.## ■ # Factory setting #.#	
Format conc. (Liq.)	Options ■ #.# ■ #.## ■ #.### ■ # Factory setting #.##	
Format conc. (Gas)	Options ■ #.# ■ #.## ■ #.### ■ # Factory setting #.##	
Format raw measured value nA	Options ■ #.# ■ #.## ■ #.### ■ # Factory setting #.##	
Temperature format	Options ■ #.# ■ #.## Factory setting #.#	

8.2.2 Calibration

Calibration settings

Configure calibration settings before calibrating the sensor. Calibration settings are configured via the SmartBlue app.

Configure the calibration settings in the SmartBlue app:

1. Enable Bluetooth. → 🖺 36

2. Link the device to a mobile device via the SmartBlue app. → 🖺 27

3. Select the device in the SmartBlue App.

4. Navigate to: **Main menu /Application/Sensor/Advanced settings/Calibration settings**

5. Configure the calibration settings. E.g. manufacturer and calibration buffer.

Performing calibration

The sensors are calibrated via the SmartBlue app or at the device.

Carrying out calibration via SmartBlue app:

The device is linked to a mobile device via the SmartBlue app.

Enable Bluetooth. → 🖺 36

→ 🖺 27

1. Select the device in the SmartBlue App.

2. Navigate to: **Main menu/Guidance/Calibration/<Measurement parameter>/<desired calibration>**

3. Navigate through the calibration via the SmartBlue app.

Perform calibration on the device:

1. Navigate to: **Main menu/Guidance**

2. Select the desired calibration.

3. Press ⊙ to navigate through the calibration.

Calibrating the pH sensor

The following calibrations can be performed:
- One-point calibration (via SmartBlue app)
- Two-point calibration (at the device or via SmartBlue app)
- Calibration by sampling (via SmartBlue app)

One-point calibration

Start calibration	▶ Immerse the sensor in the reference solution and wait for a stable measured value.
Numeric input	▶ Enter the pH value of the reference solution under **Ref.-Value**.
Finish calibration	Adopt calibration data.

Two-point calibration

Start calibration	
Buffer 1	Buffer was specified under 'Calibration settings'.
Measurement	▶ Immerse the sensor and wait for a stable measured value.
Buffer 2	Buffer was specified under 'Calibration settings'.
Measurement	▶ Immerse the sensor and wait for a stable measured value.
Result	Calibration data are displayed.
Finish calibration	Adopt calibration data.

Calibration via sampling

Start calibration	
Grab sample	Take a sample of the medium and analyze it in the laboratory. The laboratory measured value is the reference value for the calibration.
Sample measurement	Immerse the sensor in the sample and wait for a stable measured value.
Reference	Enter the laboratory measured value as the reference value.
Calibration result	Displayed values: • Current measured value • Ref.-Value • Difference
Finish calibration	Adopt calibration data.

Calibrating the ORP sensor

The following calibration can be performed:
One-point calibration (at the device or via SmartBlue app)

One-point calibration

Start calibration	▶ Immerse the sensor in the reference solution and wait for a stable measured value.
Buffer 1	Enter reference buffer.
Measurement	Immerse the sensor in the buffer and wait for a stable measured value.
Result	Displayed values • Reference buffer • Measured value • Offset
Finish calibration	Adopt calibration data

Calibrating the conductivity sensor

The following calibration can be performed:
Cell constant (at the device or via SmartBlue app)

Cell constant calibration

Start calibration	
Reference value	Enter reference value.
Measurement	Immerse the sensor and wait for a stable measured value.
Result	Displayed values • Current cell constant • New cell constant
Save calibration	Adopt calibration data.
Finish calibration	Return to measuring mode.

Calibrating the oxygen sensor

The following calibrations can be performed:
• Slope
  • **Air 100% rh** (air, water vapor-saturated)
    (at the device or via Smartblue app)
  • **H2O air-saturated** (air-saturated water)
    (via SmartBlue app)
  • **Air variable** (at the device or via Smartblue app)
  • **Grab sample** (via Smartblue app)
• Zero point
  • **1 point calib.** (One-point calibration in nitrogen or zero-point gel COY8)
    (at the device or via Smartblue app)
  • **Grab sample** (via Smartblue app)
• Electrolyte (via Smartblue app)
• Cap replacement (via Smartblue app)

Calibration **Slope/Air 100% rh/H2O air-saturated/Air variable**

Start calibration	
Measurement	Immerse the sensor in the medium/air and wait for a stable measured value.
Result	Displayed values • Current slope • New slope
Finish calibration	Save the calibration data to the sensor and return to measuring mode.

Calibration **Slope/Grab sample**

Start calibration	Take a sample of the medium and analyze it in the laboratory. The laboratory measured value is the reference value for the calibration.
Measurement	Immerse the sensor in the sample and wait for a stable measured value.
Laboratory value	Enter the laboratory measured value as the reference value.
Result	Displayed values: • Current slope • New slope
Finish calibration	Accept calibration data and return to measuring mode.

Calibration **Zero point/1 point calib.**

Start calibration	
Measurement	Immerse the sensor and wait for a stable measured value.
Result	Displayed values • Current zero point • New zero point
Save calibration data	Save the calibration data to the sensor.
Finish calibration	Return to measuring mode.

Calibration **Zero point/Grab sample**

Start calibration	Take a sample of the medium and analyze it in the laboratory. The laboratory measured value is the reference value for the calibration.
Measurement	Immerse the sensor in the sample and wait for a stable measured value.
Laboratory value	Enter the laboratory measured value as the reference value.
Result	Displayed values: • Current slope • New slope
Finish calibration	Accept calibration data and return to measuring mode.

Calibration cap replacement

Start calibration	
Replacement	Replace cap.
Finish calibration	Save the calibration data to the sensor and return to measuring mode.

8.3 Displaying the measured value history

8.3.1 Saving measured values automatically (Data logger)

Configure the data logger → 🖺 40.

8.3.2 Displaying saved measured values

▸ Navigate to: **Main menu/Diagnostics/Log entries**

This menu displays the number of saved entries for the different log procedures.

8.3.3 Deleting saved measured values

▸ Navigate to: **Main menu/Application/Data logger/Erase data**

The data are divided into 2 categories:
- Erase continuous logs
  Selects all data logger entries for deletion.
- Erase grab values
  Selects all grab values (samples) for deletion.

NOTICE

Deletion of data!

Once data are deleted, they cannot be restored. The deletion of data must be confirmed.

▸ Save data before deletion.

1. Press ⊞ to navigate to the desired category.

2. Press ◎ to select the category to be deleted.

3. Press ⊞ to select **Erase** or **Abort**.

4. Press ◎ to select **Erase** or **Abort**.

9 Firmware update

The firmware of the device can be updated via the SmartBlue app.

ℹ️ All stored data logger entries must be exported before each firmware update.

A firmware update can take up to one hour depending on the mobile device.

There must be sufficient battery charge; if necessary, connect the device to the mains. → 🖺 32

The device is prevented from switching off automatically if is connected to the SmartBlue app.

> **NOTICE**
>
> **Damage to firmware!**
> Risk of incomplete update and limited functionality of the device.
> ▶ During a firmware update, do not switch off the device manually or disconnect it from the mobile device.

🛈 A video tutorial on how to update the firmware is available on Endress+Hauser's YouTube channel via the following link or QR code: Firmwareupdate CML18

A0045926

🖭 *14   Scan the QR code to access the instruction video*

Preliminaries

1. Download the firmware update package and save to the terminal. The current firmware update package can be found in the Downloads area on the product page at www.endress.com/CML18.

2. Unpack the ZIP archive. Depending on the operating system of the mobile device, a separate app is required.

3. Enable Bluetooth. → 🖺 36

4. Link the device to a mobile device via the SmartBlue app. → 🖺 27

Start firmware update

1. Select the device in the SmartBlue App.

2. Select ☰ in the SmartBlue app.

3. Select **System**.

4. Select **Firmware update**.

5. Search for the available firmware update package on the terminal and select it. If the update is not displayed, open the firmware update file once using the SmartBlue app.
   ↳

6. Start the update.

7.   After updating the firmware successfully, update the time and date. → 🖹 36

ℹ️ Following a firmware update, Bluetooth functionality is restarted in the background. This process may take some time. All other functions of the device can be used immediately.

10   Diagnostics and troubleshooting

10.1   Diagnostic information via light emitting diodes

The status LED is used for the quick visualization of the sensor status.

LED indicators	Status
Solid green	Sensor working correctly
Solid red	No sensor connected
Flashing green (while the device is switched off)	Battery charging
Flashes red	Sensor error

10.2   Diagnostics information via the local display

10.2.1   Accessing sensor information

1. Navigate to: **Main menu**/**Diagnostics**/**Sensor info**
2. Press ⊙ to access the sensor information.

10.2.2   Accessing calibration information

1. Navigate to: **Main menu**/**Diagnostics**/**Calibration info**
2. Press ⊙ to access the calibration information.

10.2.3   Opening the diagnostics list

1. Navigate to: **Main menu**/**Diagnostics**/**Diagnostics list**
2. Press ⊙ to open the diagnostics list.

10.2.4   Test display

1. Navigate to: **Main menu**/**Diagnostics**/**Display test**
2. Press ⊙ to invoke the screen test.
3. Press ⊙ to scroll through the test windows and check the display screen for damage.

11   Maintenance

11.1   Maintenance work

11.1.1   Cleaning

▶ Only clean with a damp cloth and commercially available cleaning agents.

The device is resistant to:
• Ethanol (for a short time)
• Soap-based household cleaning agents
• Dishwashing detergent

NOTICE

Cleaning agents not permitted
Damage to the housing surface or housing seal
▶ Do not use concentrated mineral acids or alkaline solutions for cleaning.
▶ Do not use organic cleaners such as acetone, benzyl alcohol, methanol, methylene chloride, xylene or concentrated glycerol cleaner for cleaning.
▶ Do not use high-pressure steam for cleaning.

11.2   Measuring and test equipment

Calibrated and adjusted sensors with Memosens technology save their calibration data directly in the sensor.

The sensors can be used as testing equipment thanks to this functionality.

The device can be used to display the measured values of such test equipment. Each connected sensor uses its own calibration data.

A sensor can be calibrated, recalibrated and adjusted in suitable test media at the device.

12   Repair

12.1   Return

The product must be returned if repairs or a factory calibration are required, or if the wrong product was ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium.

To ensure the swift, safe and professional return of the device:

▶ Check the website www.endress.com/support/return-material for information on the procedure and general conditions.

12.2   Disposal

The device contains electronic components. The product must be disposed of as electronic waste.

▶ Observe the local regulations.

If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

The battery cannot be replaced or removed by the end customer.

The battery may only be changed by the manufacturer or by the service organization.

13   Accessories

The latest list of accessories and all compatible Memosens sensors are provided on the product page:

www.endress.com/CML18

13.1   Device-specific accessories

13.1.1   Sensors

Laboratory sensors

pH sensors

Memosens CPL51E
- pH sensor for laboratory measurements and random sampling in the field
- Digital with Memosens 2.0 technology
- Robust pH sensor with plastic shaft
- Product Configurator on the product page: www.endress.com/cpl51e

📖 Technical Information TI01672C

Memosens CPL53E
- pH sensor for laboratory measurements and random sampling
- Digital with Memosens 2.0 technology
- Versatile pH sensor with very fast response time
- Product Configurator on the product page: www.endress.com/cpl53e

📖 Technical Information TI01676C

Memosens CPL57E
- pH sensor for laboratory measurements and random sampling
- Digital with Memosens 2.0 technology
- pH sensor for pure and ultrapure water
- Product Configurator on the product page: www.endress.com/cpl57e

📖 Technical Information TI01675C

Memosens CPL59E
- pH sensor for laboratory measurements and random sampling in the field
- Digital with Memosens 2.0 technology
- Robust pH sensor with PTFE junction and ion trap
- Product Configurator on the product page: www.endress.com/cpl59e

📖 Technical Information TI01674C

Conductivity sensors

Memosens CLL47E
- Contacting conductivity sensor for laboratory measurements and random sampling in the field
- Digital with Memosens 2.0 technology
- 4-electrode sensor with large measuring range
- Product Configurator on the product page: www.endress.com/cll47e

📖 Technical Information TI01529C

Oxygen sensors

Memosens COL37E
- Agile, optical oxygen sensor for laboratory measurements and random sampling in the field
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/col37e

Technical Information TI01678C

Process sensors

The device supports process sensors with product names ending in "E" in compatibility mode. This means that the functional scope of the previous product is available. The product name of each of the previous products ends in "D", otherwise they are identical.

pH glass electrodes

Memosens CPS11E
- pH sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps11e

Technical Information TI01493C

Memosens CPS31E
- pH sensor for standard applications in drinking water and swimming pool water
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps31e

Technical Information TI01574C

Memosens CPS41E
- pH sensor for process technology
- With ceramic junction and KCl liquid electrolyte
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps41e

Technical Information TI01495C

Memosens CPS61E
- pH sensor for bioreactors in life sciences and for the food industry
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps61e

Technical Information TI01566C

Memosens CPS71E
- pH sensor for chemical process applications
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps71e

Technical Information TI01496C

Memosens CPS171D
- pH electrode for bio-fermenters with digital Memosens technology
- Product Configurator on the product page: www.endress.com/cps171d

Technical Information TI01254C

Memosens CPS91E
- pH sensor for heavily polluted media
- With open aperture
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps91e

Technical Information TI01497C

Memosens CPF81E
- pH sensor for mining operations, industrial water and wastewater treatment
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cpf81e

Technical Information TI01594C

Enamel pH electrodes

Ceramax CPS341D
- pH electrode with pH-sensitive enamel
- Meets highest demands of measuring accuracy, pressure, temperature, sterility and durability
- Product Configurator on the product page: www.endress.com/cps341d

Technical Information TI00468C

ORP sensors

Memosens CPS12E
- ORP sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps12e

Technical Information TI01494C

Memosens CPS42E
- ORP sensor for process technology
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps42e

Technical Information TI01575C

Memosens CPS72E
- ORP sensor for chemical process applications
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps72e

Technical Information TI01576C

Memosens CPS92E
- ORP sensor for use in heavily polluted media
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps92e

Technical Information TI01577C

Memosens CPF82E
- ORP sensor for mining operations, industrial water and wastewater treatment
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cpf82e

Technical Information TI01595C

Memosens CPS92E
- ORP sensor for use in heavily polluted media
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps92e

Technical Information TI01577C

pH ISFET sensors

Memosens CPS47E
- ISFET sensor for pH measurement
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps47e

Technical Information TI01616C

Memosens CPS77E
- Sterilizable and autoclavable ISFET sensor for pH measurement
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps77e

Technical Information TI01396

Memosens CPS97E
- ISFET sensor for pH measurement
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps97e

📖 Technical Information TI01618C

Combined pH/ORP sensors

Memosens CPS16E
- pH/ORP sensor for standard applications in process technology and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps16e

📖 Technical Information TI01600C

Memosens CPS76E
- pH/ORP sensor for process technology
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps76e

📖 Technical Information TI01601C

Memosens CPS96E
- pH/ORP sensor for heavily polluted media and suspended solids
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps96e

📖 Technical Information TI01602C

Conductivity sensors with conductive measurement of conductivity

Memosens CLS15E
- Digital conductivity sensor for measurements in pure and ultrapure water
- Conductive measurement
- With Memosens 2.0
- Product Configurator on the product page: www.endress.com/cls15e

📖 Technical Information TI01526C

Memosens CLS16E
- Digital conductivity sensor for measurements in pure and ultrapure water
- Conductive measurement
- With Memosens 2.0
- Product Configurator on the product page: www.endress.com/cls16e

📖 Technical Information TI01527C

Memosens CLS21E
- Digital conductivity sensor for media with medium or high conductivity
- Conductive measurement
- With Memosens 2.0
- Product Configurator on the product page: www.endress.com/cls21e

Technical Information TI01528C

Indumax H CLS54D
- Inductive conductivity sensor
- With certified, hygienic design for foodstuffs, beverages, pharmaceuticals and biotechnology
- Product Configurator on the product page: www.endress.com/cls54d

Technical Information TI00508C

Memosens CLS82E
- Hygienic conductivity sensor
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cls82e

Technical Information TI01529C

Oxygen sensors

Memosens COS22E
- Hygienic amperometric oxygen sensor with maximum measurement stability over multiple sterilization cycles
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cos22e

Technical Information TI01619C

Memosens COS51E
- Amperometric oxygen sensor for water, wastewater and utilities
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cos51e

Technical Information TI01620C

Memosens COS81D
- Sterilizable, optical sensor for dissolved oxygen
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cos81d

Technical Information TI01201C

Memosens COS81E
- Hygienic optical oxygen sensor with maximum measurement stability over multiple sterilization cycles
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cos81e

Technical Information TI01558C

13.1.2   Protective cover

Order code: 71530939
- Comprehensive protection
- Extremely robust
- Tabs and eyelets provide a range of securing options
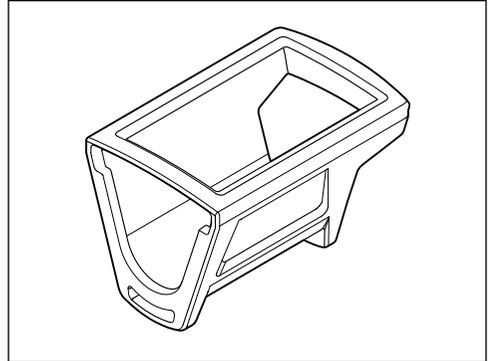
A0047710

Examples of securing options
Eyelet to secure a lanyard, for hanging or attaching to hooks or guard rails.
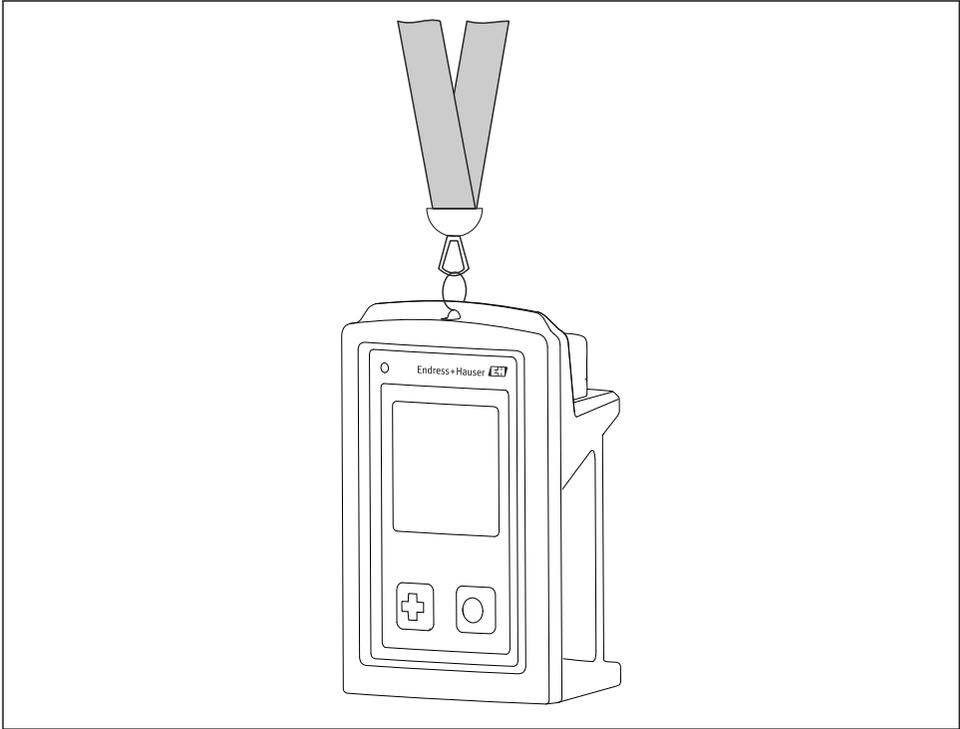
A0051068

Examples of securing options
Tabs for securing with Velcro tape, e.g. for wearing on the wrist or belt, or securing to guard
rails
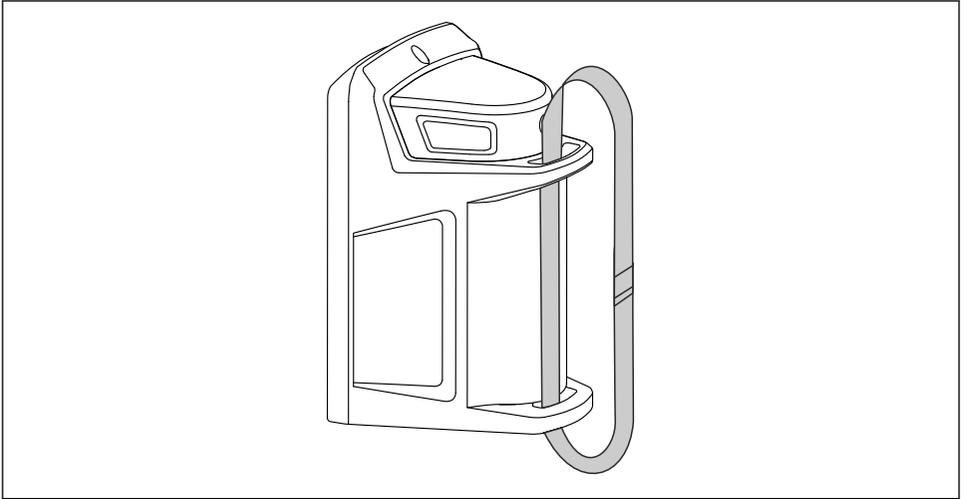
A0051069

13.1.3   Case

Order code: 71631792
Provides space for
• CML18 with protective cover
• 4 Memosens sensors
• Additional accessories, e.g. Reference buffer solutions or calibration buffer
• Measuring cable and data and charging cable

A0055606

13.1.4   CML18 Kit 5 pH

Order code: 71631651
Contains
• Case
• Liquiline Mobile CML18 with protective cover
• pH sensor CPL51E
• Measuring cable CYK12, M12 to Memosens
• Data and charging cable M12 to USB
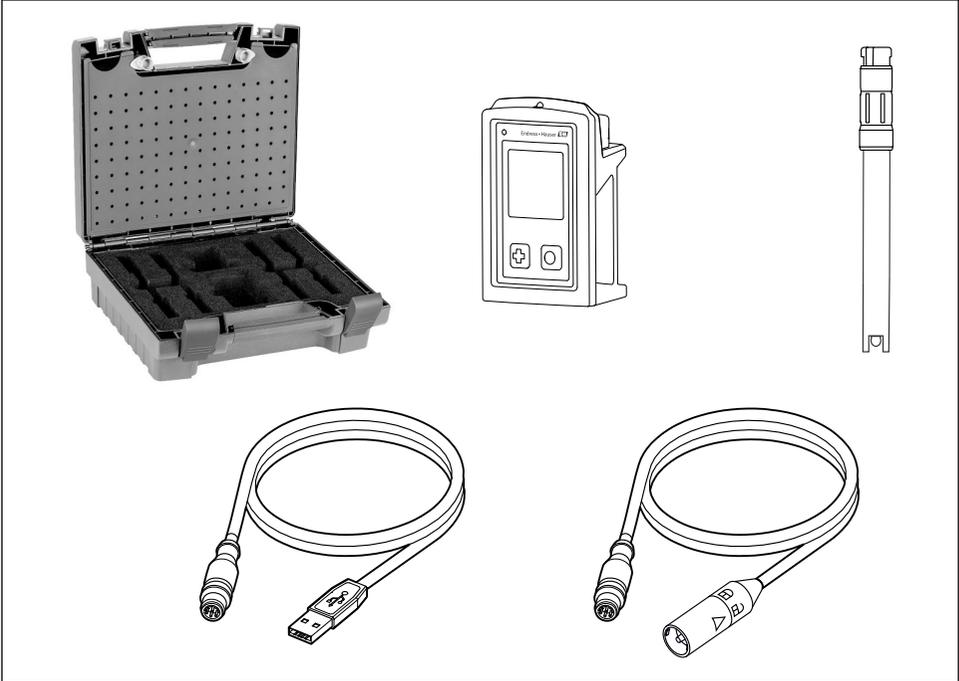
A0055946

13.2   Communication-specific accessories

13.2.1   M12 USB data + charging cable

Order code: 71496600
- Charging via cable
- Data backup
- Live data transfer
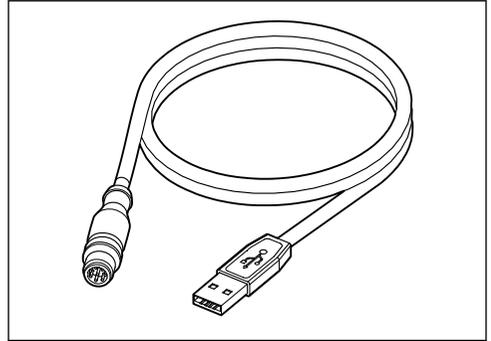
A0047709

14   Technical data

14.1   Input

14.1.1   Input power

Wireless charging	5 W
M12 connection	5 V; 0.6 A

14.1.2   Measured variables

- pH
- ORP
- pH/ORP
- Oxygen
- Conductivity
- Temperature

14.1.3   Measuring range

→ Documentation of the connected sensor

14.1.4   Type of input

Memosens connection for sensors with Memosens technology

M12 connection for digital measuring cable CYK10, CYK20 for sensors with Memosens technology

A complete list of supported sensors is provided on the device product page:

www.endress.com/CML18 -> Documents/Manuals/Software -> Certificates …

Supported sensors from the lab portfolio include:
- CPL51E, CPL53E, CPL57E, CPL59E
- CLL47E
- COL37E

Supported sensors from the process portfolio include:
- CPS11D, CPS12D, CPS16D, CPS31D, CPS41D, CPS42D, CPS47D, CPS71D, CPS72D, CPS76D, CPS77D, CPS91D, CPS92D, CPS96D, CPS97D
- CPS171D, CPS341D, CPS441D, CPS471D, CPS491D
- CPF81D, CPF82D
- CLS15D, CLS16D, CLS21D, CLS82D
- CLS50D, CLS54D
- COS21D, COS22D, COS51D, COS81D

14.2   Output

14.2.1   Output signal

Memosens M12 (maximum 80 mA)

14.3 Power supply

14.3.1 Supply voltage
Inductive charging: use Qi-certified devices (min. 5 W output power)

The power supply unit must supply an output current of at least 1500 mA.

14.3.2 Battery rated capacity
1000 mAh (min. 950 mAh)

14.3.3 Battery life
Max. 48 h (with adapted energy settings)

14.3.4 Overvoltage protection
IEC 61 000-4-4 with 0.6 kV

IEC 61 000-4-5 with 2.0 kV

14.3.5 Sensor connection
Sensors with Memosens technology

14.3.6 Cable specification
Digital measuring cable CYK10-Axx2+x

Digital measuring cable CYK20-AAxxC1

M12 USB data + charging cable

14.4 Environment

14.4.1 Ambient temperature range
Charging: 0 to +45 ℃ (32 to 113 ℉)

Operation: −10 to +60 ℃ (14 to 140 ℉)

The maximum ambient temperature depends on the process temperature and the installation position.

14.4.2 Storage temperature
−20 to +45 ℃ (−4 to 113 ℉)

Elevated storage temperatures reduce the battery capacity.

14.4.3 Relative humidity
0 to 95 %

14.4.4 Degree of protection
IP66

14.4.5   Electrical safety

EN 61010-1

14.4.6   Pollution degree

Complete device:	Pollution level 4
Internal:	Pollution level 2

14.5   Mechanical construction

14.5.1   Dimensions
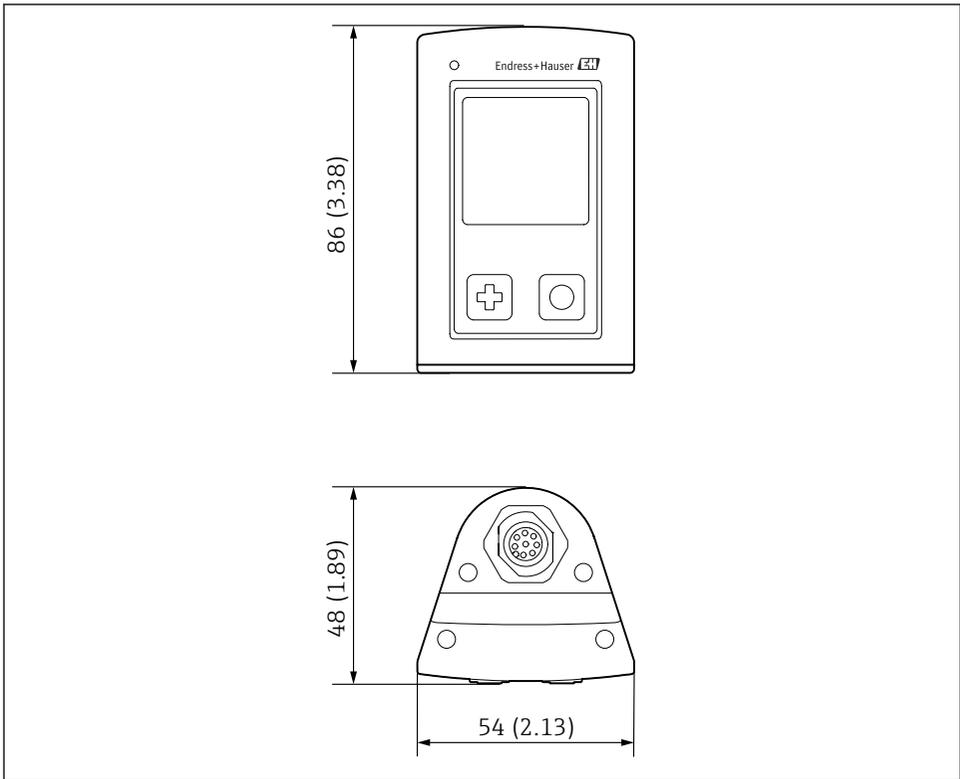
🖼 *15   Dimensions: mm (in)*

14.5.2   Materials

Components	Material
Housing	PBT
Display window, light guide	PMMA
Buttons, cap	TPE
M12 connection	CuZn, nickel-plated

14.5.3   Materials not in contact with the medium

Information according to REACH Regulation (EC) 1907/2006 Art. 33/1:

The device battery contains the SVHC 1.3 propane sulton ; ethylene glycol dimethyl ether (CAS number [1] 110-71-4) with more than 0.1% (w/w). The product does not present a hazard if it is used as designated.

14.5.4   Impact loads

The product is designed for mechanical impact loads of 1 J (IK06) as per the requirements of EN 61010-1.

14.5.5   Weight

Liquiline Mobile CML18	155 g (5.5 oz)

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1)   CAS = Chemical Abstracts Service, international identification standard for chemical substances

Index

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www.addresses.endress.com

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People for Process Automation